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Application manual

Powering Business Worldwide

Supports Firmware Version
Bundle: DG1-V0034-ETN

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Safety

WARNING!
DANGEROUS ELECTRICAL VOLTAGE!

Before commencing the installation

- Disconnect the power supply of the device
- Ensure that devices cannot be accidentally restarted
- Verify isolation from the supply
- Earth and short circuit the device
- Cover or enclose any adjacent live components
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system
- Before installation and before touching the device ensure that you are free of electrostatic charge
- The functional earth (FE, PES) must be connected to the protective earth (PE) or the potential equalization. The system installer is responsible for implementing this connection
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automation functions
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation
- Suitable safety hardware and software measures should be implemented for the I/O interface so that an open circuit on the signal side does not result in undefined states in the automation devices
- Ensure a reliable electrical isolation of the extra-low voltage of the 24 V supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD384.4.41 S2
- Deviations of the input voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause a restart
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed and with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented
- Wherever faults in the automation system may cause injury or material damage, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks, and so on)
- Depending on their degree of protection, adjustable frequency drives may contain live bright metal parts, moving or rotating components, or hot surfaces during and immediately after operation
- Removal of the required covers, improper installation, or incorrect operation of motor or adjustable frequency drive may cause the failure of the device and may lead to serious injury or damage
- The applicable national accident prevention and safety regulations apply to all work carried out on live adjustable frequency drives
- The electrical installation must be carried out in accordance with the relevant regulations (for example, with regard to cable cross sections, fuses, PE)
- Transport, installation, commissioning, and maintenance work must be carried out only by qualified personnel (IEC 60364, HD 384 and national occupational safety regulations)
- Installations containing adjustable frequency drives must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the adjustable frequency drives using the operating software are permitted
- All covers and doors must be kept closed during operation
- To reduce hazards for people or equipment, the user must include in the machine design measures that restrict the consequences of a malfunction or failure of the drive (increased motor speed or sudden standstill of motor). These measures include:
  - Other independent devices for monitoring safety-related variables (speed, travel, end positions, and so on)
  - Electrical or non-electrical system-wide measures (electrical or mechanical interlocks)
  - Never touch live parts or cable connections of the adjustable frequency drive after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be live after disconnection. Fit appropriate warning signs

Definitions and symbols

WARNING

This symbol indicates high voltage. It calls your attention to items or operations that could be dangerous to you and other persons operating this equipment. Read the message and follow the instructions carefully. This symbol is the "Safety Alert Symbol". It occurs with either of two signal words: CAUTION or WARNING, as described below.

WARNING

Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, can result in minor to moderate injury, or serious damage to the product. The situation described in the CAUTION may, if not avoided, lead to serious results. Important safety measures are described in CAUTION (as well as WARNING).

Hazardous high voltage

WARNING

Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and electronic controllers, there may be exposed components with housings or protrusions at or above line potential. Extreme care should be taken to protect against shock.

Stand on an insulating pad and make it a habit to use only one hand when checking components. Always work with another person in case an emergency occurs. Disconnect power before checking controllers or performing maintenance. Be sure equipment is properly grounded. Wear safety glasses whenever working on electronic controllers or rotating machinery.

Warnings and cautions

This manual contains clearly marked cautions and warnings which are intended for your personal safety and to avoid any unintentional damage to the product or connected appliances. Please read the information included in cautions and warnings carefully.

WARNING

The relay outputs and other I/O-terminals may have a dangerous control voltage present even when PowerXL DG1 is disconnected from mains.

WARNING

Be sure not to plug the Ethernet IP cable to the terminal under the keypad! This might harm your personal computer.

WARNING

Be sure not to plug the Modbus TCP cable to the terminal under the keypad! This might harm your personal computer.

CAUTION

Remove external control signal before resetting the fault to prevent unintentional restart of the drive.

Important safety information

Hazardous high voltage

WARNING

The components of the power unit of PowerXL Series are live when the AC drive is connected to mains potential. Coming into contact with this voltage is extremely dangerous and may cause death or severe injury.

WARNING

The motor terminals U, V, W and the brake resistor terminals are live when PowerXL Series is connected to mains, even if the motor is not running.

WARNING

After disconnecting the AC drive from the mains, wait until the indicators on the keypad go out (if no keypad is attached see the indicators on the cover). Wait 5 more minutes before doing any work on the connections of PowerXL Series. Do not open the cover before this time has expired. After expiration of this time, use a measuring equipment to absolutely ensure that no voltage is present. Always ensure absence of voltage before starting any electrical work!

WARNING

The control I/O-terminals are isolated from the mains potential. However, the relay outputs and other I/O-terminals may have a dangerous control voltage present even when PowerXL DG1 is disconnected from mains.

WARNING

Before connecting the AC drive to mains, confirm that the front and cable covers of PowerXL DG1 are closed.

WARNING

During a ramp stop (see the Application Manual), the motor is still generating voltage to the drive. Therefore, do not touch the components of the AC drive before the motor has completely stopped. Wait until the indicators on the keypad go out (if no keypad is attached see the indicators on the cover). Wait additional 5 minutes before starting any work on the drive.

Important warnings

WARNING

PowerXL Series AC drive is meant for fixed installations only.

WARNING

Do not perform any measurements when the AC drive is connected to the mains.

WARNING

The ground leakage current of PowerXL Series AC drives exceeds 3.5 mA AC. According to standard EN61800-5-1, a reinforced protective ground connection must be ensured.

WARNING

If the AC drive is used as a part of a machine, the machine manufacturer is responsible for providing the machine with a supply disconnecting device (EN 60204-1).

WARNING

Only spare parts delivered by Eaton can be used.

WARNING

At power-up, power brake or fault reset the motor will start immediately if the start signal is active, unless the pulse control for Start/Stop logic has been selected. Furthermore, the I/O functionalistic (including start inputs) may change if parameters, applications or software are changed. Disconnect, therefore, the motor if an unexpected start can cause danger.

WARNING

The motor starts automatically after automatic fault reset if the auto restart function is activated. See the Application Manual for more detailed information.

WARNING

Prior to measurements on the motor or the motor cable, disconnect the motor cable from the AC drive.

WARNING

Do not touch the components on the circuit boards. Static voltage discharge may damage the components.

WARNING

Check that the EMC level of the AC drive corresponds to the requirements of your supply network.

Additional cautions

CAUTION

The PowerXL DG1 AC drive must always be grounded with an grounding conductor connected to the grounding terminal marked with. The ground leakage current of PowerXL DG1 exceeds 3.5 mA AC. According to EN61800-5-1, one or more of the following conditions for the associated protective circuit shall be satisfied:

a) The protective conductor shall have a cross-sectional area of at least 10 mm^2 Cu or 16 mm^2 Al, through its total run

b) Where the protective conductor has a cross-sectional area of less than 10 mm^2 Cu or 16 mm^2 Al, a second protective conductor of at least the same cross-sectional area shall be provided up to a point where the protective conductor has a cross-sectional area not less than 10 mm^2 Cu or 16 mm^2 Al

c) Automatic disconnection of the supply in case of loss of continuity of the protective conductor. The cross-sectional area of every protective grounding conductor that does not form part of the supply cable or cable enclosure shall, in any case, be not less than:

- 2.5mm^2 if mechanical protection is provided or
- 4 mm^2 if mechanical protection is not provided.

The ground fault protection inside the AC drive protects only the drive itself against ground faults in the motor or the motor cable. It is not intended for personal safety. The ground fault protection inside the AC drive protects only the drive itself against ground faults in the motor or the motor cable. It is not intended for personal safety. Due to the high capacitive currents present in the AC drive, fault current protective switches may not function properly.

Do not perform any voltage withstand tests on any part of PowerXL Series. There is a certain procedure according to which the tests shall be performed. Ignoring this procedure may result in damaged product.

Sécurité

AVERTISSEMENT !
TENSION ÉLECTRIQUE DANGEREUSE !

Avant de commencer l'installation

- Débrancher l'alimentation de l'appareil
- S'assurer que les dispositifs ne peuvent pas être accidentellement redémarrés
- Vérifier l'isolement de l'alimentation
- Mettre l'appareil à la terre et le protéger contre les courts-circuits
- Couvrir ou enfermer tout composant sous tension adjacent
- Seul le personnel qualifié conformément à la norme EN 50110-1/-2 (VDE 0105 Partie 100) peut travailler sur cet appareil/ce système
- Avant l'installation et avant de toucher l'appareil, s'assurer de ne porter aucune charge électrostatique
- La terre fonctionnelle (FE, PSE) doit être raccordée à la terre de protection (PE) ou la compensation de potentiel. L'installateur du système a la responsabilité d'assurer cette connexion
- Les câbles de connexion et les lignes de signal doivent être installés de façon à ce que les interférences capacitives ou inductives ne compromettent pas les fonctions d'automatisation
- Installer les appareils d'automatisation et les éléments de fonctionnement associés de manière à ce qu'ils soient bien protégés contre tout fonctionnement accidentel
- Des dispositifs de sécurité matériels et logiciels appropriés doivent être utilisés en rapport avec l'interface des E/S afin qu'un circuit ouvert sur le côté signal ne résulte pas en états indéfinis dans les dispositifs d'automatisation
- Assurer une isolation électrique fiable sur le côté tension extra basse de l'alimentation 24 V. Utiliser uniquement des blocs d'alimentation conformes à la norme CEI 60364-4-41 (VDE 0100, partie 410) ou HD384.4.41 S2
- Les écarts entre la tension d'entrée et la tension nominale ne doivent pas dépasser les limites de tolérance indiquées dans les spécifications, au risque de provoquer un mauvais fonctionnement et une utilisation dangereuse du système
- Les dispositifs d'arrêt d'urgence conformes à la norme CEI/EN 60204-1 doivent être efficace dans tous les modes de fonctionnement des dispositifs d'automatisation. Le déverrouillage des dispositifs d'arrêt d'urgence ne doit pas entraîner un redémarrage
- Les dispositifs conçus pour un montage dans des boîtiers ou armoires de commande ne doivent être utilisés et contrôlés qu'après avoir été installés et avec le boîtier fermé. Les unités de bureau ou portatives ne doivent être utilisées et contrôlées que dans leurs boîtiers fermés
- Des mesures doivent être prises pour assurer un bon redémarrage des programmes interrompus après une chute ou une panne de tension. Ceci ne doit pas causer des états de fonctionnement dangereux, même pour un court laps de temps. Si nécessaire, des dispositifs d'arrêt d'urgence doivent être utilisés
- Quand des défaillances du système d'automatisation peuvent entraîner des blessures ou des dommages matériels, des mesures externes doivent être appliquées pour assurer un état de fonctionnement sans danger en cas de panne ou de mauvais fonctionnement (par exemple au moyen de disjoncteurs séparés, de verrouillages mécaniques, etc.)
- En fonction de leur degré de protection, les entraînements à fréquence variable peuvent contenir des pièces métalliques sous tension, des composants rotatifs ou en mouvement et des surfaces brûlantes, pendant le fonctionnement et immédiatement après l'arrêt
- Le retrait des protections requises, une installation incorrecte ou un mauvais fonctionnement du moteur ou de l'entraînement à fréquence variable peuvent causer la défaillance de l'appareil et entraîner des blessures graves et des dommages importants
- La réglementation nationale applicable en matière de sécurité et de prévention des accidents s'applique à tous les travaux effectués sur les entraînements à fréquence variable sous tension
- L'installation électrique doit être effectuée conformément aux réglementations applicables (par exemple, en ce qui concerne les sections transversales des câbles, les fusibles, la mise à la terre de protection)
- Le transport, l'installation, la mise en service et les travaux de maintenance doivent être effectués uniquement par un personnel qualifié (IEC 60364, HD 384 et règles de sécurité du travail)
- Les installations contenant des entraînements à fréquence variable doivent être équipées de dispositifs de surveillance et de protection, conformément aux réglementations applicables en matière de sécurité. Les modifications des entraînements à fréquence variable réalisées à l'aide du logiciel d'exploitation sont autorisées
- Toutes les protections et les portes doivent être maintenues fermées pendant le fonctionnement

- Pour réduire les risques d'accidents et de dommages matériels, l'utilisateur doit inclure dans la conception de la machine des mesures limitant les conséquences de panne ou de mauvais fonctionnement de l'entraînement (augmentation de la vitesse ou arrêt soudain du moteur). Ces mesures comprennent :
  - Autres dispositifs indépendants de surveillance des variables en rapport avec la sécurité (vitesse, voyages, positions d'extrémité, etc.)
  - Mesures électriques ou non électriques appliquées à l'ensemble du système (verrouillages électriques ou mécaniques)
  - Ne jamais toucher les pièces sous tension ni les connexions des câbles de l'entraînement à fréquence variable après leur déconnexion de l'alimentation. En raison de la charge dans les condensateurs, ces pièces peuvent être encore sous tension après la déconnexion. Installer les panneaux d'avertissement appropriés

Lire ce manuel en entier et s'assurer de bien comprendre les procédures avant de tenter d'installer, de configurer, d'utiliser et d'effectuer tout travail d'entretien sur cet entraînement à fréquence variable DG1.

Définitions et symboles

AVERTISSEMENT

Ce symbole indique une haute tension. Il attire l'attention sur les éléments ou les opérations qui pourraient être dangereux pour les personnes utilisant cet équipement. Lire attentivement le message et suivre attentivement les instructions.

Ce symbole est le « symbole d'alerte de sécurité ». Il accompagne les deux termes d'avertissement suivants : MISE EN GARDE ou AVERTISSEMENT, comme décrit ci-dessous.

AVERTISSEMENT

Indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures graves ou la mort.

MISE EN GARDE

Indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures légères à modérées et d'importants dégâts matériels. La situation décrite dans la MISE EN GARDE peut, si elle n'est pas évitée, entraîner des conséquences graves. Des mesures de sécurité importantes sont décrites dans les MISES EN GARDE (ainsi que dans les AVERTISSEMENTS).

Haute tension dangereuse

AVERTISSEMENT

L'équipement de contrôle du moteur et les contrôleurs électroniques sont branchés sur des tensions secteur dangereuses. Lors de l'entretien des entraînements et des contrôleurs électroniques, il peut y avoir des composants exposés avec des boîtiers ou des protubérances au niveau du potentiel du réseau ou au-dessus. Toutes les précautions doivent être prises pour se protéger contre les chocs électriques.

- **Se tenir sur un tapis isolant et prendre l'habitude de n'utiliser qu'une seule main pour vérifier les composants**
- **Toujours travailler avec une autre personne lorsqu'une situation d'urgence se produit**
- **Débrancher l'alimentation avant de vérifier les contrôleurs ou d'effectuer des travaux d'entretien**
- **S'assurer que l'équipement est correctement relié à la terre**
- **Porter des lunettes de sécurité lors des travaux sur les contrôleurs électroniques ou les machines rotatives**

AVERTISSEMENT

Les composants de la section d'alimentation de l'entraînement restent sous tension après la coupure de la tension d'alimentation. Après la déconnexion de l'alimentation, attendre au moins cinq minutes avant de retirer le couvercle pour permettre la décharge des condensateurs du circuit intermédiaire.

Prêter attention aux avertissements signalant des dangers !

DANGER
5 MIN

AVERTISSEMENT

Risque de choc électrique – risque de blessures ! Effectuer le câblage uniquement si l'unité n'est plus sous tension.

AVERTISSEMENT

Ne pas effectuer de modifications sur l'entraînement CA lorsqu'il est connecté à l'alimentation secteur.

Avertissements et mises en garde

AVERTISSEMENT

S’assurer de mettre l’appareil à la terre en suivant les instructions de ce manuel. Les unités non mises à la terre peuvent causer des chocs électriques et des incendies.

AVERTISSEMENT

Cet équipement ne doit être installé, réglé et entretenu que par un personnel d’entretien électrique qualifié connaissant la construction et le fonctionnement de ce type d’équipement, ainsi que les risques encourus. Le non-respect de cette précaution peut entraîner la mort ou des blessures graves.

AVERTISSEMENT

Les composants à l’intérieur de l’entraînement sont sous tension lorsque l’entraînement est branché à l’alimentation. Le contact avec cette tension est extrêmement dangereux et peut causer la mort ou des blessures graves.

AVERTISSEMENT

Les bornes de phase (L1, L2, L3), les bornes du moteur (U, V, W) et les bornes de résistance de liaison CC/frein (DC-, DC+/R+, R-) sont sous tension lorsque l’entraînement est branché à l’alimentation, même si le moteur ne tourne pas. Le contact avec cette tension est extrêmement dangereux et peut causer la mort ou des blessures graves.

AVERTISSEMENT

Même si les bornes E/S de commande sont isolées de la tension secteur, les sorties de relais et les autres bornes E/S peuvent présenter une tension dangereuse même lorsque l’entraînement est débranché. Le contact avec cette tension est extrêmement dangereux et peut causer la mort ou des blessures graves.

AVERTISSEMENT

Cet équipement a un grand courant de fuite capacitif pendant le fonctionnement, ce qui peut mettre les pièces du boîtier à un niveau supérieur au potentiel de terre. Une mise à la terre appropriée, telle que décrite dans ce manuel, est nécessaire. Le non-respect de cette précaution peut entraîner la mort ou des blessures graves.

AVERTISSEMENT

Avant de mettre l’entraînement sous tension, s’assurer que les protections avant et des câbles sont fermées et attachées pour empêcher l’exposition à d’éventuelles défaillances électriques. Le non-respect de cette précaution peut entraîner la mort ou des blessures graves.

AVERTISSEMENT

Un dispositif de protection/déconnexion en amont doit être fourni, tel que requis par le code électrique national (NEC®). Le non-respect de cette précaution peut entraîner la mort ou des blessures graves.

AVERTISSEMENT

Cet entraînement peut causer un courant CC dans le conducteur de mise à la terre de protection. Lorsqu’un dispositif de protection ou de surveillance à courant résiduel est utilisé pour la protection en cas de contact direct ou indirect, seul un dispositif de type B est autorisé sur le côté alimentation de ce produit.

AVERTISSEMENT

Ne travailler sur le câblage qu’après que l’entraînement a été correctement monté et attaché.

AVERTISSEMENT

Avant d’ouvrir les couvercles de l’entraînement :

- **Débrancher toute l’alimentation allant à l’entraînement, y compris l’alimentation de commande externe pouvant être présente**
- **Attendre un minimum de cinq minutes après l’extinction de tous les voyants du clavier. Cela permet aux condensateurs de bus CC de se décharger**
- **Une tension dangereuse peut rester dans les condensateurs de bus CC même si l’alimentation a été coupée. Confirmer que les condensateurs sont entièrement déchargés en mesurant la tension à l’aide d’un multimètre réglé pour mesurer la tension CC**

Le non-respect de cette précaution peut entraîner la mort ou des blessures graves.

AVERTISSEMENT

L’ouverture du dispositif de protection du circuit de dérivation peut indiquer que le courant de défaut a été interrompu. Pour réduire le risque d’incendie ou de choc électrique, les pièces porteuses de courant et les autres composants du contrôleur doivent être examinés et remplacés s’ils sont endommagés. Si l’élément de courant d’un relais de surcharge a grillé, le relais de surcharge doit être intégralement remplacé.

AVERTISSEMENT

Le fonctionnement de cet équipement nécessite le respect des instructions d'installation et de fonctionnement détaillées fournies dans le manuel d'installation/de fonctionnement destiné à être utilisé avec ce produit. Ces informations sont fournies sur le CD-ROM, la disquette ou tout autre périphérique de stockage inclus dans l'emballage contenant ce dispositif. Ce support doit être conservé avec cet appareil à tout moment. Une copie papier de ces informations peut être commandée auprès du service de documentation Eaton.

AVERTISSEMENT

Avant de procéder à l'entretien de l'entraînement :

- **Débrancher toute l'alimentation allant à l'entraînement, y compris l'alimentation de commande externe pouvant être présente**
- **Placer une étiquette « NE PAS UTILISER » sur le dispositif de déconnexion**
- **Verrouiller le dispositif de déconnexion en position ouverte**

Le non-respect de ces instructions peut entraîner la mort ou des blessures graves.

AVERTISSEMENT

Les sorties de l'entraînement (U, V, W) ne doivent pas être connectées à la tension d'entrée ni à l'alimentation secteur, car ceci pourrait gravement endommager l'appareil et causer un incendie.

AVERTISSEMENT

Le dissipateur de chaleur et/ou le boîtier externe peuvent atteindre une température élevée.

Prêter attention aux avertissements signalant des dangers !

Surface brûlante – Risque de brûlure. NE PAS TOUCHER !

MISE EN GARDE

Toute modification électrique ou mécanique de cet entraînement sans consentement écrit préalable d'Eaton annule toutes les garanties, peut entraîner un danger pour la sécurité et annuler l'homologation UL®.

MISE EN GARDE

Installer cet entraînement sur une matière résistante aux flammes, telle qu'une plaque d'acier, pour réduire les risques d'incendie.

MISE EN GARDE

Installer cet entraînement sur une surface perpendiculaire capable de supporter le poids de l'entraînement et non soumise à des vibrations afin de diminuer les risques de chute et de dommage de l'entraînement, ainsi que les risques de blessures.

MISE EN GARDE

Empêcher la pénétration de corps étrangers, tels que morceaux de fils et copeaux métalliques, dans le boîtier de l'entraînement, car ceci pourrait provoquer la formation d'un arc électrique et un incendie.

MISE EN GARDE

Installer cet entraînement dans une pièce bien aérée non soumise à des températures extrêmes, à une forte humidité ou à la condensation. Éviter les endroits directement exposés au soleil ou présentant de fortes concentrations de poussières, des gaz corrosifs, des gaz explosifs, des gaz inflammables, ou des vapeurs de liquide de meulage, etc. Une installation inadéquate peut entraîner un risque d'incendie.

MISE EN GARDE

Lors de la sélection de la section transversale des câbles, prendre en compte la chute de tension dans des conditions de charge. La prise en compte d'autres paramètres relève de la responsabilité de l'utilisateur.

Il relève de la responsabilité de l'utilisateur de respecter toutes les normes électriques nationales et internationales en vigueur concernant la mise à la terre de protection de l'ensemble de l'équipement.

MISE EN GARDE

Les spécifications minimum relatives aux sections transversales des conducteurs de terre de protection indiquées dans ce manuel doivent être respectées.

Le courant de fuite de cet équipement dépasse 3,5 mA (CA). La taille minimum du conducteur de la mise à la terre de protection doit être conforme aux exigences de la norme EN 61800-5-1 et/ou aux réglementations de sécurité locales.

MISE EN GARDE

Les courants de fuite de ce convertisseur de fréquence sont supérieures à 3,5 mA (CA). Conformément à la norme CEI/EN 61800-5-1, un conducteur de mise à la terre de l'équipement supplémentaire possédant la même superficie de coupe transversale que le conducteur de mise à la terre de protection d'origine doit être branché, ou la section transversale du conducteur de mise à la terre de l'équipement doit être d'au moins 10 mm^2 Cu. Seul un conducteur en cuivre doit être utilisé avec cet entraînement.

⚠ MISE EN GARDE

Les entrées anti-rebond ne sont pas permises dans le schéma du circuit de sécurité. Des disjoncteurs de courant résiduel (RCD) ne peuvent être installés qu'entre le réseau de courant alternatif et l'entraînement.

⚠ MISE EN GARDE

Les entrées anti-rebond ne sont pas permises dans le schéma du circuit de sécurité. Si plusieurs moteurs sont connectés à un entraînement, des contacteurs doivent être conçus pour les moteurs individuels conformément à la catégorie d'utilisation AC-3.

Sélectionner du contacteur du moteur en fonction du courant de fonctionnement nominal du moteur à connecter.

⚠ MISE EN GARDE

Les entrées anti-rebond ne sont pas permises dans le schéma du circuit de sécurité. Une commutation entre l'entraînement et l'alimentation d'entrée doit avoir lieu dans un état sans tension.

⚠ MISE EN GARDE

Les entrées anti-rebond ne sont pas permises dans le schéma du circuit de sécurité. Risque d'incendie !

Utiliser uniquement des câbles, des interrupteurs de protection et des contacteurs indiquant le courant nominal permis.

⚠ MISE EN GARDE

Avant de connecter l'entraînement à l'alimentation secteur CA, s'assurer que les réglages de la classe de protection CEM sont correctement effectués selon les instructions de ce manuel.

- Si l'entraînement doit être utilisé dans un réseau de distribution flottant, retirer les vis au niveau des VOM et CEM. Voir « Installation dans un réseau à une phase connectée à la terre (corner-grounded) » et « Installation dans un réseau IT»
- Débrancher le filtre CEM interne lors de l'installation de l'entraînement sur un réseau IT (système d'alimentation non mis à la terre ou système d'alimentation électrique mis à la terre haute résistance [plus de 30 ohms]) pour ne pas que le système soit connecté au potentiel de terre via les condensateurs du filtre CEM. Ceci peut être une cause de dangers ou endommager l'entraînement
- Débrancher le filtre CEM interne lors de l'installation de l'entraînement sur un système TN à une phase connectée à la terre pour ne pas endommager l'entraînement

Note: Lorsque le filtre CEM interne est débranché, l'entraînement peut ne pas être conforme aux normes de compatibilité électromagnétique.

- Ne pas tenter d'installer ou de retirer les vis des VOM et CEM lorsque l'alimentation est appliquée aux bornes d'entrée de l'entraînement

Sécurité du moteur et de l'équipement

⚠ MISE EN GARDE

n'effectuer aucun test de résistance de tension ou au mégohmmètre sur toute partie de l'entraînement ou de ses composants. Un test inadéquat peut entraîner des dommages.

⚠ MISE EN GARDE

Avant tout test ou mesure du moteur ou du câble du moteur, débrancher le câble du moteur au niveau des bornes de sortie de l'entraînement (U, V, W) pour éviter d'endommager ce dernier lors des tests.

⚠ MISE EN GARDE

Ne toucher aucun composant sur les cartes de circuit. Les décharges d'électricité statique peuvent endommager les composants.

⚠ MISE EN GARDE

Avant de mettre le moteur en marche, vérifier qu'il est correctement monté et aligné avec l'équipement entraîné. S'assurer que le démarrage du moteur ne risque pas de provoquer des blessures ou d'endommager l'équipement connecté au moteur.

⚠ MISE EN GARDE

Régler la vitesse maximale du moteur (fréquence) dans l'entraînement conformément aux exigences du moteur et de l'équipement qui lui est connecté. Des réglages de fréquence maximum incorrects peuvent endommager le moteur ou l'équipement et causer des blessures.

⚠ MISE EN GARDE

Avant d'inverser le sens de rotation du moteur, veiller à ce que cela ne risque pas de provoquer des blessures ou des dommages matériels.

⚠ MISE EN GARDE

S'assurer qu'aucun condensateur de correction de puissance n'est connecté à la sortie de l'entraînement ou aux bornes du moteur pour éviter un mauvais fonctionnement de l'entraînement et des dommages potentiels.

⚠ MISE EN GARDE

S'assurer que les bornes de sortie de l'entraînement (U, V, W) ne sont pas connectées à l'alimentation secteur, ce qui pourrait causer de graves dommages à l'entraînement.

⚠ MISE EN GARDE

Lorsque les bornes de commande de deux ou plusieurs unités d'entraînement sont raccordées en parallèle, la tension auxiliaire de ces connexions de commande doit être fournie par une source unique, qui peut être soit l'une des unités, soit une alimentation externe.

⚠ MISE EN GARDE

L'entraînement démarre automatiquement après une interruption de la tension d'entrée si la commande de démarrage externe est active.

⚠ MISE EN GARDE

Ne pas commander le moteur avec le dispositif de déconnexion ; à la place, utiliser les touches de marche et d'arrêt du tableau de contrôle ou les commandes du tableau des E/S de l'entraînement. Le nombre de cycles de charge maximum permis des condensateurs CC (c'est-à-dire les mises sous tension par application de puissance) est de cinq en dix minutes.

⚠ MISE EN GARDE

Fonctionnement incorrect de l'entraînement :

- Si l'entraînement n'est pas mis en marche pendant une longue période, la performance de ses condensateurs électrolytiques sera réduite
- S'il est arrêté pour une période prolongée, le mettre en marche au moins tous les six mois pendant au moins 5 heures pour restaurer la performance des condensateurs, puis vérifier son fonctionnement. Il est recommandé de ne pas brancher l'entraînement directement sur la tension secteur. La tension doit être augmentée progressivement en utilisant une source CA réglable

Le non-respect de ces instructions peut entraîner des blessures ou des dégâts matériels.

Pour plus d'informations techniques, contacter l'usine ou le représentant commercial Eaton local.

Chapter 1—PowerXL series overview

This chapter describes the purpose and contents of this manual, the receiving inspection recommendations and the PowerXL Series Open Drive catalog numbering system.

How to use this manual

The purpose of this manual is to provide you with information necessary to install, set and customize parameters, start up, troubleshoot and maintain the Eaton PowerXL Series variable frequency drive (VFD). To provide for safe installation and operation of the equipment, read the safety guidelines at the beginning of this manual and follow the procedures outlined in the following chapters before connecting power to the PowerXL Series VFD. Keep this operating manual handy and distribute to all users, technicians and maintenance personnel for reference.

Receiving and inspection

The PowerXL Series VFD has met a stringent series of factory quality requirements before shipment. It is possible that packaging or equipment damage may have occurred during shipment. After receiving your PowerXL Series VFD, please check for the following:

Check to make sure that the package includes the Instruction Leaflet Quick Start Guide, and accessory packet. The accessory packet includes:

- Rubber grommets
- Control cable grounding clamps
- Additional grounding screw

Inspect the unit to ensure it was not damaged during shipment.

Make sure that the part number indicated on the nameplate corresponds with the catalog number on your order.

If shipping damage has occurred, please contact and file a claim with the carrier involved immediately.

If the delivery does not correspond to your order, please contact your Eaton Electrical representative.

Note: Do not destroy the packing. The template printed on the protective cardboard can be used for marking the mounting points of the PowerXL VFD on the wall or in a cabinet.

Real time clock battery activation

To activate the real time clock (RTC) functionality in the PowerXL Series VFD, the RTC battery (already mounted in the drive) must be connected to the control board.

Simply remove the primary drive cover, locate the RTC battery directly below the keypad, and connect the white 2-wire connector to the receptacle on the control board.

Figure 1. RTC battery connection

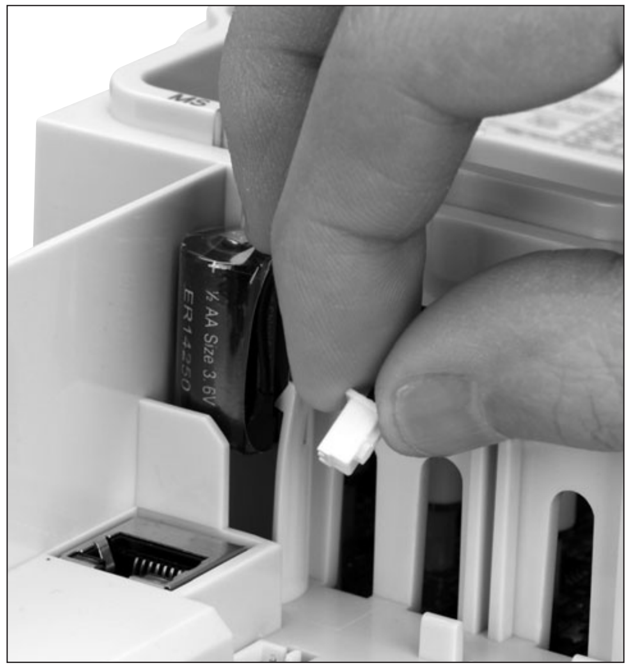
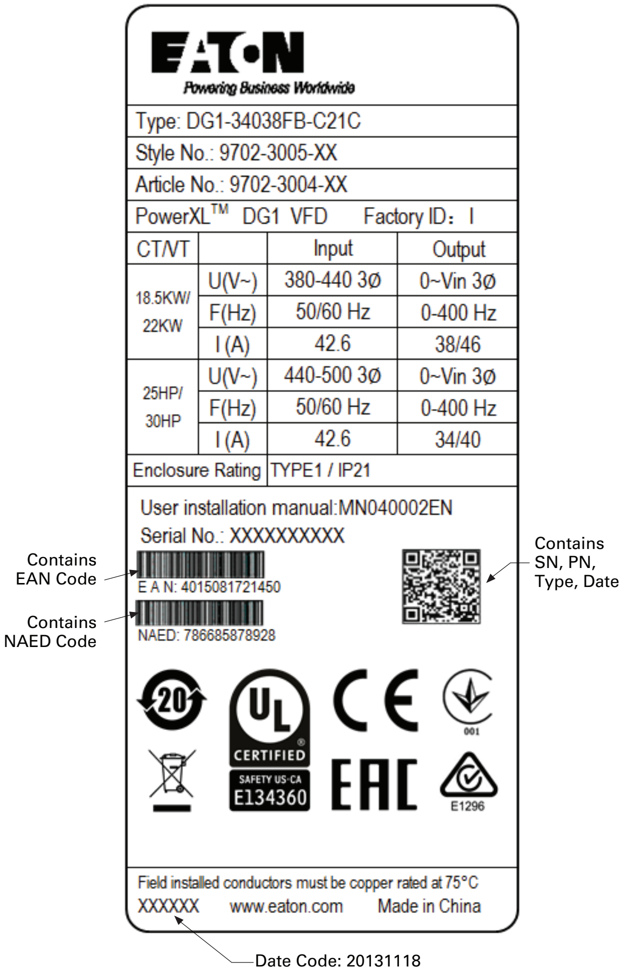


Table 1. Common abbreviations

Abbreviation	Definition
CT	Constant torque with high overload rating (150%)
VT	Variable torque with low overload rating (110%)
IH	High overload current (150%)
I_L	Low overload current (110%)
VFD	Variable Frequency Drive
RTC	Real Time Clock

Rating label

Figure 2. Rating label

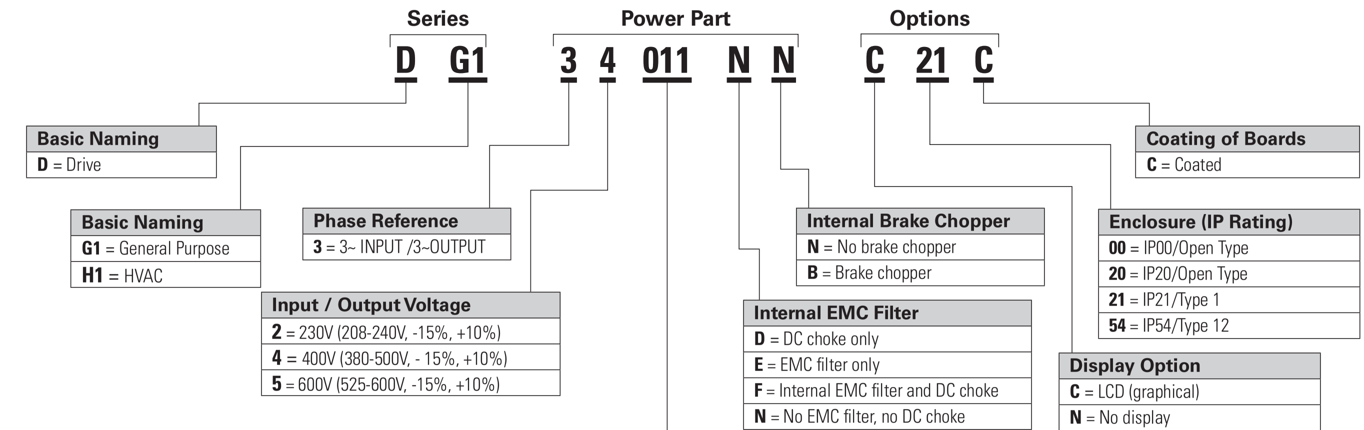


Carton labels (U.S. and Europe)

Same as rating label shown above.

Catalog number system

Figure 3. Catalog numbering system



DG1 - Output Current Rating (CT)		
208-240V	**380-500V**	**525-600V**
3D7 =3.7 A, 0.55 kW, 0.75 hp	**2D2** =2.2 A, 0.75 kW, 1 hp	**3D3** =3.3 A, 1.5 kW, 2 hp
4D8 =4.8 A, 0.75 kW, 1 hp	**3D3** =3.3 A, 1.1 kW, 1.5 hp	**4D5** =4.5 A, 2.2 kW, 3 hp
6D6 =6.6 A, 1.1 kW, 1.5 hp	**4D3** =4.3 A, 1.5 kW, 2 hp	**7D5** =7.5 A, 3.7 kW, 5 hp
7D8 =7.8 A, 1.5 kW, 2 hp	**5D6** =5.6 A, 2.2 kW, 3 hp	**010** =10 A, 5.5 kW, 7.5 hp
011 =11 A, 2.2 kW, 3 hp	**7D6** =7.6 A, 3 kW, 5 hp	**013** =13.5 A, 7.5 kW, 10 hp
012 =12.5 A, 3 kW, 5 hp (VT)	**9D0** =9 A, 4 kW, 7.5 hp (VT)	**018** =18 A, 11 kW, 15 hp
017 =17.5 A, 3.7 kW, 5 hp	**012** =12 A, 5.5 kW, 7.5 hp	**022** =22 A, 15 kW, 20 hp
025 =25 A, 5.5 kW, 7.5 hp	**016** =16 A, 7.5 kW, 10 hp	**027** =27 A, 18.5 kW, 25 hp
031 =31 A, 7.5 kW, 10 hp	**023** =23 A, 11 kW, 15 hp	**034** =34 A, 22 kW, 30 hp
048 =48 A, 11 kW, 15 hp	**031** =31 A, 15 kW, 20 hp	**041** =41 A, 30 kW, 40 hp
061 =61 A, 15 kW, 20 hp	**038** =38 A, 18.5 kW, 25 hp	**052** =52 A, 37 kW, 50 hp
075 =75 A, 18.5 kW, 25 hp	**046** =46 A, 22 kW, 30 hp	**062** =62 A, 45 kW, 60 hp
088 =88 A, 22 kW, 30 hp	**061** =61 A, 30 kW, 40 hp	**080** =80 A, 55 kW, 75 hp
114 =114 A, 30 kW, 40 hp	**072** =72 A, 37 kW, 50 hp	**100** =100 A, 75 kW, 100 hp
143 =143 A, 37 kW, 50 hp	**087** =87 A, 45 kW, 60 hp	**125** =125 A, 90 kW, 125 hp
170 =170 A, 45 kW, 60 hp	**105** =105 A, 55 kW, 75 hp	**144** =144 A, 110 kW, 150 hp
211 =211 A, 55 kW, 75 hp	**140** =140 A, 75 kW, 100 hp	**208** =208 A, 132 kW, 200 hp
248 =248 A, 75 kW, 100 hp	**170** =170 A, 90 kW, 125 hp	**200** = 208 A, 200 kW, 200 hp
	205 =205 A, 110 kW, 150 hp	**261** = 261 A, 250 kW, 250 hp
	245 =245 A, 132 kW, 200 hp	**325** = 325 A, 315 kW, 300 hp
	310 = 310 A, 160 kW, 250 hp	**385** = 385 A, 355 kW, 300 hp
	385 = 385 A, 200 kW, 300 hp	**416** = 416 A, 400 kW, 400 hp
	460 = 460 A, 250 kW, 350 hp	**460** = 460 A, 450 kW, 450 hp
	520 = 520 A, 250 kW, 450 hp	**520** = 520 A, 500 kW, 500 hp
	590 = 590 A, 315 kW, 500 hp	**590** = 590 A, 560 kW, 600 hp
	650 = 650 A, 355 kW, 500 hp	**650** = 650 A, 630 kW, 650 hp
	730 = 730 A, 400 kW, 600 hp	**820** = 820 A, 800 kW, 800 hp (VT)
	820 = 820 A, 450 kW, 700 hp	
	920 = 920 A, 500 kW, 800 hp	
	1K0 = 1180 A, 630 kW, 1000 hp (VT)	

Power ratings and product selection

PowerXL Series drives—208-230 Volt

Table 2. Type/IP20

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)			
Frame size	230 V, 50 Hz kW rating	230 V, 60 Hz hp	Current A	230 V, 50 Hz kW rating	230 V, 60 Hz hp	Current A	DG1 Catalog number
FR0	0.55	0.75	3.7	0.75	1	4.8	DG1-323D7EB-C20C
	0.75	1	4.8	1.1	1.5	6.6	DG1-324D8EB-C20C
	1.1	1.5	6.6	1.5	2	7.8	DG1-326D6EB-C20C

Table 3. Type 1/IP21

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)			
Frame size	230 V, 50 Hz kW rating	230 V, 60 Hz hp	Current A	230 V, 50 Hz kW rating	230 V, 60 Hz hp	Current A	Catalog number
FR1	0.55	0.75	3.7	0.75	1	4.8	DG1-323D7FB-C21C
	0.75	1	4.8	1.1	1.5	6.6	DG1-324D8FB-C21C
	1.1	1.5	6.6	1.5	2	7.8	DG1-326D6FB-C21C
	1.5	2	7.8	2.2	3	11	DG1-327D8FB-C21C
	2.2	3	11	3	–	12.5	DG1-32011FB-C21C
FR2	3	–	12.5	3.7	5	17.5	DG1-32012FB-C21C
	3.7	5	17.5	5.5	7.5	25	DG1-32017FB-C21C
	5.5	7.5	25	7.5	10	31	DG1-32025FB-C21C
FR3	7.5	10	31	11	15	48	DG1-32031FB-C21C
	11	15	48	15	20	61	DG1-32048FB-C21C
FR4	15	20	61	18.5	25	75	DG1-32061FN-C21C
	18.5	25	75	22	30	88	DG1-32075FN-C21C
	22	30	88	30	40	114	DG1-32088FN-C21C
FR5	30	40	114	37	50	143	DG1-32114FN-C21C
	37	50	143	45	60	170	DG1-32143FN-C21C
	45	60	170	55	75	211	DG1-32170FN-C21C
FR6	55	75	211	75	100	261	DG1-32211FN-C21C
	75	100	248	90	125	312	DG1-32248FN-C21C

Table 4. Type 12/IP54

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)			
Frame size	230 V, 50 Hz kW rating	230 V, 60 Hz hp	Current A	230 V, 50 Hz kW rating	230 V, 60 Hz hp	Current A	Catalog number
FR1	0.55	0.75	3.7	0.75	1	4.8	DG1-323D7FB-C54C
	0.75	1	4.8	1.1	1.5	6.6	DG1-324D8FB-C54C
	1.1	1.5	6.6	1.5	2	7.8	DG1-326D6FB-C54C
	1.5	2	7.8	2.2	3	11	DG1-327D8FB-C54C
	2.2	3	11	3	–	12.5	DG1-32011FB-C54C
FR2	3	–	12.5	3.7	5	17.5	DG1-32012FB-C54C
	3.7	5	17.5	5.5	7.5	25	DG1-32017FB-C54C
	5.5	7.5	25	7.5	10	31	DG1-32025FB-C54C
FR3	7.5	10	31	11	15	48	DG1-32031FB-C54C
	11	15	48	15	20	61	DG1-32048FB-C54C
FR4	15	20	61	18.5	25	75	DG1-32061FN-C54C
	18.5	25	75	22	30	88	DG1-32075FN-C54C
	22	30	88	30	40	114	DG1-32088FN-C54C
FR5	30	40	114	37	50	143	DG1-32114FN-C54C
	37	50	143	45	60	170	DG1-32143FN-C54C
	45	60	170	55	75	211	DG1-32170FN-C54C
FR6	55	75	211	75	100	261	DG1-32211FN-C54C
	75	100	248	90	125	312	DG1-32248FN-C54C

Note:

PowerXL Series drives—380-500 Volt

Table 5. Type/IP20

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)			
Frame size	400 V, 50 Hz kW rating	460 V, 60 Hz hp	Current A	400 V, 50 Hz kW rating	460 V, 60 Hz hp	Current A	DG1 Catalog number
FR0	0.75	1	2.2	1.1	1.5	3.3	**DG1-342D2EB-C20C**
	1.1	1.5	3.3	1.5	2	4.6	**DG1-343D3EB-C20C**
	1.5	2	4.3	2.2	3	5.6	**DG1-344D3EB-C20C**
	2.2	3	5.6	3	5	7.6	**DG1-345D6EB-C20C**

Table 6. Type 1/IP21

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)			
Frame size	400 V, 50 Hz kW rating	460 V, 60 Hz hp	Current A	400 V, 50 Hz kW rating	460 V, 60 Hz hp	Current A	Catalog number
FR1	0.75	1	2.2	1.1	1.5	3.3	**DG1-342D2FB-C21C**
	1.1	1.5	3.3	1.5	2	4.3	**DG1-343D3FB-C21C**
	1.5	2	4.3	2.2	3	5.6	**DG1-344D3FB-C21C**
	2.2	3	5.6	3	5	7.6	**DG1-345D6FB-C21C**
	3	5	7.6	4	–	9	**DG1-347D6FB-C21C**
	4	–	9	5.5	7.5	12	**DG1-349D0FB-C21C**
FR2	5.5	7.5	12	7.5	10	16	**DG1-34012FB-C21C**
	7.5	10	16	11	15	23	**DG1-34016FB-C21C**
	11	15	23	15	20	31	**DG1-34023FB-C21C**
FR3	15	20	31	18.5	25	38	**DG1-34031FB-C21C**
	18.5	25	38	22	30	46	**DG1-34038FB-C21C**
	22	30	46	30	40	61	**DG1-34046FB-C21C**
FR4	30	40	61	37	50	72	**DG1-34061FN-C21C**
	37	50	72	45	60	87	**DG1-34072FN-C21C**
	45	60	87	55	75	105	**DG1-34087FN-C21C**
FR5	55	75	105	75	100	140	**DG1-34105FN-C21C**
	75	100	140	90	125	170	**DG1-34140FN-C21C**
	90	125	170	110	150	205	**DG1-34170FN-C21C**
FR6	110	150	205	132	200	261	**DG1-34205FN-C21C**
	150	200	245	160	250	310	**DG1-34245FN-C21C**

Table 7. Type 12/IP54

Frame size	Constant torque (CT)/high overload (I_H) 400 V, 50 Hz kW rating	460 V, 60 Hz hp	Current A	Variable torque (VT)/low overload (I_L) 400 V, 50 Hz kW rating	460 V, 60 Hz hp	Current A	Catalog number
FR1	0.75	1	2.2	1.1	1.5	3.3	**DG1-342D2FB-C54C**
	1.1	1.5	3.3	1.5	2	4.3	**DG1-343D3FB-C54C**
	1.5	2	4.3	2.2	3	5.6	**DG1-344D3FB-C54C**
	2.2	3	5.6	3	5	7.6	**DG1-345D6FB-C54C**
	3	5	7.6	4	–	9	**DG1-347D6FB-C54C**
	4	–	9	5.5	7.5	12	**DG1-349D0FB-C54C**
FR2	5.5	7.5	12	7.5	10	16	**DG1-34012FB-C54C**
	7.5	10	16	11	15	23	**DG1-34016FB-C54C**
	11	15	23	15	20	31	**DG1-34023FB-C54C**
FR3	15	20	31	18.5	25	38	**DG1-34031FB-C54C**
	18.5	25	38	22	30	46	**DG1-34038FB-C54C**
	22	30	46	30	40	61	**DG1-34046FB-C54C**
FR4	30	40	61	37	50	72	**DG1-34061FN-C54C**
	37	50	72	45	60	87	**DG1-34072FN-C54C**
	45	60	87	55	75	105	**DG1-34087FN-C54C**
FR5	55	75	105	75	100	140	**DG1-34105FN-C54C**
	75	100	140	90	125	170	**DG1-34140FN-C54C**
	90	125	170	110	150	205	**DG1-34170FN-C54C**
FR6	110	150	205	132	200	261	**DG1-34205FN-C54C**
	150	200	245	160	250	310	**DG1-34245FN-C54C**

PowerXL Series drives—380, 500 Volt

Table 8. Type 0/IP00

Frame size	Constant torque (CT)/high overload (I_H) 400 V, 50 Hz kW rating	480 V, 60 Hz hp	Current A	Variable torque (VT)/low overload (I_L) 400 V, 50 Hz kW rating	480 V, 60 Hz hp	Current A	Catalog number
FR7	160	250	311	200	300	385	**DG1-34310FN-C00C**
	200	300	385	250	350	460	**DG1-34385FN-C00C**
	250	350	460	250	450	520	**DG1-34460FN-C00C**
	250	450	520	315	500	590	**DG1-34520FN-C00C**
FR8	315	500	590	355	500	650	**DG1-34590FN-C00C**
	355	500	650	400	600	730	**DG1-34650FN-C00C**
	400	600	730	450	700	820	**DG1-34730FN-C00C**
	450	700	820	500	800	920	**DG1-34820FN-C00C**
	500	800	920	560	900	1040	**DG1-34920FN-C00C**
	500	800	920	630	1000	1180	**DG1-341K0FN-C00C**

PowerXL Series Drives—600 volt ①

Table 9. Type 1/IP21

Frame size	Constant torque (CT)/high overload (I_H) 600 V, 60 Hz kW rating	600 V, 60 Hz hp	Current A	Variable torque (VT)/low overload (I_L) 600 V, 60 Hz kW rating	600 V, 60 Hz hp	Current A	Catalog number
FR1	1.5	2	3.3	2.2	3	4.5	**DG1-353D3FB-C21C**
	2.2	3	4.5	3.7	5	7.5	**DG1-354D5FB-C21C**
	3.7	5	7.5	5.5	7.5	10	**DG1-357D5FB-C21C**
FR2	5.5	7.5	10	7.5	10	13.5	**DG1-35010FB-C21C**
	7.5	10	13.5	11	15	18	**DG1-35013FB-C21C**
	11	15	18	15	20	22	**DG1-35018FB-C21C**
FR3	15	20	22	18.5	25	27	**DG1-35022FB-C21C**
	18.5	25	27	22	30	34	**DG1-35027FB-C21C**
	22	30	34	30	40	41	**DG1-35034FB-C21C**
FR4	30	40	41	37	50	52	**DG1-35041FN-C21C**
	37	50	52	45	60	62	**DG1-35052FN-C21C**
	45	60	62	55	75	80	**DG1-35062FN-C21C**
FR5	55	75	80	75	100	100	**DG1-35080FN-C21C**
	75	100	100	90	125	125	**DG1-35100FN-C21C**
	90	125	125	110	150	144	**DG1-35125FN-C21C**
FR6	110	150	144	150	200	208	**DG1-35144FN-C21C**
	150	200	208	187	250	250	**DG1-35208FN-C21C**

Table 10. Type 12/IP54

Frame size	Constant torque (CT)/high overload (I_H) 600 V, 60 Hz kW rating	600 V, 60 Hz hp	Current A	Variable torque (VT)/low overload (I_L) 600 V, 60 Hz kW rating	600 V, 60 Hz hp	Current A	Catalog number
FR1	1.5	2	3.3	2.2	3	4.5	**DG1-353D3FB-C54C**
	2.2	3	4.5	3.7	5	7.5	**DG1-354D5FB-C54C**
	3.7	5	7.5	5.5	7.5	10	**DG1-357D5FB-C54C**
FR2	5.5	7.5	10	7.5	10	13.5	**DG1-35010FB-C54C**
	7.5	10	13.5	11	15	18	**DG1-35013FB-C54C**
	11	15	18	15	20	22	**DG1-35018FB-C54C**
FR3	15	20	22	18.5	25	27	**DG1-35022FB-C54C**
	18.5	25	27	22	30	34	**DG1-35027FB-C54C**
	22	30	34	30	40	41	**DG1-35034FB-C54C**
FR4	30	40	41	37	50	52	**DG1-35041FN-C54C**
	37	50	52	45	60	62	**DG1-35052FN-C54C**
	45	60	62	55	75	80	**DG1-35062FN-C54C**
FR5	55	75	80	75	100	100	**DG1-35080FN-C54C**
	75	100	100	90	125	125	**DG1-35100FN-C54C**
	90	125	125	110	150	144	**DG1-35125FN-C54C**
FR6	110	150	144	150	200	208	**DG1-35144FN-C54C**
	150	200	208	187	250	250	**DG1-35208FN-C54C**

PowerXL Series drives—525—600 Volt

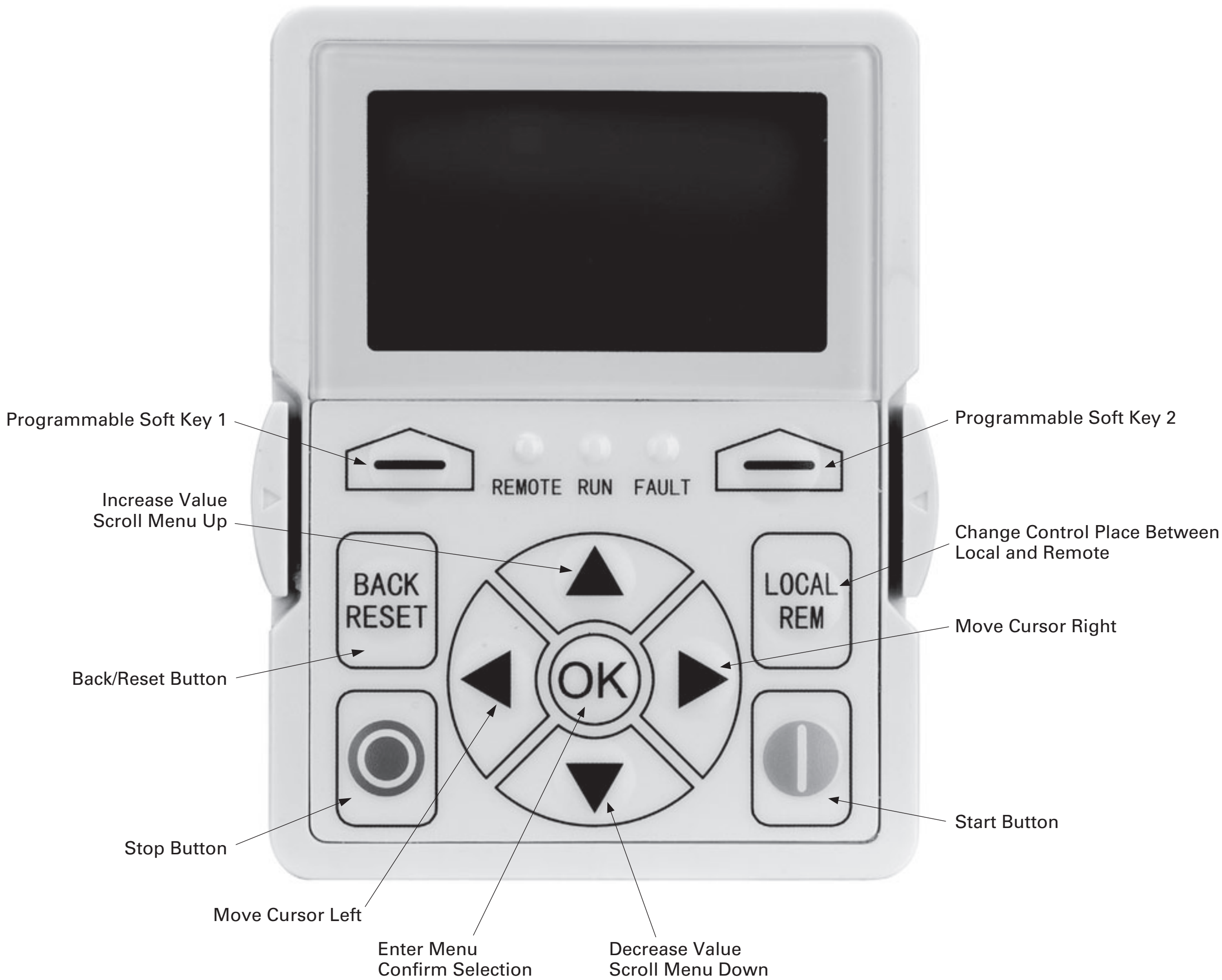
Table 11. Type 0/IP00

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)			
Frame size	600 V, 50 Hz kW rating	600 V, 60 Hz hp	Current A	600 V, 50 Hz kW rating	600 V, 60 Hz hp	Current A	Catalog number
FR7	187	250	261	224	300	325	**DG1-35261FN-C00C**
	224	300	325	298	400	385	**DG1-35325FN-C00C**
	224	300	385	336	450	416	**DG1-35385FN-C00C**
FR8	298	400	416	336	450	460	**DG1-35416FN-C00C**
	336	450	460	373	500	520	**DG1-35460FN-C00C**
	373	500	520	448	600	590	**DG1-35520FN-C00C**
	448	600	590	485	650	650	**DG1-35590FN-C00C**
	485	650	650	522	700	750	**DG1-35650FN-C00C**
	485	650	650	597	800	820	**DG1-35820FN-C00C**

Chapter 2—Keypad overview

The keypad is the interface between the drive and the user. It features an LCD display, 3 LED lights and 11 buttons. With the control keypad, it is possible to control the speed of a motor, to supervise the state of the equipment and to set the frequency converter's parameters. See **Figure 4.**

Figure 4. Keypad and display

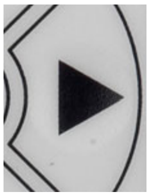
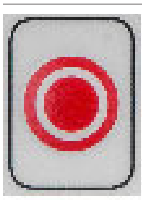
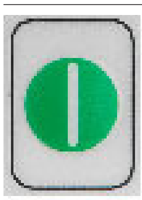


Keypad buttons

Buttons description

Table 12. Keypad buttons

Icon	Button	Description
	Soft key 1, Soft key 2	**Soft key 1, soft key 2:** The functions of these two buttons shall be the following: • Forward/Reverse, this shall change motor's run direction. • Menu, this shall return to main menu. • Details, this shall display the details of the fault. • Bypass, this shall make drive go into bypass. • Jog, this shall activate jog. Jog can enabled via press OK Key and Soft2 Key(When the Soft2Key is Jog) and disabled via release any one of the two keys. • Favorite, this shall add this parameter to the Favorite menu. • Delete, this shall delete this parameter from the Favorite menu.
	Back/Reset	**Back/Reset:** This button has three integrated functions. The button operates as backward button during normal mode. In edit mode, it is used as cancel operate. It is also used to reset faults when faults occur. • Backs up one step. • Cancels Modify in edit mode. • Resets the active faults (all the active faults shall be reset by pressing this button more than 2 seconds in any page). • Hold Stop and Back Reset for 5 seconds to return drive to factory default • At Main Menu page by hitting Back/Reset takes to Default Page.
	Local/Remote	**Local/Remote:** Switches between LOCAL and REMOTE control for start and speed reference. The control locations corresponding to local and remote shall be selected within an application.
 	Up Down	**Up and down arrows:** • Move either up or down a menu list to select the desired menu item. • Editing a parameter bit by bit, while the active digit is scrolled. • Increase/decrease the reference value of the selected parameter. • In parameter comparison mode, scroll through the parameters of which current value is different from comparison parameter value. • In parameter page when in read mode, move to the previous or next brother parameter of this parameter.

	Left	**Left arrow:** • Navigation button, movement to left when editing a parameter digit by digit. • Backs up one step. • At Main Menu page by hitting Back/Reset takes to Default Page.
	Right	**Right arrow:** • Enter parameter group mode. • Enter parameter mode from group mode. • Enter parameter whole edit mode when this parameter can be written. • Enter parameter bit by bit edit mode from whole edit mode. • Navigation button, movement to right when editing a parameter bit by bit.
	OK	**OK:** • Will clear all the fault history if pressed for more than 5 seconds (including 5 seconds) in any page. • This button is used in the parameter edit mode to save the parameter setting. • To confirm the start-up list at the end of the Start-Up Wizard. • To confirm the comparison item in parameters comparison mode. The following is the same with Right key: • Enter parameter whole edit mode when this parameter can be written. • Enter parameter group mode. • Enter parameter mode from group mode.
	Stop	**Stop:** This button operates as the motor stop button for normal operation. The default is for this button to always be active. It can be changed in parameter P7.5 to only when "Keypad" is selected as the control source. • Motor stop from the keypad.
	Start	**Start:** This button operates as motor start button for normal operation when the "Keypad" is selected as the active control source. When Keypad is the reference place after hitting the start button, it will jump directly to the Keypad Ref Screen.

LED lights

Table 13. LED state indicators

Indicator	Description
Run	**Run:** Indicates that the VFD is running and controlling the load in Drive or Bypass. Blinks when a stop command has been given but the drive is still ramping down.
Fault	**Fault:** Turn on when there is one or more active drive fault(s).
Remote	**Local/Remote:** Local: If the local control place is selected, the light will be off. Remote: If the remote control place is selected, the light will be on.

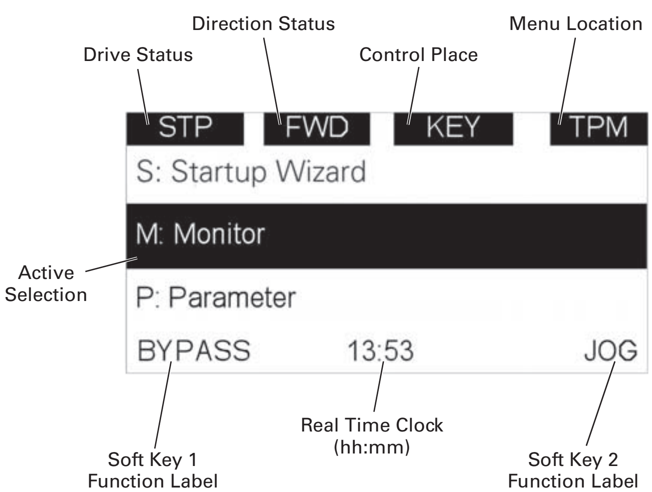
LCD display

The keypad LCD indicates the status of the motor and the drive and any faults in motor or drive functions. On the LCD, the user sees information about the current location in the menu structure and the item displayed.

Overview

Five lines shall be displayed in the screen. General view is as following in **Figure 5**.

Figure 5. General view of LCD



The lines definition is as below:

The first line is State line, shows:

- **RUN/STP/NRD/FIM/TFM**—If motor is running, the run state shall display "RUN", otherwise the state display "STP". "RUN" blinks when the stop command is sent but the drive is decelerating. "NRD" is displayed if the drive is not ready or does not have a signal "FIM" is displayed to indicate it is in Fire Mode and the drive is in a Run state. "TFM" is displayed when in the Fire Mode Test Mode and the drive is in a Run State.
- **FWD/REV/JOG**—If the motor running direction is clockwise, display "FWD", otherwise display "REV" "Jog" if the drive is in Jog mode the status indication will occur.
- **KEY/I/O/BPS/RBP/BUS/OFF**—If it is in bypass currently, display "BPS"; when run command is given it will got to "RBP". otherwise, if the current control source is I/O terminal, display "I/O". If it is keypad, then display "KEY"; otherwise display "BUS." if HOA enabled and switch to OFF, it shall show OFF.
- **PAR/MON/FLT/OPE/QSW/FAV/TPM/MS1/SL1/SL2/SL3/SL4/BUx.**—If the current page is parameter menu, display "PAR"; If monitor menu, then display "MON"; If fault menu, then display "FLT"; If operation menu, then display "OPE"; If quick start wizard, then display "QSW"; If optional card menu, then display "BOA"; If favorite menu, then display "FAV"; If main menu, then display "TPM" when doing the Multi-drive Pump and Fan mode, the drive mode will be defined with MS- Master and SL being a slave drive. The 1 through 4 will indicate the number in the series it is. "BUx" indicates the drive being a backup drive when in the redundant drive system.

The second line is Code line, shows the menu code.

The third line is Name line, shows the menu name or parameters name.

The fourth line is Value line, shows the submenu name or parameters value.

The fifth line is Soft key line, the functions of Soft key 1 and Soft key 2 are changeable, and the real time is in the middle.

Welcome page

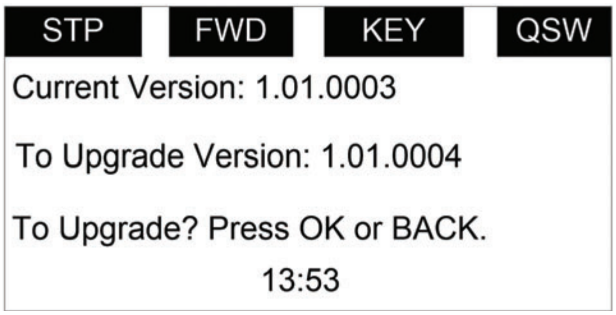
LCD shall show the welcome page when power on. See **Figure 6**.

Figure 6. Welcome page

Upgrade page

After welcome page, keypad will check whether there is different keypad firmware version in MCU's serial flash. If yes, then ask user whether to upgrade the keypad.

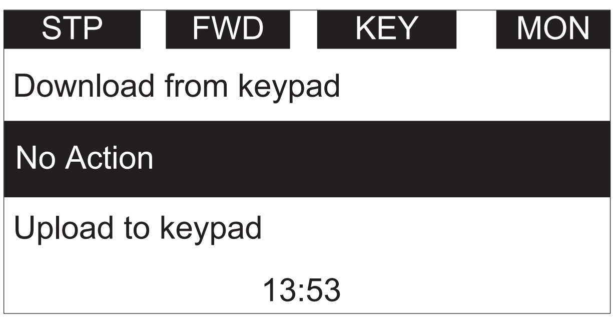
Figure 7. Upgrade page



Auto backup page

If keypad is plugged into a new drive, then auto backup page will be shown to notice the user whether to do the upload/download.

Figure 8. Auto backup page



Soft key description

There are two soft key buttons. They have different definitions under different pages.

Table 14. Soft keys

Keypad Display page	Default Soft key 1	Default Soft key 2
Main menu page	Null or bypass	Jog*
Group node page	Reverse or forward*	Menu
Parameter node page	Null or favorite	Menu
Favorite page	Delete	Menu
Fault page	Detail	Menu

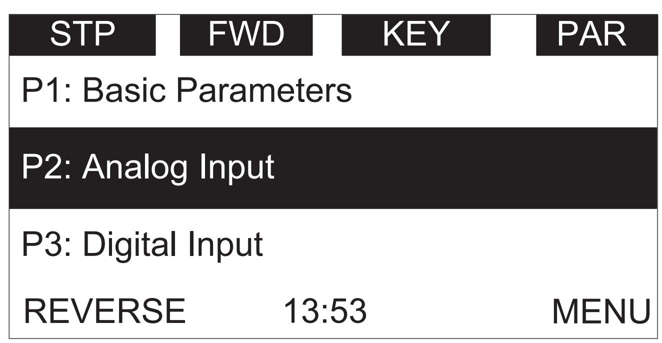
***Note:** if P21.1.18 or P21.1.19 is set to hidden it will hide this value.

1. In the main menu (root node), "JOG" shall be shown on the right. If bypass is enabled, then "BYPASS" shall be shown on the left. Otherwise, it will not be shown. See **Figure 9**

Figure 9. Main menu

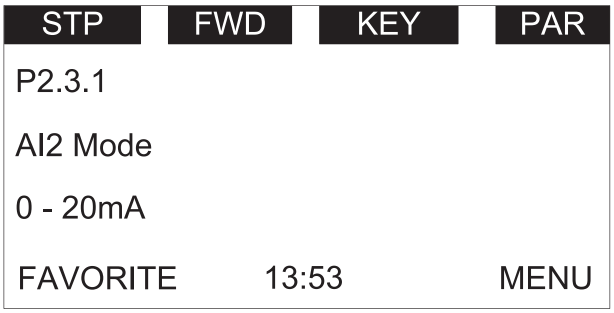
2. For the parameter group, the two soft keys "REVERSE/ FORWARD" and "MENU" shall be shown. See **Figure 10**

Figure 10. Parent node page



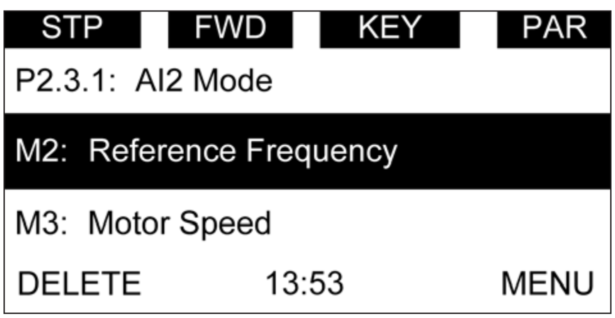
3. For the parameter menu, if this parameter hasn't been added into the favorite list, two soft keys "FAVORITE" and "MENU" shall be shown. If it has been added into the favorite list, only one soft key "MENU" is shown in the right

Figure 11. Parameter page



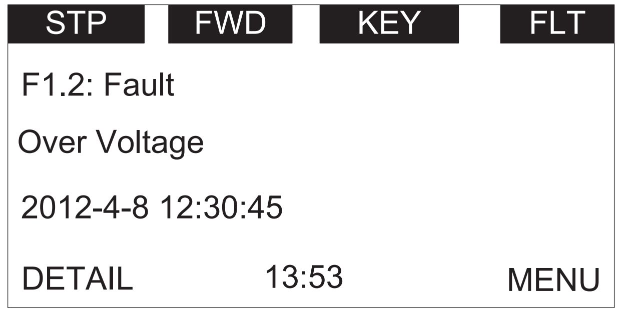
4. If one parameter has been added to the favorite list, it shall appear in the favorite menu. Then when you enter into the favorite menu, two soft keys "DELETE" and "MENU" shall be shown, and "DELETE" means you can delete the selected parameter from favorite list. See **Figure 12**

Figure 12. Parameter page from favorite menu



5. For the fault group, two soft keys "DETAIL" and "MENU" shall be shown. See **Figure 13.** For more information, see **Page 16**

Figure 13. Fault page



Chapter 3—Menu overview

Main menu page

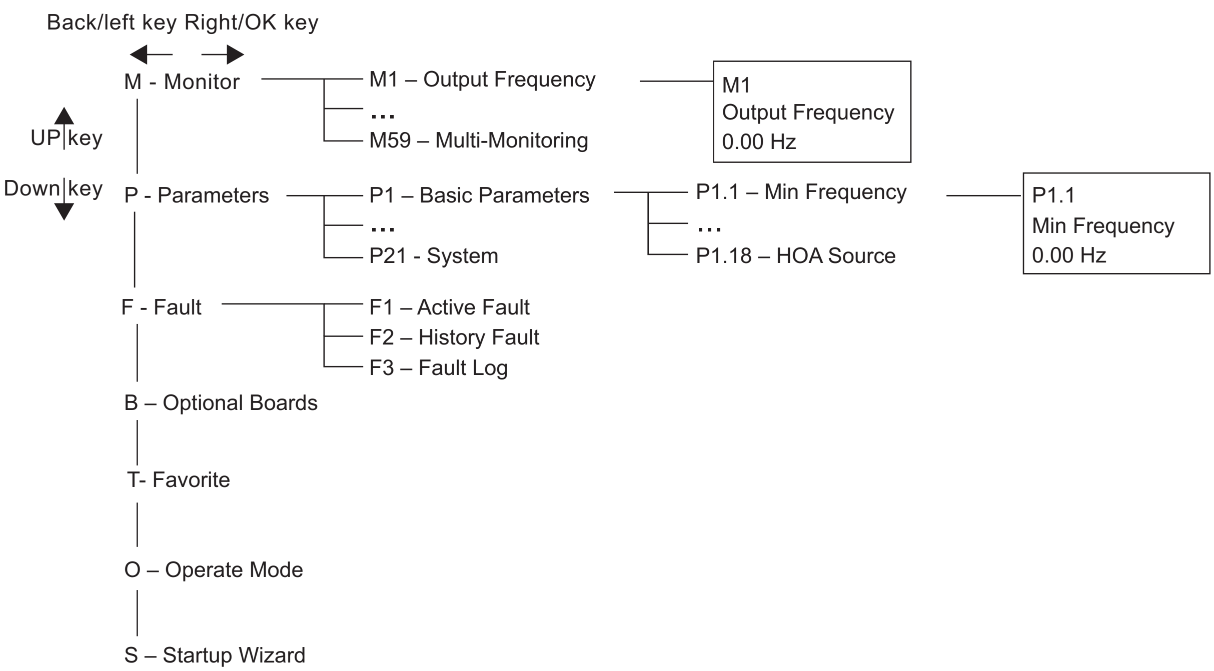
The data on the keypad are arranged in menus and sub-menus. The first menu level consists of M, P, F, B, T, O and S, and it is called the Main Menu.

Figure 14. Main menu page

Menu navigation

This section provides basic instruction on navigating each section in the menu structure.

Figure 15. Main menu navigation



Menu structure

Table 15. Keypad menus

Item	Description	
Monitor	M1—Output Frequency	M31—PID1 Feedback
	M2—Freq Reference	M32—PID1 Error Value
	M3—Motor Speed	M33—PID1 Output
	M5—Motor Torque	M35—PID2 Set Point
	M6—Motor Power	M36—PID2 Feedback
	M7—Motor Voltage	M37—PID2 Error Value
	M8—DC-link Voltage	M38—PID2 Output
	M9—Unit Temperature	M39—PID2 Status
	M10—Motor Temperature	M40—Running Motors
	M11—Torque Reference	M41—PT100 Temp
	M12—Analog Input 1	M42—Last Active Fault
	M13—Analog Input 2	M43—RTC Battery Status
	M14—Analog Output 1	M44—Instance Motor Power
	M15—Analog Output 2	M45—Energy Savings
	M16—DI1, DI2, DI3	M46—Control Board DIDO Status
	M17—DI4, DI5, DI6	M47—SlotA DIDO Status
	M18—DI7, DI8	M48—SlotB DIDO Status
	M19—DO1, Virtual RO1, Virtual RO2	M49—Application Status Word
	M20—RO1, RO2, RO3	M50—Standard Status Word
	M21—TC1, TC2, TC3	M51—Output
	M22—Interval 1	M52—Reference
	M23—Interval 2	M53—Total MWh Count
	M24—Interval 3	M54—Total Power Day Count
	M25—Interval 4	M55—Total Power Hr Count
	M26—Interval 5	M56—Trip MWh Count
	M27—Timer 1	M57—Trip Power Day Count
	M28—Timer 2	M58—Trip Power Hr Count
	M29—Timer 3	M59—Multi-Monitoring
	M30—PID1 Set Point	

Item	Description
Parameters	P1—Basic Parameters
	P2—Analog Input
	P3—Digital Input
	P5—Digital Output
	P6—Logic Function
	P7—Drive Control
	P8—Motor Control
	P9—Protections
	P10—PID Controller1
	P11—PID Controller2
	P12—Preset Speed
	P13—Torque Control
	P14—Brake
	P15—Fire Mode
	P16—Second Motor Para
	P17—Bypass
	P18—Pump Parameters
	P19—Real Time Clock
	P20—Communication
	P21—System

Item	Description
Fault	F1—Active Fault
	F2—History Fault
	F3—Fault Log
Optional Boards	Bx—SlotA/SlotB
Favorite	—
Operate Mode	O1—Output Frequency
	O2—Freq Reference
	O3—Motor Speed
	O4—Motor Current
	O5—Motor Torque
	O6—Motor Power
	O7—Motor Voltage
	O8—DC-Link Voltage
	O9—Unit Temperature
	O10—Motor Temperature
	R11—Keypad Torque Ref
	R12—Keypad Reference
	R13—PID1 Keypad Setpoint 1
	R14—PID1 Keypad Setpoint 2
Startup Wizard	S—Startup Wizard

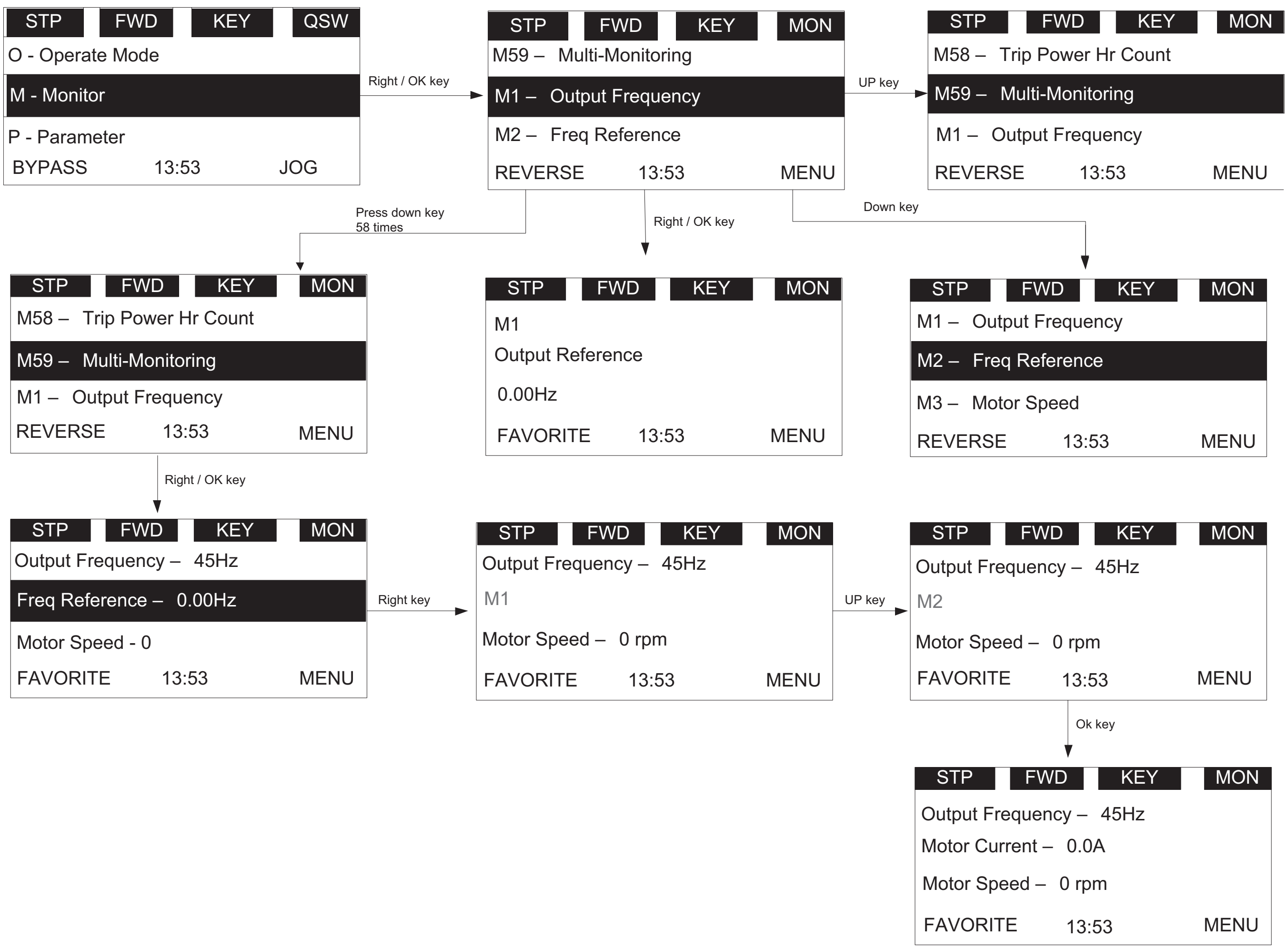
Note: Will vary depending on application selected.

M—Monitor

In monitor page, user shall not be able to edit the parameters except multi-monitor parameter. Multi-monitor parameters allow for displaying 3 monitor values on display. The three values can be changed to any of the listed values.

The navigation for monitor is as **Figure 16**.

Figure 16. M—Monitor



F—Fault

There are four fault pages. The first one is F1 active faults; the second one will pop-up automatically when fault occurs; the third one is F2 fault history, and the fourth one is the fault log page

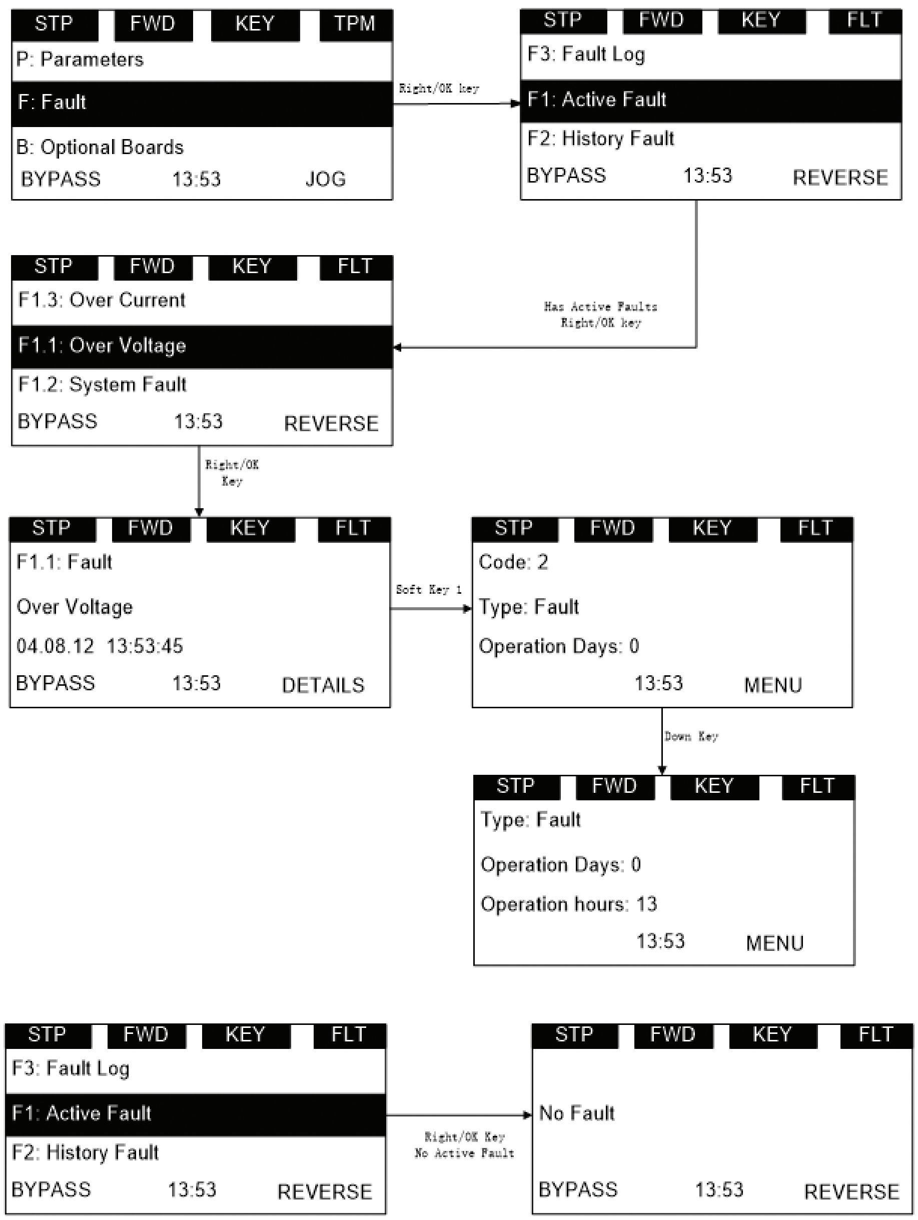
If there is no active fault/history fault, then "No fault" shall be shown.

Active fault

The navigation for active faults is as **Figure 17**.

After the DETAIL soft key is pressed, the following detail information about the fault shall be shown: fault code, type, power day count, power hour count, frequency, current, voltage, power, torque, DC voltage, unit temperature, run status, direction, warning, zero speed, Mwh count, at reference.

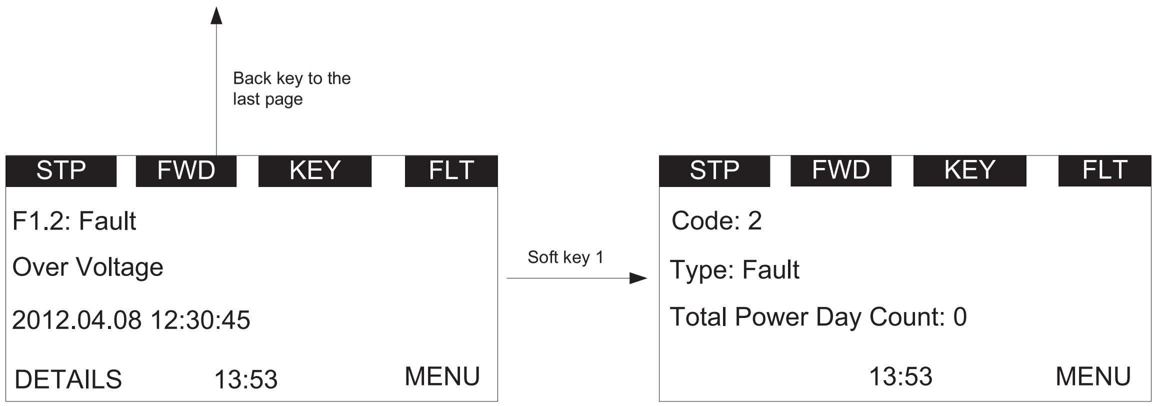
Figure 17. Active faults



Pop-up fault

The navigation for the pop-up active fault is as **Figure 18**.

Figure 18. Pop-up active faults



The latest active fault page shall pop up when there is a new active fault, the pop-up fault page is the same as the active fault page.

Pressing the back/reset key less than 2 seconds shall back to the last page user is watching.

Pressing the back/reset key more than 2 seconds shall reset all active faults when all the active fault condition is not satisfied.

User shall be able to navigate all the active faults by up/down key.

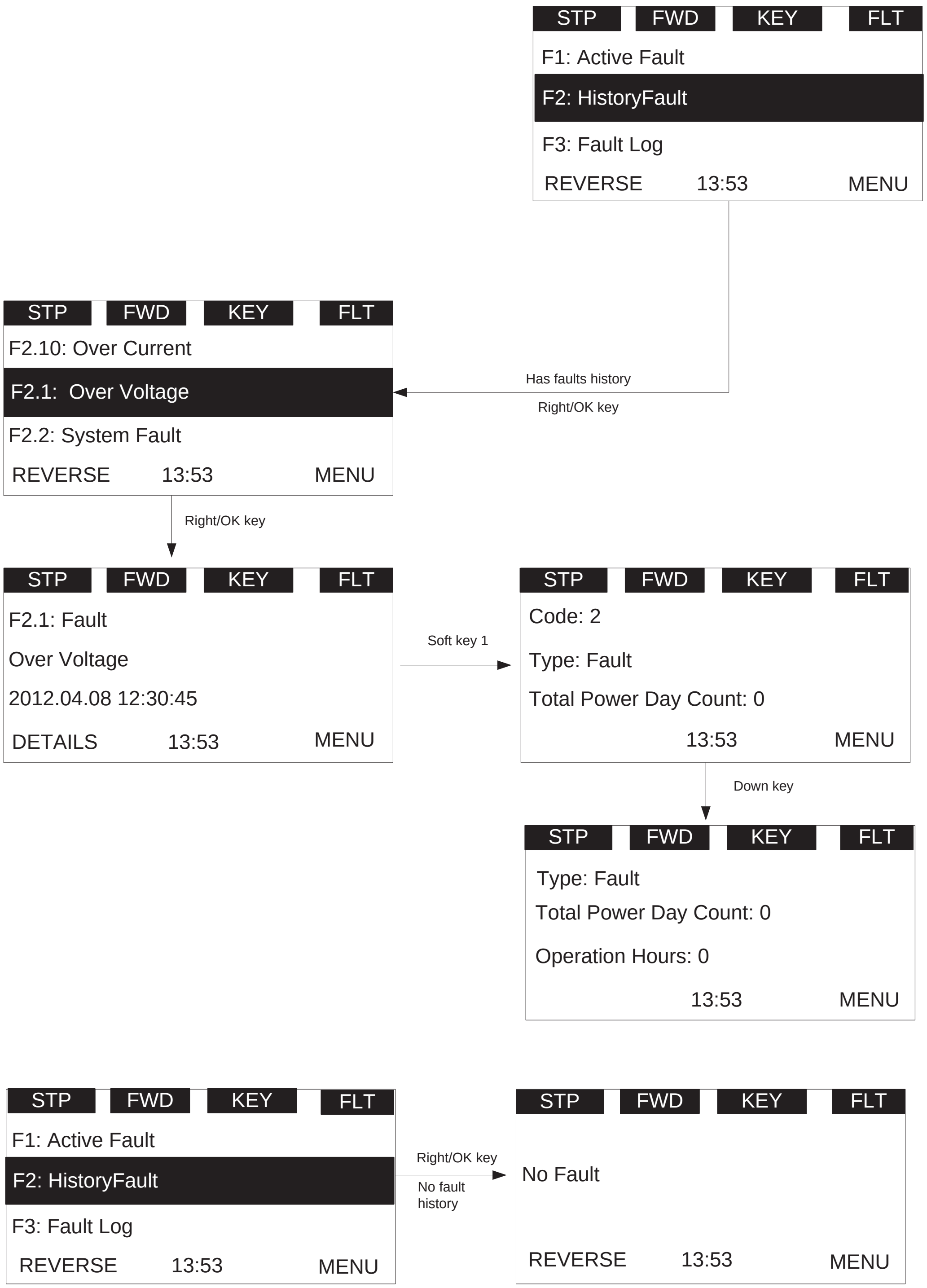
The page for active faults and pop-up faults are the same, except one: the response to the "Back" key. In active faults page, if the Back key is pressed, it returns to the last level menu. In pop-up faults page, it returns to the last page.

Fault history

The navigation for fault history is as **Figure 19**.

In any page, OK button is used to clear all the active faults and fault history by pressing more than 5s without password.

Figure 19. Fault history



Fault Log

The Fault Log will store the last 50 faults in it with 1 being the most recent and 50 being the oldest. Only the fault code, name and time stamp are stored with these faults.

P—Parameter

The navigation for the parameter menu is shown in **Figure 20**.

In parameter page, the parameter code shall be shown in the second line (such as P1.1).

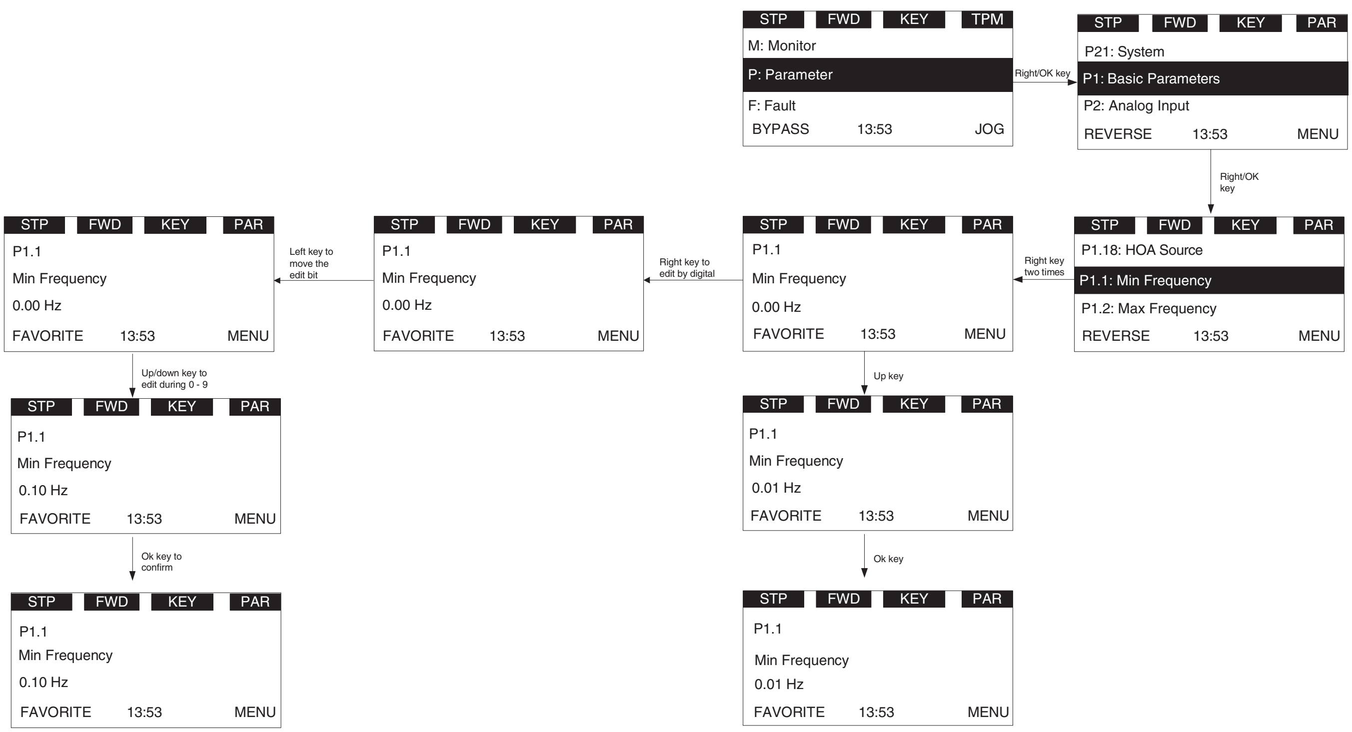
In parameter page, the parameter name shall be shown in the third line (such as Min Frequency).

In parameter page, the value of parameter and unit shall be shown in the fourth line (0.00 Hz).

If the parameter is read and write, then pressing the right key shall make the parameter value flash, which means that the value can be edited.

If the parameter is read only, then pressing the right key will not have any effect, which means that the value can't be edited.

Figure 20. Parameter menu overview



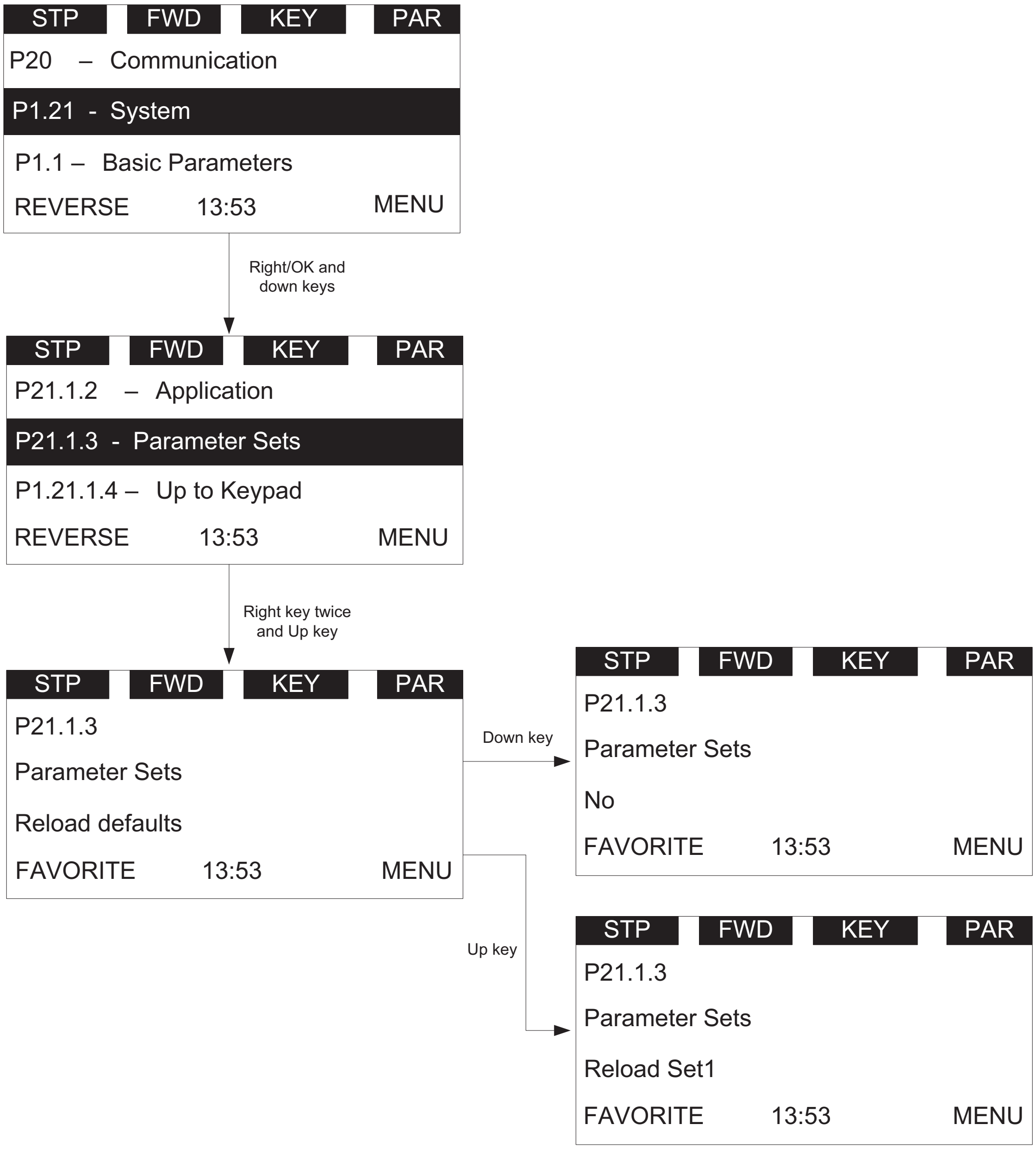
There are several special pages:

1. P21.1.3 Parameter Sets. See **Figure 21**.

User shall be able to load or store parameters. The options are as follows: Reload Defaults, Reload Set 1, Reload Set 2, Store Set 1, Store Set 2, Reset, Reload Defaults VM. The special points are:

- During this operation, "waiting…" shall flash, which means it is in process
- When it is finished, "OK" shall be shown
- Drive shall restart after default parameters are loaded
- "Reload Defaults VM" is for the sales stand. Do not use on a fully functioning drive

Figure 21. Parameter sets

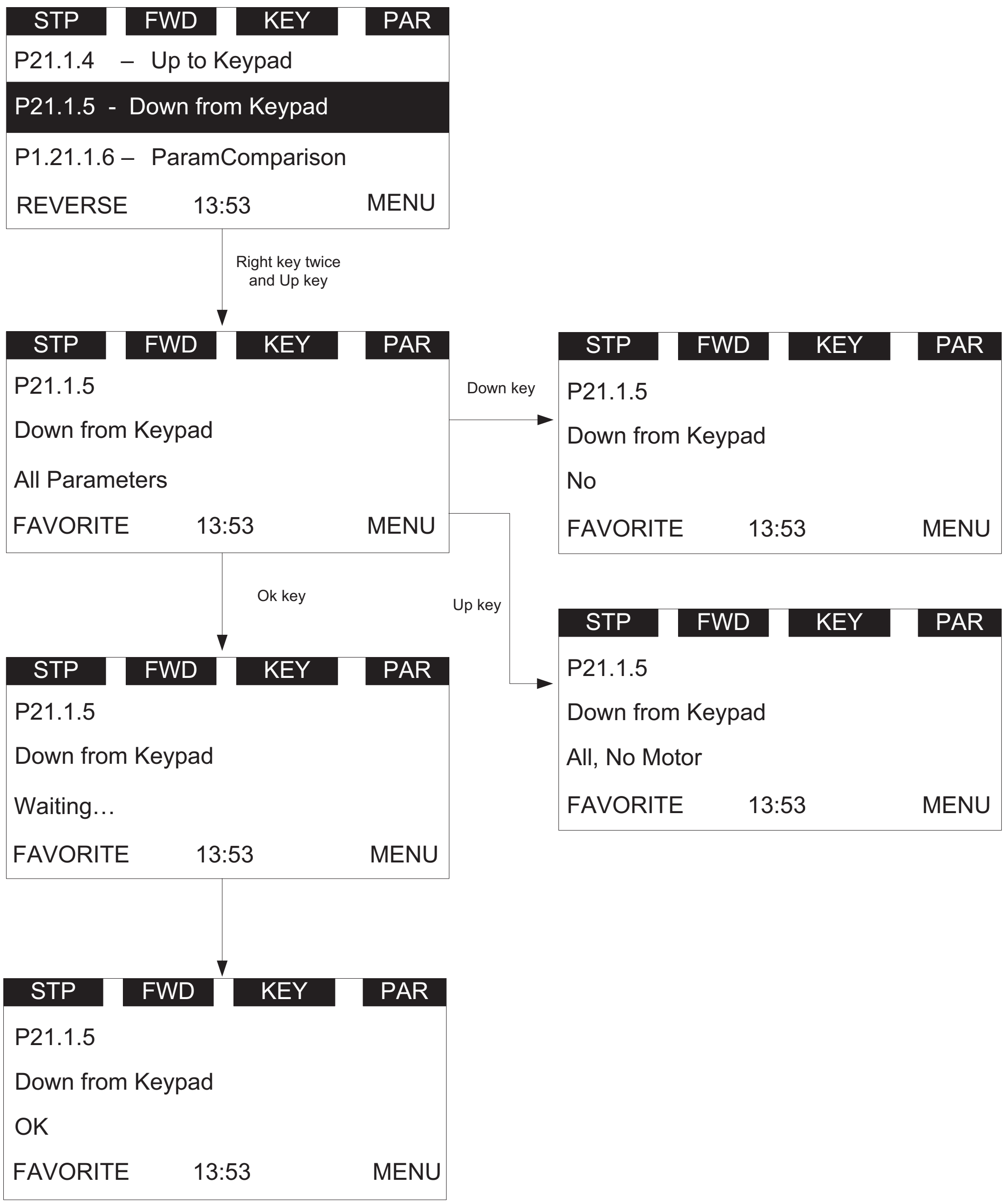


2. P21.1.4 Up to keypad and P21.1.5 Down from keypad

   During this operation, "waiting…" shall flash, which means it is in process. When it is finished, "OK" shall be shown.

This stores the parameters to keypad for transferring. Down from keypad is to download parameters from keypad to drive. Up to keypad takes the parameters from the drive and loads them to the keypad.

Figure 22. Down from keypad



3. P21.1.6 Parameters Comparison

   After the operation, the number of different parameter will be shown. Then press the right key; the first different parameter shall be shown.

   The parameter name shall be shown in the second line, and the value which is from keypad/default/set1/set2 shall be shown in the third line, the current value shall be shown in the fourth line.

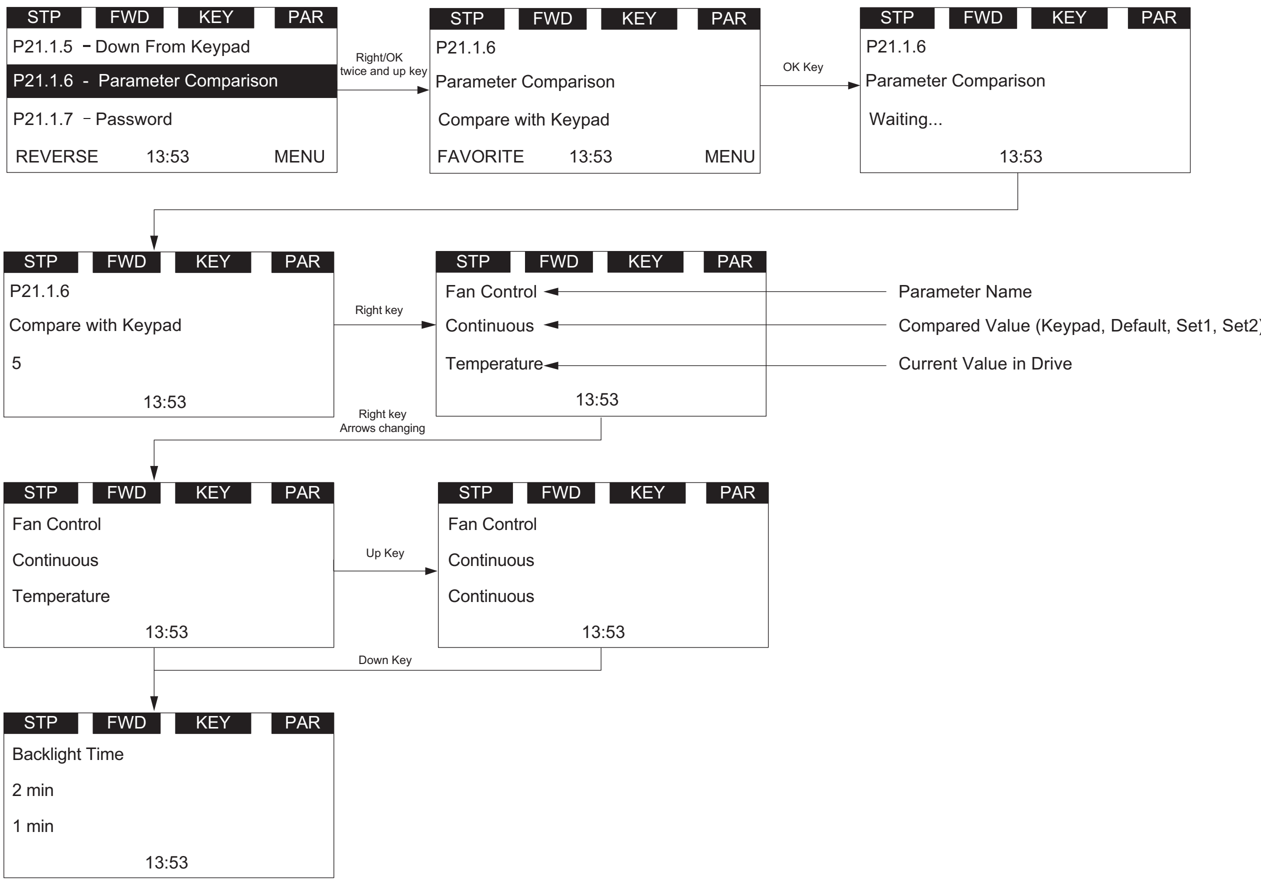
If the user wants to modify the current value, user shall be able to enter the edit mode by right key.

User shall be able to browse all the different parameters by up/down key.

During this operation, "waiting…" shall flash, which means it is in process.

When it is finished, "OK" shall be shown. See **Figure 23**.

Figure 23. Parameters comparison



4. P21.1.7 Password

Password protects the parameters' security. Zero means not used, otherwise in use. If password is in use, user can still see the values of parameters, but needs to enter the password before editing. User must enter current password before changing the password.

0000 shall mean that the password is not used, the password is 0000 by default.

The password range shall be 0001–9999, the setting of password and checking of password are as Figure 4-21.

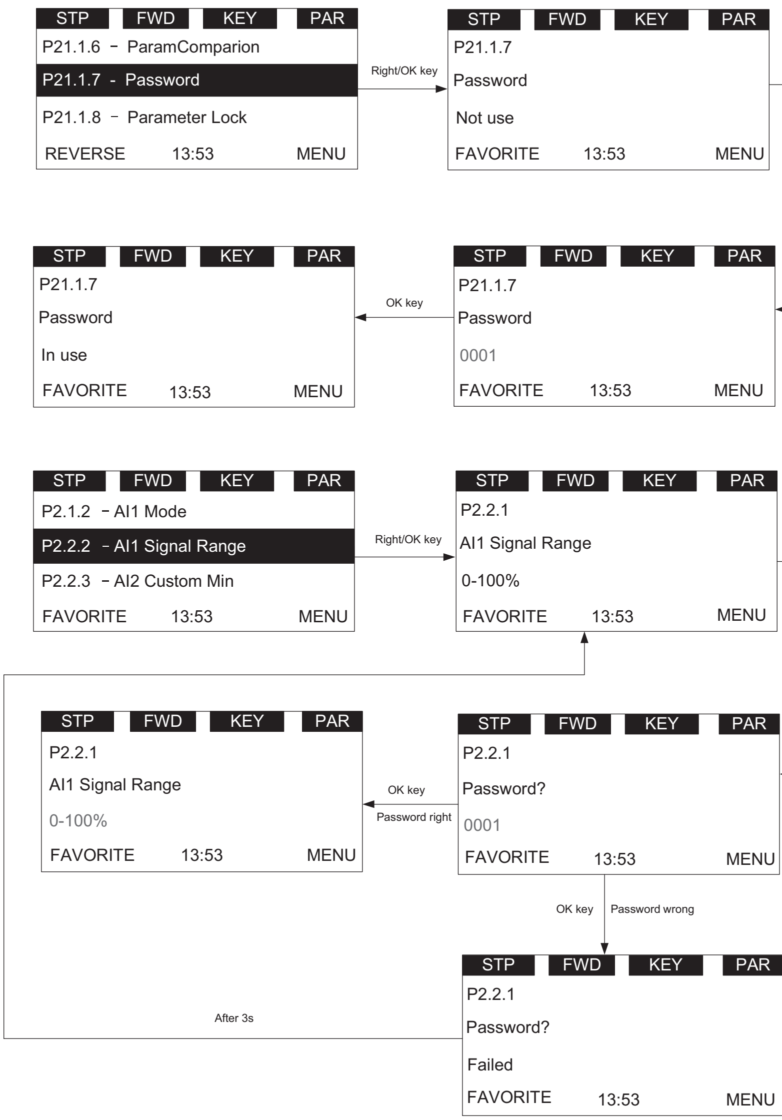
Enter the password setting page. If the password is 0000, then the "Not use" shall be shown. If the password is not 0000, then the "in use" shall be shown.

If the password is in use, and user inputs the wrong password, then the "failed" shall be shown.

After "failed" is shown 3 seconds, the page shall return to the parameter read page.

If the password is in use, and user inputs the right password, then the value shall flash, which indicates that it can be edited.

Figure 24. Password



Value edit

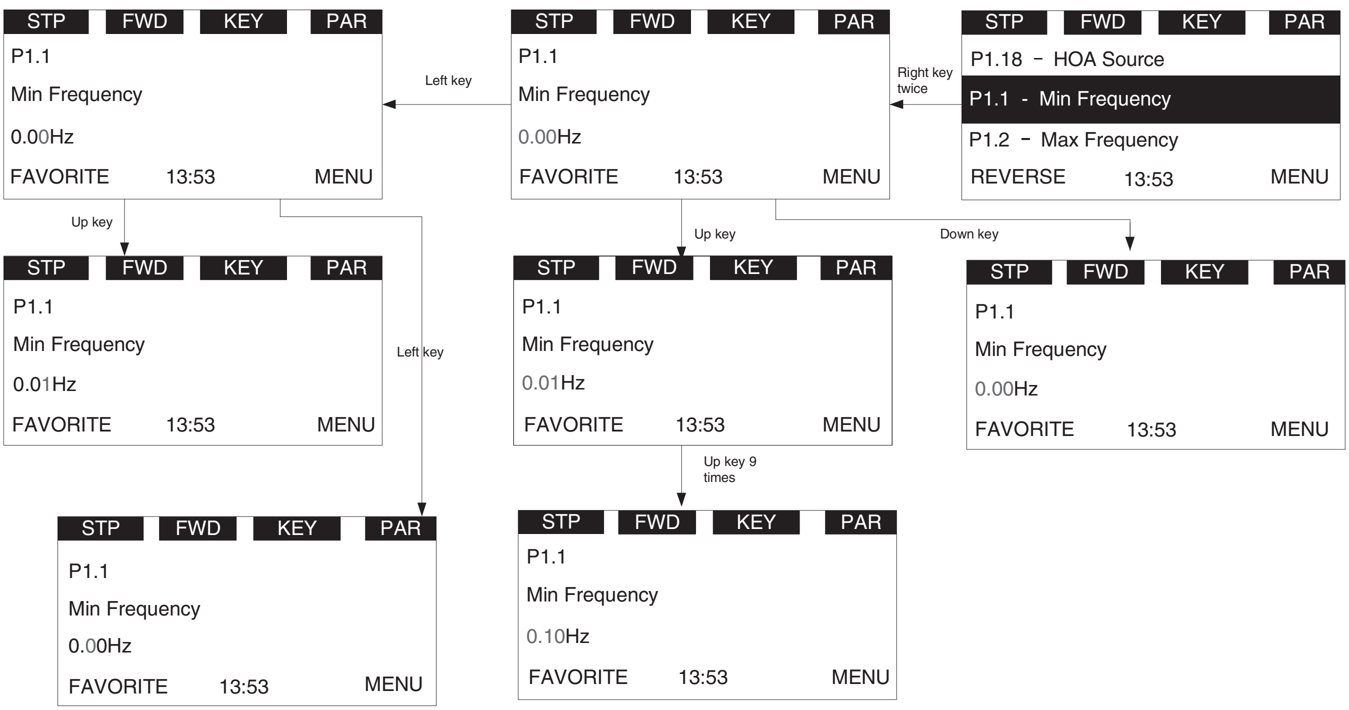
This topic shows the methods to edit value, and what will happen to edit value when password is in use and parameter lock is enabled.

We have three methods to edit value: edit by key press-hold, edit bit by bit, edit click by click.

For details, please see **Figure 25**. For the editable parameter, press "Right" key once to enter the read mode (just read the value of this parameter), press "Right" key again to enter the edit mode (user can modify the value of this parameter), press "Right" key again to enter the bit-by-bit edit mode.

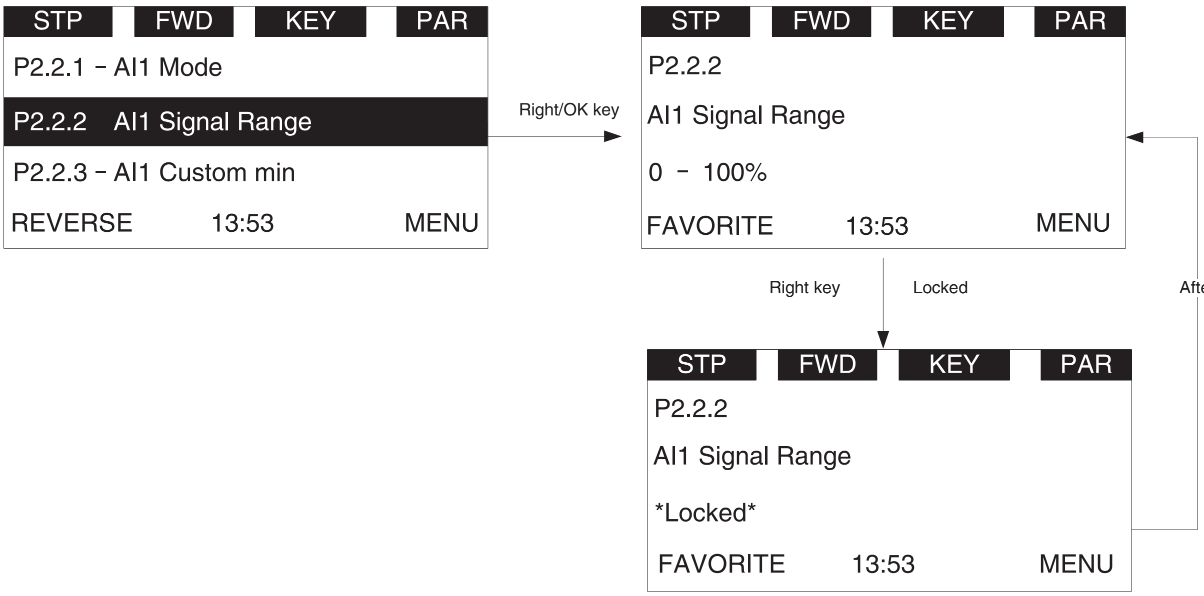
User shall use Left/Right key to change the current editable bit. When editing one number, it increases/decreases circularly, for example, pressing Up key can change to 9 from 0.

Figure 25. Edit parameter value



1. If password is in use, password shall be needed to check before edit parameter value.
2. If no action in 1min, the password shall need to be checked again.
3. If Parameter locked is enabled, *Locked* shall be shown if user tries to edit the parameter.

Figure 26. Parameter locked



T—Favorite

Favorites collect the user's favorite parameters. User can add one parameter into favorite list by "FAVORITE" soft key, and can delete it from favorite list by "DELETE" soft key.

If a parameter has not been added into the favorite list, the soft keys "FAVORITE" will be shown in parameter page (see **Figure 11** on **Page 12**). If it has been added into the favorite list, the soft key "FAVORITE" will not be shown.

If a parameter has been added to the favorite list, it shall appear in the favorite menu. Then when you enter into the favorite menu, the soft keys "DELETE" will be shown. This allows you to remove the selected parameter from favorite list (see **Figure 12** on **Page 12**).

After one parameter is removed from favorite list, the next parameter in the favorite list will be selected by default.

Chapter 4—Startup

Startup wizard page

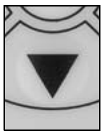
The Startup Wizard is a sub-menu of main menu. Once user enters into this menu, the Startup Wizard will begin.

In the Startup Wizard, you will be prompted for essential information needed by the drive so that it can start controlling your motor. During this process, you can also select the application that best suits your needs.

If user changes the Application, the drive and keypad will reset.

Startup wizard

In the *Startup Wizard*, you will be prompted for essential information needed by the drive so that it can start controlling your process. In the Wizard, you will need the following keypad buttons:

Up/Down buttons.

Use these to change value.

OK button.

Confirm selection with this button, and enter into next question.

Back/Reset button.

If this button was pressed at the first question, the Startup Wizard will be cancelled.

If this button is pressed in any step on the Startup Wizard, the Startup Wizard will be cancelled.

Once you have connected power to your Eaton PowerXL frequency converter, and the Startup Wizard is enabled, follow these instructions to easily set up your drive.

Table 16. Startup wizard instructions

Item	Description	
1	Startup Wizard	Press OK?
2	Application	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
3	Language	0 = English 1 = 中文 2 = Deutsch
4	Real Time Clock	yy.mm.dd hh:mm:ss
5	Daylight Saving	0 = Off 1 = EU 2 = US
6	Min Frequency	Min: 0.00Hz Max: Max Frequency
7	Max Frequency	Min: Min Frequency Max: 400.00Hz
8	Motor Nom Current	Min: DriveNomCurrCT*1/10 Max: DriveNomCurrCT*2
9	Current Limit	Min: Ih*1/10 Max: Ih*2
10	Motor Nom Speed	Min: 300 Max: 20000

Table 16. Startup wizard instructions, continued

Item	Description	
11	Motor PF	Min: 0.30 Max: 1.0
12	Motor Nom Volt	Min: 180 V Max: 690 V
13	Motor Nom Freq	Min: 30.00 Hz Max: 400.00 Hz
14	Accel Time 1	Min: 0.1 s Max: 3000.0 s
15	Decel Time 1	Min: 0.1 s Max: 3000.0 s
16	Local Control Place	0 = Keypad 1 = I/O terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
17	Local Reference	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 8 = Motor Pot 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 - AI2 12 = AI2 - AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = MIN(AI1,AI2) 16 = MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output
18	Remote 1 Control Place	0 = Keypad 1 = I/O terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
19	Remote 1 Reference	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 8 = Motor Pot 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 - AI2 12 = AI2 - AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = MIN(AI1,AI2) 16 = MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output

Now the Startup Wizard is done. It will not show again at the next power up. If you want to reset it, please select it from the main menu ("Startup Wizard").

Application macro Mini-Wizard

Multi-Pump and fan control Mini-Wizard

Table 17. Multi-Pump and fan control

Item	Description	
20	PID 1 Process Unit	Select Units
21	PID1 Process Unit Min	Min: –99999.99 Max: PID1 Process Unit Max
22	PID1 Process Unit Max	Min: Process Unit Min Max: 99999.99
23	PID 1 Set Point 1 Source	Select Function
24	PID 1 Keypad Set Point 1	Min: PID 1 Process Unit Min Max: PID 1 Process Unit Max
25	PID 1 Feedback 1 Source	Select Input
26	PID 1 Feedback 1 Min	Min: –200% Max: 200%
27	PID 1 Feedback 1 Max	Min: –200% Max: 200%
28	Number of Pumps	Min: 1 Max: 5
29	PID Bandwidth	Min: 0% Max: 100%
30	Add/Remove Delay	Min: 0 s Max: 3600 s
31	Interlock Enable	0 = Disabled 1 = Enabled

PID Mini-Wizard

The PID Mini-Wizard is activated in the Quick Setup menu. This Wizard assumes that you are going to use the PID controller in the "one feedback/one setpoint" mode. The control place will be I/O A and the default process unit "%". The PID Mini-Wizard asks for the following values to be set:

Table 18. PID Mini-Wizard values

Item	Description	
20	PID 1 Process Unit	Select Units
21	PID1 Process Unit Min	Min: –99999.99 Max: PID1 Process Unit Max
22	PID1 Process Unit Max	Min: PID1 Process Unit Min Max: 99999.99
23	PID 1 Set Point 1 Source	Select Function
24	PID 1 Keypad Set Point 1	Min: PID 1 Process Unit Min Max: PID 1 Process Unit Max
25	PID 1 Feedback 1 Source	Select Input
26	PID 1 Feedback 1 Min	Min: –200% Max: 200%
27	PID 1 Feedback 1 Max	Min: –200% Max: 200%

Chapter 5—Standard application

Introduction

The Standard Application is typically used in basic motor control scenarios where multiple pump control, PID loops, or advanced control loops are not required. It provides the ability for the user to define its local and remote control and reference signals. In addition there is the ability to scale the analog input and output signals to be read based off the desired motor response. There are also 8 digital inputs, 3 relay outputs, and 1 digital output that can be programmed to allow for control schemes that require the drive to have certain functions. It provides full customization on the motor control sequence with the ability to be in frequency or speed control mode, and tuning of the V/Hz curve can be selected. Drive/Motor protections can be customized to defined actions for added user control. Below is a list of other features that are available in the Standard Application.

Standard Application includes functions:

- Selectable digital input function
- Selectable digital output function
- Reference filter, scaling, inversion, offset and range
- Output signal filter, scaling, inversion, offset and range
- Selectable analog output function
- Programmable start/stop and reverse signal logic
- Two independent set of Acceleration/Deceleration ramps
- S curves
- Skip frequency
- Start source (Local/Remote control function)
- Reference source
- Flying start
- Jog
- Volts per Hertz control
- Real time clock function—RTC time display
- Drive temperature limit supervision
- Output frequency 1 limit supervision
- Output frequency 2 limit supervision
- Torque limit supervision
- Reference frequency limit supervision
- Power limit supervision
- Analog input limit supervision
- Auto restart
- Power loss ride through
- Trend buffer
- Programmable switching frequency
- Multi-Preset speeds
- Emergency stop
- Line start lockout
- Fan control
- DC brake
- Flux brake
- Dynamic brake
- Motor current limit supervision

I/O controls

- "Terminal To Function" (TTF) Programming

The design behind the programming of the digital inputs in the DG1 drive is to use "Terminal To Function" programming, which is composed of multiple functions that get assigned a digital input to that function. The parameters in the drive are set up with specific functions and by defining the digital input and slot in some cases, depending on which options are available. For use of the drives control board inputs, they will be referred to as DigIN:1 through DigIN:8. When additional option cards are used, they will be defined as DigIN:X:IOY:Z. The X indicates the slot that the card is being installed in, which will be either A or B. The IOY determines the type of card it is, which would be IO1 or IO5. The Z indicates which input is being used on that available option card.

- "Function To Terminal" (FTT) Programming

The design behind the programming of the relay outputs and digital output in the DG1 drive is to use "Function To Terminal" programming. It is composed of a terminal, be it a relay output or a digital output, that is assigned a parameter. Within that parameter, it has different functions that can be set.

The parameters of the Standard Application are explained on **Page 186** of this manual, "Description of Parameters." The explanations are arranged according to the parameter number.

For the DI function, we use Terminal programming method to function (TTF), where there is a fixed input that gets programmed to a list of functions. This allows for multiple inputs to be used for different functions. Connecting a certain input with a certain parameter function is done by give a parameter an appropriate value. The value is formed by the location of the input, either being on the standard control board or an external option board and the slot it is located in.

Force open/force close selection

The Force Open Selection would make the selected function always off. Essentially this is a virtual switch that is always open.

The Force Close Selection would make the selected function always on. Essentially this is a virtual switch that is always closed.

These options are assigned to a function if we want to force a state without using a hardware input.

Example:

If we set Run Enable to Force Closed the drive is always enabled. If we set the same function to Force Open the drive would never be Enabled. If a Digital input is to be used to activate this Run Enable the function should be assigned to a hardware input(See below for DIGIN Selections).

DIGIN selection

This allows Assignment of a hardware digital input to a function, this is set in a format of DigIN:X where X is one of the 8 Digital inputs on the Main control board.

Example:

If we set Run Enable to DigIN:6 the drive will be enabled when digital input 6 (Terminal 8) is closed, and would not be enabled when digital input 6 (Terminal 8) is open.

Option board DIGIN selection

This allows Assignment of a hardware digital input on an option card to a function, this is set in a format of DigIN: Y:IO1:X where Y is the slot the option card is inserted on the Main control board and X is the Input on the Board and IO1 is the type of option board used.

Example:

If we set Run Enable to DigIN:A:IO5:6 the drive will be enabled when digital input 6 is closed on the IO5 option card which is inserted in Slot A, and would not be enabled when digital input 6 on the option card is open.

Timer channel selection

A Time Channel is a virtual path to link the digital output of a timer function to a digital input function. To utilize this feature a timer or interval would need to be assigned to a time channel 1 through 3, and the input function to be controlled would need to be assigned to the same time channel.

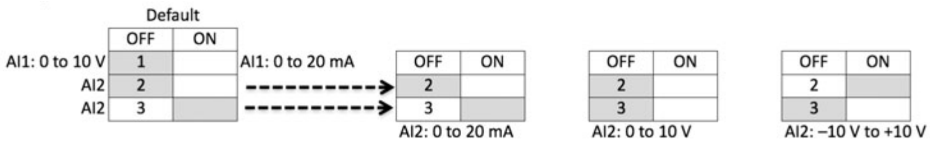
Example:

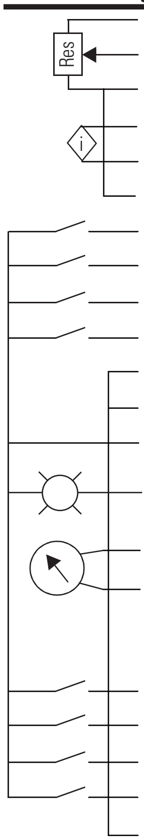
If we set Run Enable to DigIN:TimeChannel1 the drive will be enabled when the timer assigned to Time Channel 1 is active or High, and would not be enabled when the Time Channel is inactive or Low.

Control I/O configuration

- Run 240 Vac and 24 Vdc control wiring in separate conduit
- Communication wire to be shielded

Table 19. I/O connection





External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10 V	Ref. Output Voltage	—	10 Vdc Supply Source
	2	AI1+ ①	Analog Input 1	0–10 V	Voltage Speed Reference (Programmable to 4 mA to 20 mA)
	3	AI1–	Analog Input 1 Ground	—	Analog Input 1 Common (Ground)
	4	AI2+ ①	Analog Input 2	4 mA to 20 mA	Current Speed Reference (Programmable to 0–10 V)
	5	AI2–	Analog Input 2 Ground	—	Analog Input 2 Common (Ground)
	6	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	7	DIN5	Digital Input 5	Preset Speed B0	Sets frequency output to Preset Speed 1
	8	DIN6	Digital Input 6	Preset Speed B1	Sets frequency output to Preset Speed 2
	9	DIN7	Digital Input 7	Not used (TI–)	Input forces VFD output to shut off
	10	DIN8	Digital Input 8	Force Remote (TI+)	Input takes VFD from Local to Remote
	11	CMB	DI5 to DI8 Common	Grounded	Allows source input
	12	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	13	24 V	+24 Vdc Output	—	Control voltage output (100 mA max.)
	14	DO1	Digital Output 1	Ready	Shows the drive is ready to run
	15	24 Vo	+24 Vdc Output	—	Control voltage output (100 mA max.)
	16	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	17	AO1+	Analog Output 1	Output Frequency	Shows Output frequency to motor 0–60 Hz (4 mA to 20 mA)
	18	AO2+	Analog Output 2	Motor Current	Shows Motor current of motor 0–FLA (4 mA to 20 mA)
	19	24 Vi	+24 Vdc Input	—	External control voltage input
	20	DIN1	Digital Input 1	Run Forward	Input starts drive in forward direction (start enable)
	21	DIN2	Digital Input 2	Run Reverse	Input starts drive in reverse direction (start enable)
	22	DIN3	Digital Input 3	External Fault	Input causes drive to fault
	23	DIN4	Digital Input 4	Fault Reset	Input resets active faults
	24	CMA	DI1 to DI4 Common	Grounded	Allows source input
	25	A/+	RS-485 Signal A	—	Fieldbus Communication (Modbus, BACnet)
	26	B/-	RS-485 Signal B	—	Fieldbus Communication (Modbus, BACnet)
	27	R3NO	Relay 3 Normally Open	At Speed	Relay output 3 shows VFD is at Ref. Frequency
	28	R1NC	Relay 1 Normally Closed	Run	Relay output 1 shows VFD is in a run state
	29	R1CM	Relay 1 Common		
	30	R1NO	Relay 1 Normally Open		
	31	R3CM	Relay 3 Common	At Speed	Relay output 3 shows VFD is at Ref. Frequency
	32	R2NC	Relay 2 Normally Closed	Fault	Relay output 2 shows VFD is in a fault state
	33	R2CM	Relay 2 Common		
	34	R2NO	Relay 2 Normally Open		

Notes: The above wiring demonstrates a SINK configuration. It is important that CMA and CMB are wired to ground (as shown by dashed line). If a SOURCE configuration is desired, wire 24 V to CMA and CMB and close the inputs to ground. When using the +10 V for AI1, it is important to wire AI1—to ground (as shown by dashed line). If using +10 V for AI1 or AI2, terminals 3, 5, and 6 need to be jumpered together.
① AI1+ and AI2+ Support 10K potentiometer.

Table 20. Drive communication ports

Port	Communication
RJ45 Keypad Port	
Upload/Download Parameters	USB to RJ45
Remote Mount Keypad	Ethernet
Upgrade Drive Firmware	USB to RJ45
RJ45 Ethernet Port	
Upload/Download Parameters	Ethernet
Ethernet IP Communications	Ethernet
Modbus TCP Communications	Ethernet
RS-485 Serial Port ①	
Upload/Download Parameters	Two-Wire Twisted Pair
Upgrade Drive Firmware	Two-Wire Twisted Pair
Modbus RTU Communications	Two-Wire Twisted Pair
BACnet MS/TP Communications	Two-Wire Twisted Pair

① Shielded wire recommended.

Standard application—parameters list

On the next pages you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given on **Page 36,** "Description of Parameters." The descriptions are arranged according to the parameter number.

Column explanations:

Code = Location indication on the keypad; shows the operator the present parameter number
Parameter = Name of parameter
Min = Minimum value of parameter
Max = Maximum value of parameter
Unit = Unit of parameter value; given if available
Default = Value preset by factory
ID = ID number of the parameter

Table 21. Monitor—M

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1	Output Frequency			Hz		1	
M2	Freq Reference			Hz		24	
M3	Motor Speed			rpm		2	
M4	Motor Current			A		3	
M5	Motor Torque			%		4	
M6	Motor Power			%		5	
M7	Motor Voltage			V		6	
M8	DC-link Voltage			V		7	
M9	Unit Temperature			°C		8	
M10	Motor Temperature			%		9	
M12	Analog Input 1			Varies		10	
M13	Analog Input 2			Varies		11	
M14	Analog Output 1			Varies		25	
M15	Analog Output 2			Varies		575	
M16	DI1, DI2, DI3					12	
M17	DI4, DI5, DI6					13	
M18	DI7, DI8					576	
M19	DO1,Virtual RO1,Virtual RO2					14	
M20	RO1, RO2, RO3					557	
M41	PT100 Temperture			°C	1000.0	27	
M42	Latest Fault Code					28	
M43	RTC Battery Status				0	583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = OverVoltage
M44	Instant Motor Power			kW		1686	
M45 ②	Energy Savings			Varies	0.000	2120	
M46	Control Board DIDO Status					2209	
M47	SlotA DIDO Status					2210	
M48	SlotB DIDO Status					2211	
M49	Application Status Word					29	
M50	Standard Status Word					2414	
M51	Output			Varies		2445	
M52	Reference			Varies		2447	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 21. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M53	Total MWh Count			Mwh		601	
M54	Total Power Day Count					603	
M55	Total Power Hr Count					606	
M56	Trip MWh Count			Mwh		604	
M57	Trip Power Day Count					636	
M58	Trip Power Hr Count					637	
M59	Total Run time Count			h		2827	
M60	Numbers Of Start					2830	
M61	Trip Run Time Count			h		2829	
M62	Multi-Monitoring				2,1,3	30	
M63	FB Status Word					2101	
M64	FB Ctrol Word					2001	
M65	FB Speed Reference	0.00	100.00	%		2003	

Parameters

Table 22. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ②	Min Frequency	0.00	See Par ID 102	Hz	0.00	101	
P1.2 ②	Max Frequency	See Par ID 101	400.00	Hz	MaxFreqMFG	102	
P1.3 ②	Accel Time 1	0.1	3000.0	s	3.0	103	
P1.4 ②	Decel Time 1	0.1	3000.0	s	3.0	104	
P1.5 ①	Motor Nom Current	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT	486	
P1.6 ①	Motor Nom Speed	300	24000	rpm	MotorNomSpeedMFG	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	MotorNomVoltMFG	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	MotorNomFreqMFG	488	
P1.10 ②	Power Up Local Remote Select				0	1685	0 = Hold Last 1 = Local Control 2 = Remote control
P1.11 ②	Remote 1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal Start 2 3 = Keypad
P1.12 ②	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.13 ②	Bumpless Enable				0	2462	0 = Disabled 1 = Enabled

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 22. Basic Parameters—P1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.14 ①②	Local Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 - AI2 12 = AI2 - AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = AI2),MIN(AI1,AI2) 16 = AI2),MAX(AI1,AI2)
P1.15 ①②	Remote 1 Reference				0	137	See Par ID 136
P1.16 ①	Reverse Enable				1	1679	See Par ID 2462
P1.17 ②	Run Delay Time	0	32500	s	0	2423	
P1.18 ②	HOA Source				0	2465	0 = Disabled 1 = IO Terminal 2 = Keypad

Analog Input

Table 23. Basic Setting—P2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1 ②	AI Ref Scale Min Value	0.00	See Par ID 145	Hz	0.00	144	
P2.1.2 ②	AI Ref Scale Max Value	See Par ID 144	400.00	Hz	0.00	145	

Table 24. AI1 Settings—P2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10 V
P2.2.2 ②	AI1 Signal Range				0	175	0 = 0–100%/ 0–20 mA/0–10 V 1 = 20–100%/ 4–20 mA/2–10 V 2 = Customized
P2.2.3 ②	AI1 Custom Min	0.00	See Par ID 177	%	0.00	176	
P2.2.4 ②	AI1 Custom Max	See Par ID 176	100.00	%	100.00	177	
P2.2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.2.6 ②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.2.10 ②	AI1 Joystick Offset	-50.00	50.00	%	0.00	133	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 25. AI2 Settings—P2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.3.1	AI2 Mode				0	223	0 = 0–20 mA 1 = 0–10 V 2 = -10 to +10 V
P2.3.2 ②	AI2 Signal Range				1	183	0 = 0–100%/0–20mA/ 0–10 V/–10 to 10 V 1 = 20–100%/4–20 mA/ 2–10 V/–6 to 10 V 2 = Customized
P2.3.3 ②	AI2 Custom Min	0.00	See Par ID 185	%	0.00	184	
P2.3.4 ②	AI2 Custom Max	See Par ID 184	100.00	%	100.00	185	
P2.3.5 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.3.6 ②	AI2 Signal Invert				0	189	See Par ID 181
P2.3.7 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.3.8 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.3.9 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
P2.3.10 ②	AI2 Joystick Offset	-50.00	50.00	%	0.00	134	

Table 26. Fine Adjust—P2.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.4.1 ①②	Fine Tuning Input				0	2484	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = Fieldbus
P2.4.2 ①②	Fine Tuning Min	0.0	100.0	%	0.0	2485	
P2.4.3 ①②	Fine Tuning Max	0.0	100.0	%	0.0	2486	

Table 27. Digital Input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	IO Terminal 1 Start Stop Logic				0	143	0 = Forward - Reverse 1 = Start - Reverse 2 = Start - Enable 3 = 3 Wire Control
P3.2 ②⑤	IO Terminal 1 Start Signal 1				2	190	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 27. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.2 ②⑤, continued	IO Terminal 1 Start Signal 1				2	190	19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 31 = RO1 Function 32 = RO2 Function 33 = RO3 Function 34 = Virtual RO1 Function 35 = Virtual RO2 Function
P3.3 ②⑤	IO Terminal 1 Start Signal 2				3	191	See Par ID 190
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②③	Reverse				0	198	See Par ID 190
P3.6 ②③	Ext. Fault 1 NO				4	192	See Par ID 190
P3.7 ②③	Ext. Fault 1 NC				1	193	See Par ID 190
P3.8 ②④	Fault Reset				5	200	See Par ID 190
P3.9 ②③	Run Enable				1	194	See Par ID 190
P3.10 ②③	Preset Speed B0				6	205	See Par ID 190
P3.11 ②③	Preset Speed B1				7	206	See Par ID 190
P3.12 ②③	Preset Speed B2				0	207	See Par ID 190
P3.15 ②③	Accel/Decel Time Set				0	195	See Par ID 190
P3.16 ②③	Accel/Decel Prohibit				0	201	See Par ID 190
P3.17 ②④	No Access To Param				0	215	See Par ID 190
P3.21 ②③	Remote Control				9	196	See Par ID 190
P3.22 ②③	Local Control				0	197	See Par ID 190
P3.23 ②③	Remote 1/2 Select				0	209	See Par ID 190
P3.26 ②③	DC Brake Active				0	202	See Par ID 190
P3.32 ②③	Jog Enable				0	199	See Par ID 190
P3.36 ②③	AI Ref Source Select				0	208	See Par ID 190
P3.42 ②③	Ext Fault-AR				1	747	See Par ID 190
P3.45 ①②	IO Terminal 2 Start Stop Logic				0	2206	See Par ID 143
P3.46 ②⑤	IO Terminal 2 Start Signal 1				2	2207	See Par ID 190
P3.47 ②⑤	IO Terminal 2 Start Signal 2				3	2208	See Par ID 190
P3.48 ②③	Ext. Fault 2 NO				0	2293	See Par ID 190
P3.49 ②③	Ext. Fault 2 NC				1	2294	See Par ID 190
P3.50 ②③	Ext. Fault 3 NO				0	2295	See Par ID 190
P3.51 ②③	Ext. Fault 3 NC				1	2296	See Par ID 190

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 27. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.52 ②	Ext. Fault 1 Text				0	2297	0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage
P3.53 ②	Ext. Fault 2 Text				1	2298	See Par ID 2297
P3.54 ②	Ext. Fault 3 Text				2	2299	See Par ID 2297
P3.55 ②④	Parameter Set1/2 Sel				0	2312	See Par ID 190
P3.57 ②③	HOA On/Off				1	2395	See Par ID 190
P3.59 ②③	OP Cont Interlock NO				4	2801	See Par ID 190
P3.60 ②③	OP Cont Interlock NC				1	2802	See Par ID 190

Table 28. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	See Par ID 222
P4.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0–Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 19 = AI1 20 = AI2 21 = Output Freq (–2 ± 2N) 22 = Motor Torque (–2 ± 2N) 23 = Motor Power (–2 ± 2N) 24 = PT100 Temperature 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2 35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current (–2 ± 2N)
P4.3 ②	AO1 Minimum				1	149	0 = 0 V/0 mA 1 = 2 V/4 mA
P4.4 ②	AO1 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	AO1 Scale	10	1000	%	100	150	
P4.6 ②	AO1 Inversion				0	148	See Par ID 181
P4.7 ②	AO1 Offset	-100.00	100.00	%	0.00	173	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 28. Analog Output—P4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.8 ②	AO2 Mode				0	228	See Par ID 222
P4.9 ②	AO2 Function				4	229	See Par ID 146
P4.10 ②	AO2 Minimum				1	232	See Par ID 149
P4.11 ②	AO2 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	AO2 Scale	10	1000	%	100	233	
P4.13 ②	AO2 Inversion				0	231	See Par ID 181
P4.14 ②	AO2 Offset	-100.00	100.00	%	0.00	234	

Table 29. Digital Output—P5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1 ②	DO1 Function				1	151	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 13 = OverHeat Fault 14 = OverCurrent Regular 15 = OverVoltage Regular 16 = UnderVoltage Regular 17 = 4 mA Ref Fault/ Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Therm Protection 31 = FB Digital Input 1 32 = FB Digital Input 2 33 = FB Digital Input 3 34 = FB Digital Input 4 39 = In E-Stop 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 63 = Auto Local On COM Fault 64 = FieldBus_RTU_ Fault,FieldBus RTU Fault

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 29. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1 ②, continued	DO1 Function				1	151	65 = FieldBus_TCP_ Fault,FieldBus TCP Fault 66 = FieldBus_MSTP_ Fault,FieldBus MSTP Fault 67 = FieldBus_EIP_ Fault,FieldBus EIP Fault 68 = FieldBus_SlotA_ Fault,FieldBus SlotA Fault 69 = FieldBus_SlotB_ Fault,FieldBus SlotB Fault 70 = FieldBus SMDT Fault
P5.2 ②	RO1 Function				2	152	See Par ID 151
P5.3 ②	RO2 Function				3	153	See Par ID 151
P5.4 ②	RO3 Function				7	538	See Par ID 151
P5.5 ②	Virtual RO1 Function				0	2463	See Par ID 151
P5.6 ②	Virtual RO2 Function				0	2464	See Par ID 151
P5.7 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 1 Supv Val	0.00	See Par ID 102	Hz	0.00	155	
P5.9 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10 ②	Freq Limit 2 Supv Val	0.00	See Par ID 102	Hz	0.00	158	
P5.11 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Torque Limit Supv Val	-1000.0	1000.0	%	100.0	160	
P5.13 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.14 ②	Ref Limit Supv Val	0.00	See Par ID 102	Hz	0.00	162	
P5.17 ②	Temp Limit Supv				0	165	See Par ID 161
P5.18 ②	Temp Limit Supv Val	-10.0	75.0	°C	40.0	166	
P5.19 ②	Power Limit Supv				0	167	See Par ID 161
P5.20 ②	Power Limit Supv Val	-200.0	200.0	%	0.0	168	
P5.21 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.22 ②	AI Limit Supv				0	171	See Par ID 161
P5.23 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.32 ②	RO1 On Delay	0.0	320.0	s	0.0	2112	
P5.33 ②	RO1 Off Delay	0.0	320.0	s	0.0	2113	
P5.34 ②	RO2 On Delay	0.0	320.0	s	0.0	2114	
P5.35 ②	RO2 Off Delay	0.0	320.0	s	0.0	2115	
P5.36 ②	RO3 On Delay	0.0	320.0	s	0.0	2116	
P5.37 ②	RO3 Off Delay	0.0	320.0	s	0.0	2117	
P5.38 ②	RO3 Reverse				0	2118	0 = No 1 = Yes
P5.39 ②	Motor Current 1 Supv				0	2189	See Par ID 159
P5.40 ②	Motor Current 1 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190	
P5.41 ②	Motor Current 2 Supv				0	2191	See Par ID 159
P5.42 ②	Motor Current 2 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192	
P5.43 ②	Second AI Supv Select				0	2193	See Par ID 170

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 29. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.44 ②	Second AI Limit Supv				0	2194	See Par ID 161
P5.45 ②	Second AI Limit Supv Val	0.00	100.00	%	0.00	2195	
P5.46 ②	Motor Current 1 Supv Hyst	0.1	1.0	A	0.1	2196	
P5.47 ②	Motor Current 2 Supv Hyst	0.1	1.0	A	0.1	2197	
P5.48 ②	AI Supv Hyst	1.00	10.00	%	1.00	2198	
P5.49 ②	Second AI Supv Hyst	1.00	10.00	%	1.00	2199	
P5.50 ②	Freq Limit 1 Supv Hyst	0.10	1.00	Hz	0.10	2200	
P5.51 ②	Freq Limit 2 Supv Hyst	0.10	1.00	Hz	0.10	2201	
P5.52 ②	Torque Limit Supv Hyst	1.0	5.0	%	1.0	2202	
P5.53 ②	Ref Limit Supv Hyst	0.10	1.00	Hz	0.10	2203	
P5.54 ②	Temp Limit Supv Hyst	1.0	10.0	°C	1.0	2204	
P5.55 ②	Power Limit Supv Hyst	0.1	10.0	%	0.1	2205	

Table 30. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See Par ID 135
P7.2 ①②	Remote 2 Reference				7	139	See Par ID 136
P7.3 ②	Keypad Reference	See Par ID 101	See Par ID 102	Hz	0.00	141	
P7.4 ②	Keypad Direction				0	116	0 = Forward 1 = Reverse
P7.5 ②	Keypad Stop				1	114	0 = Enabled-Keypad Operation 1 = Always Enabled
P7.6 ②	Jog Reference	0.00	See Par ID 102	Hz	5.00	117	
P7.9 ②	Start Mode				0	252	0 = Ramp 1 = Flying Start From Stop Frequency 2 = Flying Start From Max Frequency
P7.10 ②	Stop Mode				1	253	0 = Coasting 1 = Ramp
P7.11 ②	Ramp 1 Shape	0.0	10.0	s	0.0	247	
P7.12 ②	Ramp 2 Shape	0.0	10.0	s	0.0	248	
P7.13 ②	Accel Time 2	0.1	3000.0	s	10.0	249	
P7.14 ②	Decel Time 2	0.1	3000.0	s	10.0	250	
P7.15 ②	Skip F1 Low Limit	0.00	See Par ID 257	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	See Par ID 256	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	See Par ID 259	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	See Par ID 258	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	See Par ID 261	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	See Par ID 260	400.00	Hz	0.00	261	
P7.21 ②	Skip Range Ramp Factor	0.1	10.0		1.0	264	
P7.22 ②	Power Loss Function				0	267	See Par ID 2462
P7.23 ②	Power Loss Time	0.3	5.0	s	2.0	268	
P7.24 ②	Currency				0	2122	0 = $ 1 = £ 2 = € 3 = ¥ 4 = Rs 5 = R$ 6 = Fr 7 = kr

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 30. Drive Control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.25 ②	Energy Cost			Varies	0.00	2123	
P7.26 ②	Data Type				0	2124	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P7.27	Energy Savings Reset					2125	0 = Not Reset 1 = Reset
P7.28 ①②	2th Stage Ramp Frequency	See Par ID 101	See Par ID 102	Hz	30.00	2444	
P7.29	Change PhaseSequence Motor				0	2515	0 = Change Disable 1 = Change Enable
P7.30 ②	Run Remove Stop Mode				0	2667	See Par ID 253

Table 31. Motor Control—P8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.1 ①②	Motor Control Mode				0	287	0 = Freq Control 1 = Speed Control
P8.2 ①	Current Limit	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrVT	107	
P8.3 ①②	V/Hz Optimization				0	109	See Par ID 2462
P8.4 ①②	V/Hz Ratio				0	108	0 = Linear 1 = Squared 2 = Programmable 3 = Linear + Flux Optimization
P8.5 ①②	Field Weakening Point	8.00	400.00	Hz	FieldWeakPointMFG	289	
P8.6 ①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7 ①②	V/Hz Mid Frequency	0.00	See Par ID 289	Hz	VHzCurveMidFreqMFG	291	
P8.8 ①②	V/Hz Mid Voltage	0.00	100.00	%	100.00	292	
P8.9 ①②	Zero Frequency Voltage	0.00	40.00	%	0.00	293	
P8.10 ②	Switching Frequency	MinSwitchFreq	MaxSwitchFreq	kHz	DefaultSwitchFreqCT	2522	
P8.11 ②	Sine Filter Enable				0	1665	See Par ID 2462
P8.12 ①②	OverVoltage Control				3	294	0 = Disabled 1 = REF + 8Hz 2 = Max Freq 3 = Max Freq + 8Hz
P8.17 ②	Frequency Ramp Out FilterTime Constant	0	3000	ms	0	1585	
P8.55	VF Stable Kd	0	3000	%	100	1656	
P8.56	VF Stable Kq	0	3000	%	100	1657	
P8.57 ①②	Overmodulation Enable				0	2835	See Par ID 2462

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 32. Protections—P9

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.1 ①②	4 mA Input Fault				0	306	0 = No Action 1 = Warning 2 = Warning: Previous Freq 3 = Warning: Preset Freq 4 = Fault 5 = Fault, Coast
P9.2 ①②	4 mA Fault Frequency	0.00	See Par ID 102	Hz	0.00	331	
P9.3 ①②	External Fault				2	307	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P9.4 ①②	Input Phase Fault				2	332	See Par ID 307
P9.5 ①②	Uvolt Fault Response				2	330	See Par ID 307
P9.6 ①②	Output Phase Fault				2	308	See Par ID 307
P9.7 ①②	Ground Fault				2	309	See Par ID 307
P9.8 ①②	Motor Thermal Protection				2	310	See Par ID 307
P9.9 ②	Motor Thermal F0 Current	0.0	150.0	%	40.0	311	
P9.10 ②	Motor Thermal Time	1	200	min	45	312	
P9.11 ①②	Stall Protection				0	313	See Par ID 307
P9.12 ②	Stall Current Limit	0.1	ActiveMotor NomCurr*2	A	ActiveMotor NomCurr*13/10	314	
P9.13 ②	Stall Time Limit	1.0	120.0	s	15.0	315	
P9.14 ②	Stall Frequency Limit	1.00	See Par ID 102	Hz	25.00	316	
P9.15 ①②	Underload Protection				0	317	See Par ID 307
P9.16 ②	Underload Fnom Torque	10.0	150.0	%	50.0	318	
P9.17 ②	Underload F0 Torque	5.0	150.0	%	10.0	319	
P9.18 ②	Underload Time Limit	2.00	600.00	s	20.00	320	
P9.19 ①②	Thermistor Fault Response				2	333	See Par ID 307
P9.20 ②	Line Start Lockout				2	750	0 = Disabled, No Change 1 = Enable, No Change 2 = Disabled, Changed 3 = Enable, Changed
P9.21 ①②	Fieldbus Fault Response				2	334	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast 4 = Warning, Coast 5 = Warning, Auto Switch To Local 6 = Warning, Auto Switch To Preset Speed 1
P9.22 ①②	OPTCard Fault Response				2	335	See Par ID 307
P9.23 ①②	Unit Under Temp Prot				2	1564	See Par ID 307
P9.24 ②	AR Wait Time	1.00	300.00	s	1.00	321	
P9.25 ②	AR Trail Time	0.00	600.00	s	30.00	322	
P9.26 ②	AR Start Function				0	323	0 = Flying Start From Stop Frequency 1 = Ramp 2 = Flying Start From Max Frequency
P9.27 ②	Undervoltage Attempts	0	10		1	324	
P9.28 ②	OverVoltage Attempts	0	10		1	325	
P9.29 ②	OverCurrent Attempts	0	3		1	326	
P9.30 ②	4 mA Fault Attempts	0	10		1	327	
P9.31 ②	Motor Temp Fault Attempts	0	10		1	329	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 32. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.32 ②	External Fault Attempts	0	10		1	328	
P9.33 ②	Underload Attempts	0	10		1	336	
P9.34 ①②	RTC Fault				1	955	See Par ID 307
P9.35 ①②	PT100 Fault Response				2	337	See Par ID 307
P9.36 ①②	Replace Battery Fault Response				1	1256	See Par ID 307
P9.37 ①②	Replace Fan Fault Response				1	1257	See Par ID 307
P9.38 ①②	IP Address Confliction Resp				1	1678	See Par ID 307
P9.39 ②	Cold Weather Mode				0	2126	See Par ID 2462
P9.40 ②	Cold Weather Volt. Level	0.0	20.0	%	2.0	2127	
P9.41 ②	Cold Weather Time Out	0	10	min	3	2128	
P9.42	Cold Weather Password					2129	
P9.43	Under Temp Fault Override					2130	See Par ID 2118
P9.44 ②	Ground Fault Limit	0	30	%	15	2158	
P9.45 ①②	Keypad Comm Fault Response				2	2157	See Par ID 307
P9.46 ②	Preheat Mode				0	2159	See Par ID 2462
P9.47 ②	Preheat Control Source				31	2160	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 31 = Drive Temperature 32 = SlotA PT100 Temp Channel 1 33 = SlotA PT100 Temp Channel 2 34 = SlotA PT100 Temp Channel 3 35 = SlotA Max PT100 Temp 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 32. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.47 ②, continued	Preheat Control Source				31	2160	38 = SlotB PT100 Temp Channel 3 39 = SlotB Max PT100 Temp 40 = SlotA and SlotB Max PT100 Temp
P9.48 ②	Preheat Enter Temp	0.0	19.9	°C	10.0	2161	
P9.49 ②	Preheat Quit Temp	20.0	40.0	°C	20.0	2162	
P9.50 ②	Preheat Output Volt	0.0	20.0	%	2.0	2163	
P9.56 ②	STO Fault Response				2	2427	0 = No Action 1 = Warning 2 = Fault
P9.57 ②	Fault Reset Start				0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset
P9.58	Warning Operation Mode				1	2657	0 = No Action 1 = Warning, No Store 2 = Warning, Store
P9.59 ②	Fan Protection				2	2664	See Par ID 307
P9.60	Under Voltage Trip Level	DCLinkUnder VoltStopLimit	DCLinkOver VoltStopLimit	V	DCLinkUnder VoltProtectLimit	2666	
P9.61 ②	OP Cont Interlock Attempts	0	10		1	2803	
P9.62 ①②	OP Cont Interlock Protection				2	2831	See Par ID 307

Table 33. Preset Speed—P12

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1 ②	Preset Speed 1	0.00	See Par ID 102	Hz	5.00	105	
P12.2 ②	Preset Speed 2	0.00	See Par ID 102	Hz	10.00	106	
P12.3 ②	Preset Speed 3	0.00	See Par ID 102	Hz	15.00	118	
P12.4 ②	Preset Speed 4	0.00	See Par ID 102	Hz	20.00	119	
P12.5 ②	Preset Speed 5	0.00	See Par ID 102	Hz	25.00	120	
P12.6 ②	Preset Speed 6	0.00	See Par ID 102	Hz	30.00	121	
P12.7 ②	Preset Speed 7	0.00	See Par ID 102	Hz	35.00	122	

Table 34. Brake—P14

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P14.1 ①②	DC-Brake Current	DriveNom CurrCT*15/100	DriveNom CurrCT*15/10	A	DriveNom CurrCT*1/2	254	
P14.2 ①②	Start DC-Brake Time	0.00	600.00	s	0.00	263	
P14.3 ①②	Stop DC-Brake Frequency	0.10	10.00	Hz	1.50	262	
P14.4 ①②	Stop DC-Brake Time	0.00	600.00	s	0.00	255	
P14.5 ①②	Brake Chopper Mode				0	251	0 = Disabled 1 = B(Run) T(Rdy) 2 = External 3 = B(Rdy) T(Rdy) 4 = B(Run) T(No)
P14.6 ①②	Flux Brake				0	266	0 = Off 1 = On
P14.7 ①②	Flux Brake Current	ActiveMotor NomCurr*1/10	See Par ID 107	A	ActiveMotor NomCurr*1/2	265	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Communication

Table 35. FB Process Data Input Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1 ②	FB Process Data Input 1 Sel	0	2663		2541	2533	
P20.1.2 ②	FB Process Data Input 2 Sel	0	See Par ID 2533		2542	2534	
P20.1.3 ②	FB Process Data Input 3 Sel	0	See Par ID 2533		2550	2535	
P20.1.4 ②	FB Process Data Input 4 Sel	0	See Par ID 2533		0	2536	
P20.1.5 ②	FB Process Data Input 5 Sel	0	See Par ID 2533		0	2537	
P20.1.6 ②	FB Process Data Input 6 Sel	0	See Par ID 2533		0	2538	
P20.1.7 ②	FB Process Data Input 7 Sel	0	See Par ID 2533		0	2539	
P20.1.8 ②	FB Process Data Input 8 Sel	0	See Par ID 2533		0	2540	

Table 36. FB Process Data Output Sel—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1 ②	FB Process Data Output 1 Sel				1	1556	
P20.2.2 ②	FB Process Data Output 2 Sel				2	1557	
P20.2.3 ②	FB Process Data Output 3 Sel				3	1558	
P20.2.4 ②	FB Process Data Output 4 Sel				4	1559	
P20.2.5 ②	FB Process Data Output 5 Sel				5	1560	
P20.2.6 ②	FB Process Data Output 6 Sel				6	1561	
P20.2.7 ②	FB Process Data Output 7 Sel				7	1562	
P20.2.8 ②	FB Process Data Output 8 Sel				28	1563	
P20.2.9 ②	Standard Status Word Bit0 Function Select				1	2415	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 13 = OverHeat Fault 14 = OverCurrent Regular 15 = OverVoltage Regular 16 = UnderVoltage Regular 17 = 4 mA Ref Fault/ Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 36. FB Process Data Output Sel—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.9 ②, continued	Standard Status Word Bit0 Function Select				1	2415	24 = Thermistor Fault Output 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Therm Protection 31 = FB Digital Input 1 32 = FB Digital Input 2 33 = FB Digital Input 3 34 = FB Digital Input 4 39 = In E-Stop 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 63 = Auto Local On COM Fault 64 = FieldBus_RTU_ Fault,FieldBus RTU Fault 65 = FieldBus_TCP_ Fault,FieldBus TCP Fault 66 = FieldBus_MSTP_ Fault,FieldBus MSTP Fault 67 = FieldBus_EIP_ Fault,FieldBus EIP Fault 68 = FieldBus_SlotA_ Fault,FieldBus SlotA Fault 69 = FieldBus_SlotB_ Fault,FieldBus SlotB Fault 70 = FieldBus SMDT Fault
P20.2.10 ②	Standard Status Word Bit1 Function Select				2	2416	See Par ID 2415
P20.2.11 ②	Standard Status Word Bit2 Function Select				3	2417	See Par ID 2415
P20.2.12 ②	Standard Status Word Bit3 Function Select				4	2418	See Par ID 2415
P20.2.13 ②	Standard Status Word Bit4 Function Select				5	2419	See Par ID 2415
P20.2.14 ②	Standard Status Word Bit5 Function Select				6	2420	See Par ID 2415
P20.2.15 ②	Standard Status Word Bit6 Function Select				7	2421	See Par ID 2415
P20.2.16 ②	Standard Status Word Bit7 Function Select				8	2422	See Par ID 2415

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

RS-485 Bus

Table 37. Basic Setting—P20.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.1.1 ①	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP 2 = SWD

Table 38. Modbus RTU—P20.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.2.1 ①	Slave Address	1	247		1	587	
P20.3.2.2 ①	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.2.3 ①	Parity Type				2	585	0 = None 1 = Odd 2 = Even
P20.3.2.4	Modbus RTU Protocol Status					588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.3.2.5	Comm Timeout Modbus RTU	0	60000	ms	10000	593	
P20.3.2.6	Modbus RTU Fault Response				0	2516	0 = in Fieldbus Control 1 = in all Control

Table 39. BACnet MS/TP—P20.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.1	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P20.3.3.2	MSTP MS/TP Device Address	0	127		1	595	
P20.3.3.3	MSTP Instance Number	0	4194302		0	596	
P20.3.3.4	MSTP Comm Timeout MSTP	0	60000	ms	10000	598	
P20.3.3.5	MSTP Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.3.3.6	MSTP Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud rate fault
P20.3.3.7	MSTP Fault Response				0	2526	See Par ID 2516
P20.3.3.8 ①	MSTP Max Master	1	127		127	1537	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 40. Terminal: SWD—P20.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.4.1 ②	Parameter Access				1	2630	0 = Local Control 1 = Fieldbus
P20.3.4.2 ①②	Process Data Access				4	2631	0 = Local Control 1 = Fieldbus 2 = Mixed Interface 4 = NET, Local on Fault 5 = Dual Mode
P20.3.4.3	Fault Situation Counter					2632	
P20.3.4.4	Board Status					2609	
P20.3.4.5	Firmware Version					2610	
P20.3.4.6	Protocol Status					2612	0 = Not Configured 1 = Operational 2 = Diagnostics
P20.3.4.7	Operation Mode					2613	0 = PD2x16Bit Profil 1 = 8Bit Profil 2 = 1-0–A Switch
P20.3.4.8 ②	PDP-Telegram Selection				1	2614	1 = Standard Telegram 1
P20.3.4.9	Fault Counter PDP				0	2615	
P20.3.4.10 ②	Fault Situations Max				8,8	2616	
P20.3.4.11 ②	PDP-Profil Number				809	2618	
P20.3.4.12	PDP-Control Word					2619	
P20.3.4.13 ②	PDP-Status Word				64	2620	
P20.3.4.14	PDP-MaxBlockLength				30	2621	
P20.3.4.15	PDP-NoOfMultiparameter				1	2622	
P20.3.4.16	PDP-MaxLatency				2	2623	
P20.3.4.17	PDP-DO Manufacturer				413	2624	
P20.3.4.18	PDP-DO Device Type				CONST_PROD_CODE	1451	
P20.3.4.19	PDP-DO FW-Interface				FIRMWARE_MAJOR_NUM * 100 + FIRMWARE_MINOR_NUM	2625	
P20.3.4.20	PDP-DO FW-Year					2626	
P20.3.4.21	PDP-DO FW-DayMonth					2627	
P20.3.4.22	PDP-DO NoOfDOs				1	2628	
P20.3.4.23	PDP-DO Subclass				1	2629	

Table 41. EtherNet/IP—P20.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.4.1 ①	IP Address Mode				0	1500	0 = Static IP 1 = DHCP with AutoIP
P20.4.2	Active IP Address					1507	
P20.4.3	Active Subnet Mask					1509	
P20.4.4	Active Default Gateway					1511	
P20.4.5	MAC Address					1513	
P20.4.6 ①	Static IP Address				192.168.1.254	1501	
P20.4.7 ①	Static Subnet Mask				255.255.255.0	1503	
P20.4.8 ①	Static Default Gateway				192.168.1.1	1505	
P20.4.9	Ethernet IP Protocol Status					608	0 = Off 1 = Operational 2 = Faulted
P20.4.10	EIP Fault Response				0	2518	See Par ID 2516

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 42. Modbus TCP—P20.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.5.1	Connection Limit				5	609	
P20.5.2	Modbus TCP Unit ID				1	610	
P20.5.3	Comm Timeout Modbus TCP	0	60000	ms	10000	611	
P20.5.4	Modbus TCP Protocol Status					612	See Par ID 599
P20.5.5	Modbus TCP Fault Response				0	2517	See Par ID 2516
P20.5.6	Modbus TCP Trusted IP Enable				1	74	See Par ID 2462
P20.5.7	Trusted IP White List				0xC0.0xA8.0x01.0xFF. 0x00.0x00.0x00.0x00.0x0 0.0x00.0x00.0x00	68	

System

Table 43. Basic Setting—P21.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.1	Language				0	340	0 = English 1 = 中文 2 = Deutsch
P21.1.2 ①	Application					142	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
P21.1.3 ①	Parameter Sets					619	0 = No 1 = Reload Defaults 2 = Reload Set 1 3 = Reload Set 2 4 = Store Set 1 5 = Store Set 2 6 = Reset 7 = Reload Defaults VM
P21.1.4	Up To Keypad					620	See Par ID 2118
P21.1.5 ①	Down From Keypad					621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters
P21.1.6	Parameter Comparison					623	0 = No 1 = Compare with Keypad 2 = Compare with Default 3 = Compare with Set 1 4 = Compare with Set 2
P21.1.7	Password	0	9999		0	624	
P21.1.8	Parameter Lock				0	625	0 = Change Enable 1 = Change Disable
P21.1.9	Multimonitor Set				0	627	See Par ID 625
P21.1.10	Default Page				2	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu 4 = Keypad Reference
P21.1.11	Timeout Time	0	65535	s	30	629	
P21.1.12	Contrast Adjust	5	18		12	630	
P21.1.13	Backlight Time	1	65535	min	10	631	
P21.1.14	Fan Control				1	632	0 = Continuous 1 = Temperature 2 = Run Follow
P21.1.15	Keypad ACK Timeout	200	5000	ms	200	633	
P21.1.16	Keypad Retry Number	1	10		5	634	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 43. Basic Setting—P21.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.17	Startup Wizard				0	626	0 = Yes 1 = No
P21.1.18 ②	Jog Softkey Hidden				0	2412	See Par ID 2462
P21.1.19 ②	Reverse Softkey Hidden				0	2413	See Par ID 2462
P21.1.20 ②	Output Display Unit				45	2424	0 = % 1 = 1/min 2 = rpm 3 = ppm 4 = pps 5 = l/s 6 = l/min 7 = l/h 8 = kg/s 9 = kg/min 10 = kg/h 11 = m3/s 12 = m3/min 13 = m3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVS 20 = kW 21 = °C 22 = GPM 23 = gal/s 24 = gal/min 25 = gal/h 26 = lb/s 27 = lb/min 28 = lb/h 29 = CFM 30 = ft3/s 31 = ft3/min 32 = ft3/h 33 = ft/s 34 = in wg 35 = ft wg 36 = PSI 37 = lb/in2 38 = HP 39 = °F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m 45 = Hz 46 = strokes/min
P21.1.21 ②	Output Display Unit Min	-60000.00	See Par ID 2425	Varies	0.00	2460	
P21.1.22 ②	Output Display Unit Max	See Par ID 2460	60000.00	Varies	MotorNomFreqMFG	2425	
P21.1.23	Keypad Lock Password	0	9999		0	75	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 44. Version Info—P21.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.2.1	Keypad Software Version					640	
P21.2.2	Motor Control Software Version					642	
P21.2.3	Application Software Version					644	
P21.2.4	Software Bundle Version					1714	

Table 45. Application Info—P21.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.3.1	Brake Chopper Status					646	See Par ID 2118
P21.3.2	Brake Resistor Status					647	See Par ID 2118
P21.3.3	Serial Number					648	
P21.3.4	Power Unit Serail Number					1270	
P21.3.5	Control Unit Serial Number					1276	

Table 46. User Info—P21.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.4.1	Real Time Clock				0.0.0.1:1:13	566	
P21.4.2	Daylight Saving				0	582	0 = Off 1 = EU 2 = US
P21.4.3	Total MWh Count			Mwh		601	
P21.4.4	Total Power Day Count					603	
P21.4.5	Total Power Hr Count					606	
P21.4.6	Trip MWh Count			Mwh		604	
P21.4.7	Clear Trip MWh Count					635	See Par ID 2125
P21.4.8	Trip Power Day Count					636	
P21.4.9	Trip Power Hr Count					637	
P21.4.10	Clear Trip Power Count					639	See Par ID 2125

Table 47. Operate Mode—O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz		1	
O2	Freq Reference			Hz		24	
O3	Motor Speed			rpm		2	
O4	Motor Current			A		3	
O5	Motor Torque			%		4	
O6	Motor Power			%		5	
O7	Motor Voltage			V		6	
O8	DC-link Voltage			V		7	
O9	Unit Temperature			°C		8	
O10	Motor Temperature			%		9	
R12 ②	Keypad Reference	See Par ID 101	See Par ID 102	Hz	0.00	141	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Chapter 6 — Multi-pump and fan control application

Introduction

The Multi-Pump and Fan Control Application is designed to be used in applications where multiple pumps or fan systems are used to maintain a desired flow rate, pressure, or temperature value. It gives the ability to use a single PID loop to control one drive and have auxiliary motors connected via drives or contactors start and stop based off the desired process. It also gives the ability to use a single PID loop and operate using a multi-master/lead-lag scheme using up to 5 drives. It also provides the ability to auto-change between the multiple motors to keep run times equal. Controlwise it allows for 2 control and reference place selections with 8 digital inputs and 2 analog inputs that are programmable. For monitoring the system and turning on aux motors, there are 3 programmable relay outputs, 1 digital output, and 2 sets of analog outputs that are programmable. The application allows for full customization of the motor control scheme with frequency or speed control along with customizing the V/Hz curve. Drive/Motor protections can be customized to defined actions. Below is a list of other features in addition to the Standard Application features that are available in the Multi-Pump and Fan Control Application.

Select the Multi-Pump and Fan Application in menu **P21.1.2**.

Multi-Pump and Fan includes all the functions in Standard Application and Additional functions:

- Damper control
- Fire mode
- Smoke purge mode
- Interlock for motors
- Multi-Pump control
- Auto change function
- Bypass
- Real time clock function—Timer
- Real time clock function—Interval
- PM setback
- Two independent set of motor Parameter
- PID
- Multi-Master/Lead-Lag

Note: When Fire mode is enabled, this causes the drive to ignore any fault and run till its death. Warranty will be none valid in the case this is enabled and the drive causes issues to the system.

I/O controls

- “Terminal To Function” (TTF) Programming

The design behind the programming of the digital inputs in the DG1 drive is to use “Terminal To Function” programming, which is composed of multiple functions that get assigned a digital input to that function. The parameters in the drive are set up with specific functions and by defining the digital input and slot in some cases, depending on which options are available. For use of the drives control board inputs, they will be referred to as DigIN:1 through DigIN:8. When additional option cards are used, they will be defined as DigIN:X:IOY:Z. The X indicates the slot that the card is being installed in, which will be either A or B. The IOY determines the type of card it is, which would be IO1 or IO5. The Z indicates which input is being used on that available option card.

- “Function To Terminal” (FTT) Programming

The design behind the programming of the relay outputs and digital output in the DG1 drive is to use “Function To Terminal” programming. It is composed of a terminal, be it a relay output or a digital output, that is assigned a parameter. Within that parameter, it has different functions that can be set.

The parameters of the Multi-Pump and Fan Control Application are explained on **Page 69** of this manual, “Description of Parameters.” The explanations are arranged according to the parameter

For the DI function, we use Terminal programming method to function (TTF), where there is a fixed input that gets programmed to a list of functions. This allows for multiple inputs to be used for different functions. Connecting a certain input with a certain parameter function is done by give a parameter an appropriate value. The value is formed by the location of the input, either being on the standard control board or an external option board and the slot it is located in.

Force open/force close selection

The Force Open Selection would make the selected function always off. Essentially this is a virtual switch that is always open.

The Force Close Selection would make the selected function always on. Essentially this is a virtual switch that is always closed.

These options are assigned to a function if we want to force a state without using a hardware input.

Example:

If we set Run Enable to Force Closed the drive is always enabled. If we set the same function to Force Open the drive would never be Enabled. If a Digital input is to be used to activate this Run Enable the function should be assigned to a hardware input(See below for DIGIN Selections).

DIGIN selection

This allows Assignment of a hardware digital input to a function, this is set in a format of DigIN:X where X is one of the 8 Digital inputs on the Main control board.

Example:

If we set Run Enable to DigIN:6 the drive will be enabled when digital input 6 (Terminal 8) is closed, and would not be enabled when digital input 6 (Terminal 8) is open.

Option board DigIN selection

This allows Assignment of a hardware digital input on an option card to a function, this is set in a format of DigIN: Y:IO1:X where Y is the slot the option card is inserted on the Main control board and X is the Input on the Board and IO1 is the type of option board used.

Example:

If we set Run Enable to DigIN:A:IO5:6 the drive will be enabled when digital input 6 is closed on the IO5 option card which is inserted in Slot A, and would not be enabled when digital input 6 on the option card is open.

Timer channel selection

A Time Channel is a virtual path to link the digital output of a timer function to a digital input function. To utilize this feature a timer or interval would need to be assigned to a time channel 1 through 3, and the input function to be controlled would need to be assigned to the same time channel.

Example:

If we set Run Enable to DigIN:TimeChannel1 the drive will be enabled when the timer assigned to Time Channel 1 is active or High, and would not be enabled when the Time Channel is inactive or Low.

Control examples

Single Drive

Figure 27. Example of Two-Pump autochange, main diagram

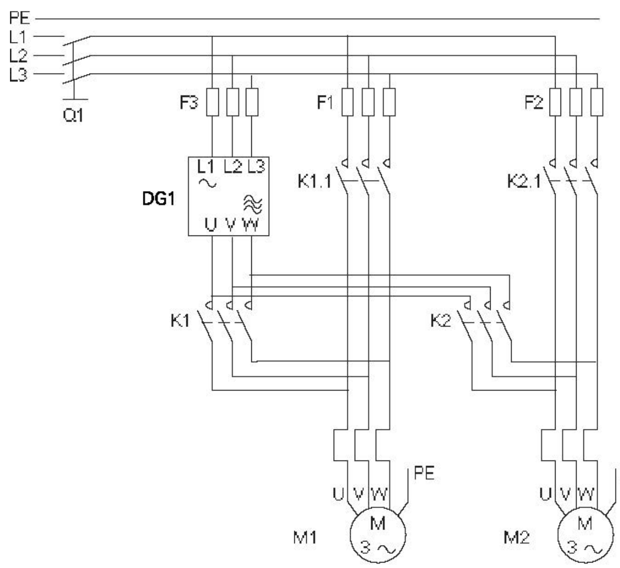


Figure 28. Two-Pump autochange system principal control diagram

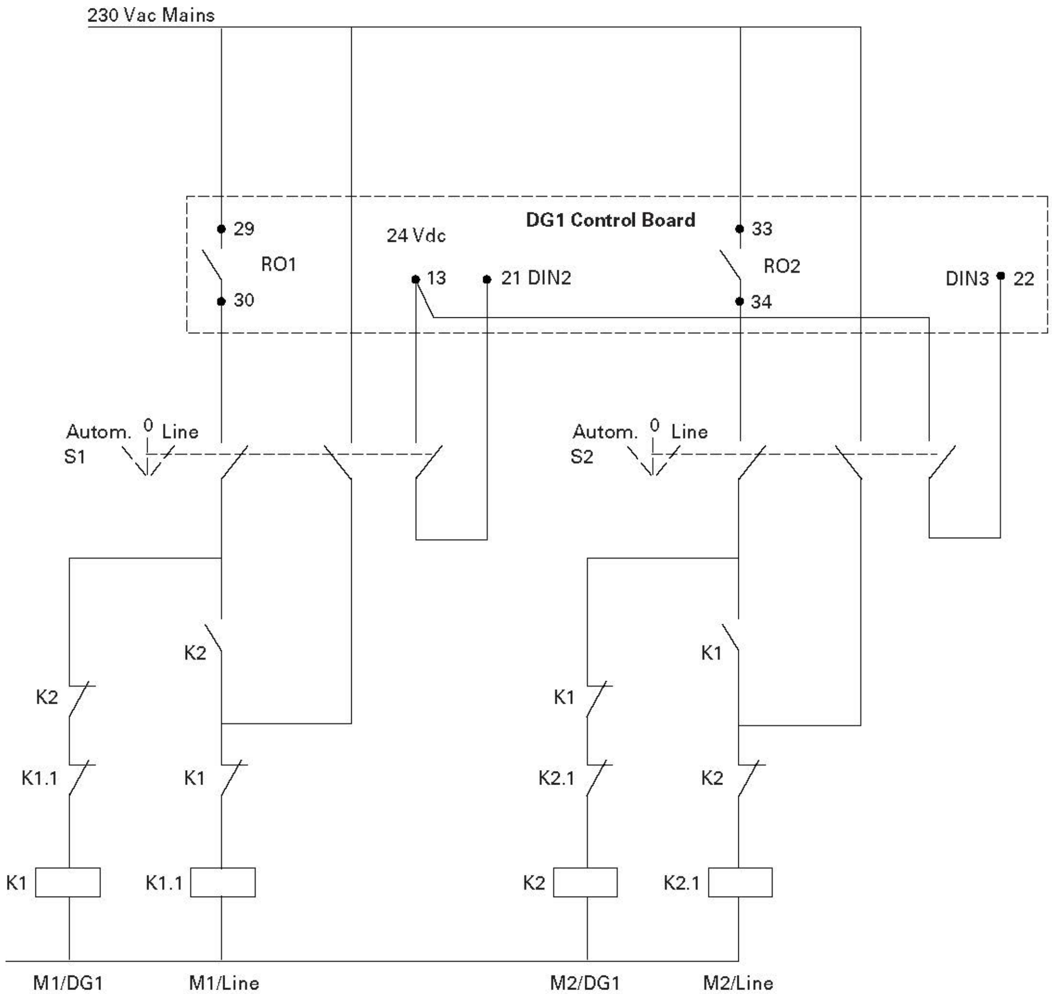


Figure 29. Example of Three-Pump autochange, main diagram

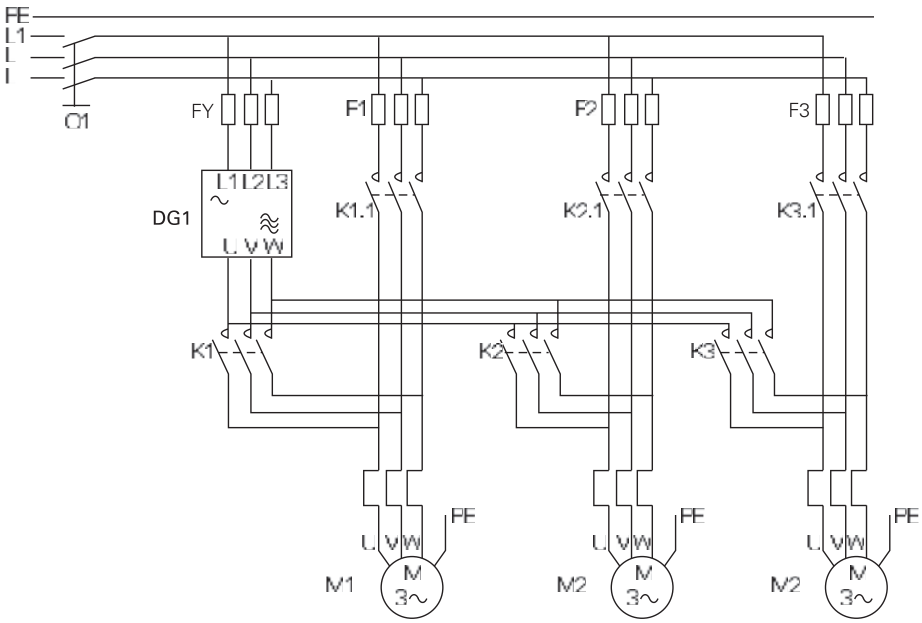


Figure 30. Three-Pump autochange system principal control diagram

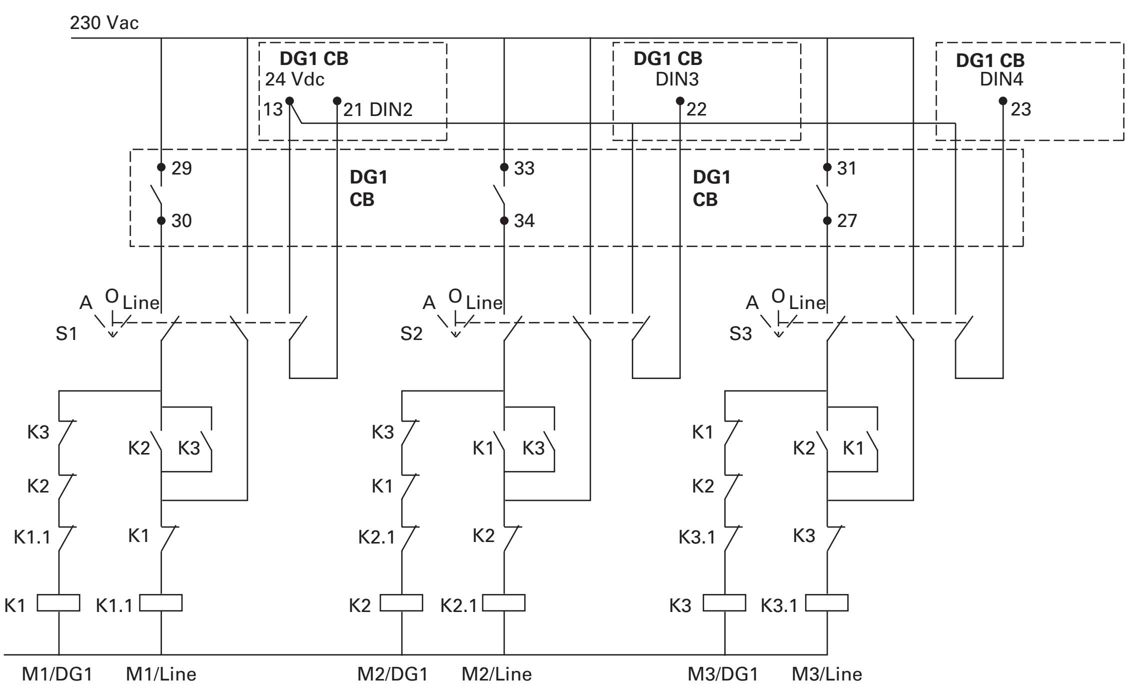


Figure 31. Example of the function of the PFC application with three auxiliary drives

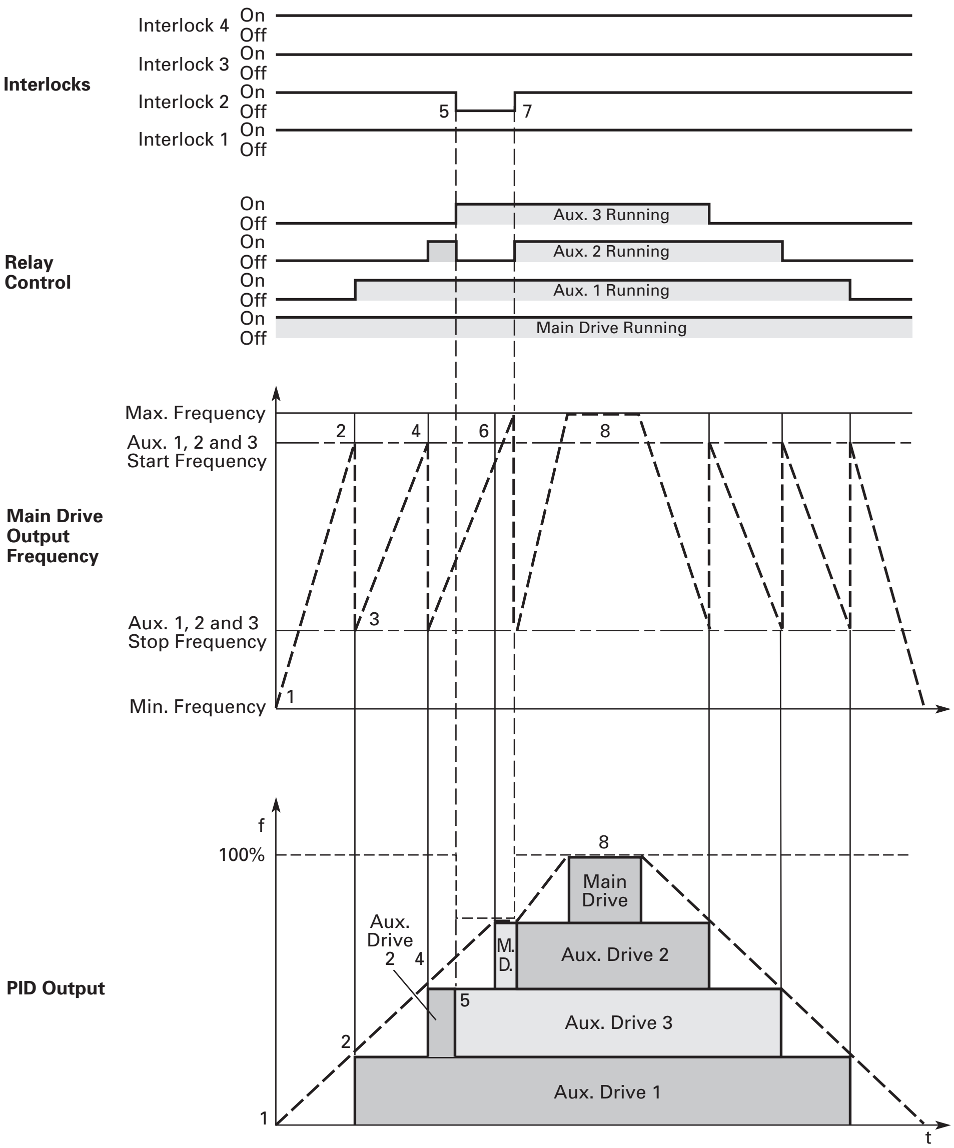


Figure 32. Multi Pump control curve

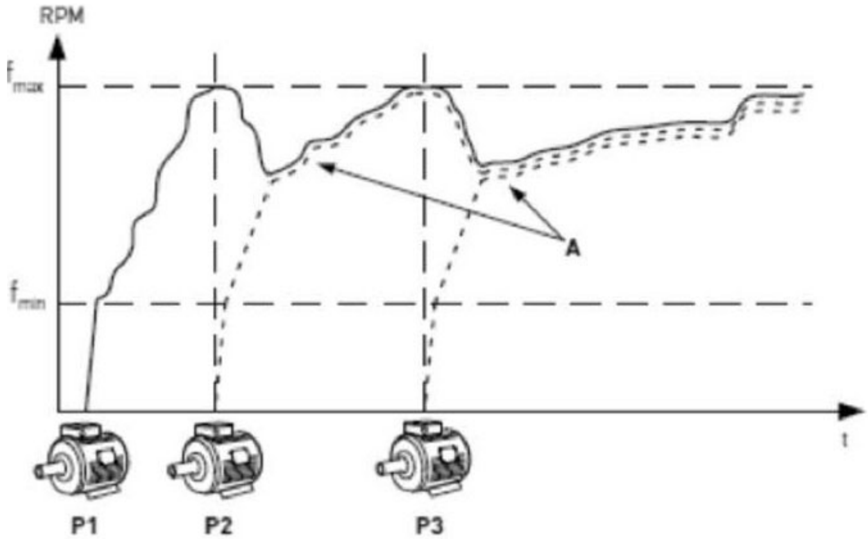


Figure 33. Multi-Drive/Multi-Pump layout

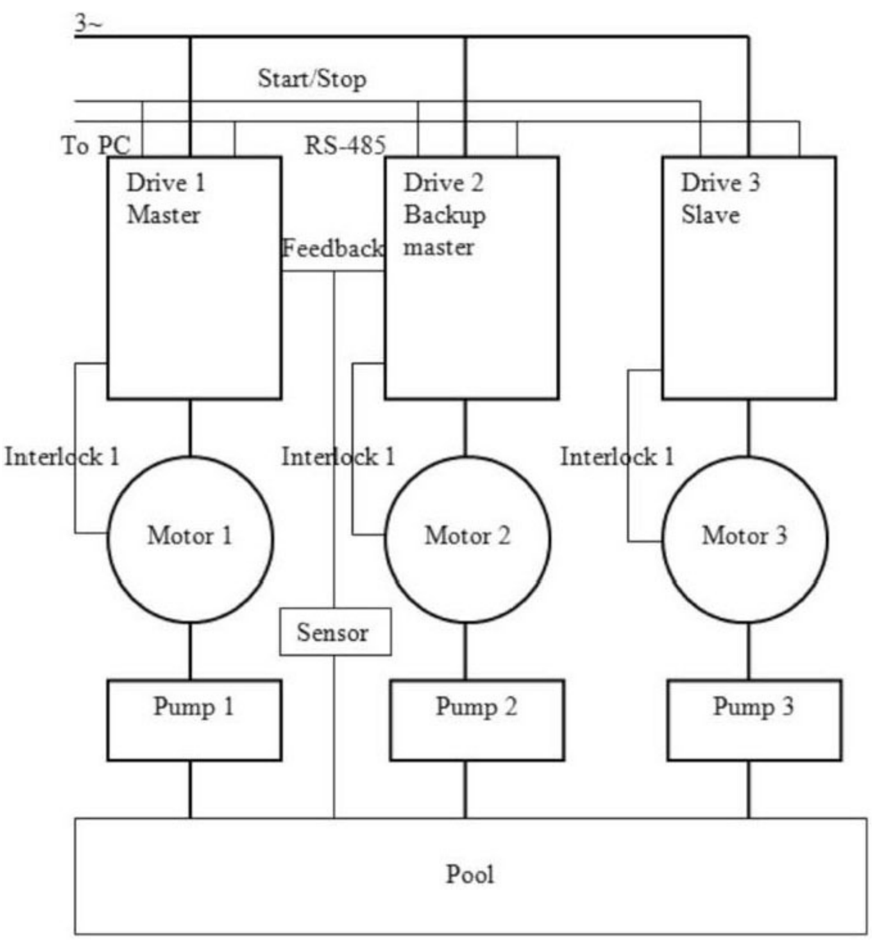
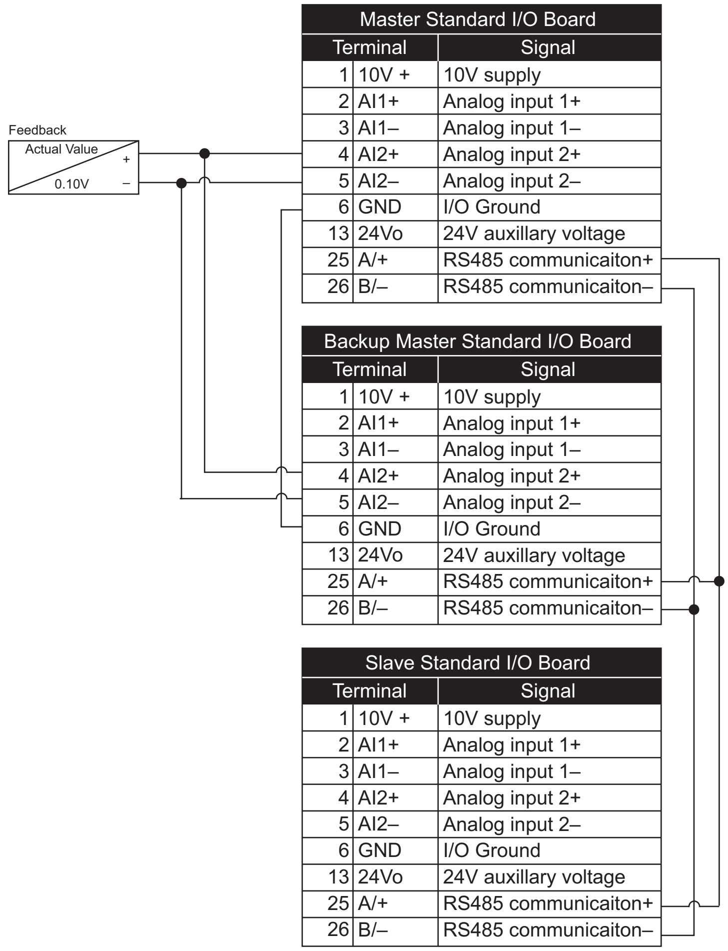


Figure 34. PowerXL drives with 10 V supply with a 0–10 V transducer

Note
– 10V+/24V Supplies along with grounds for each Master should be connected for the Reference/Setpoint And Start signal if using I/O. (There could be up to 1-5 Masters, anything not considered a master could be a slave with a max of 4 slaves)
–The feedback is wired' to each Master, since it is a voltage signal they are connected in parallel
– Check the Analog input jumpers to be sure they match signal.



Master Standard I/O Board

Terminal		Signal
1	10V +	10V supply
2	AI1+	Analog input 1+
3	AI1–	Analog input 1–
4	AI2+	Analog input 2+
5	AI2–	Analog input 2–
6	GND	I/O Ground
13	24Vo	24V auxillary voltage
25	A/+	RS485 communicaiton+
26	B/–	RS485 communicaiton–

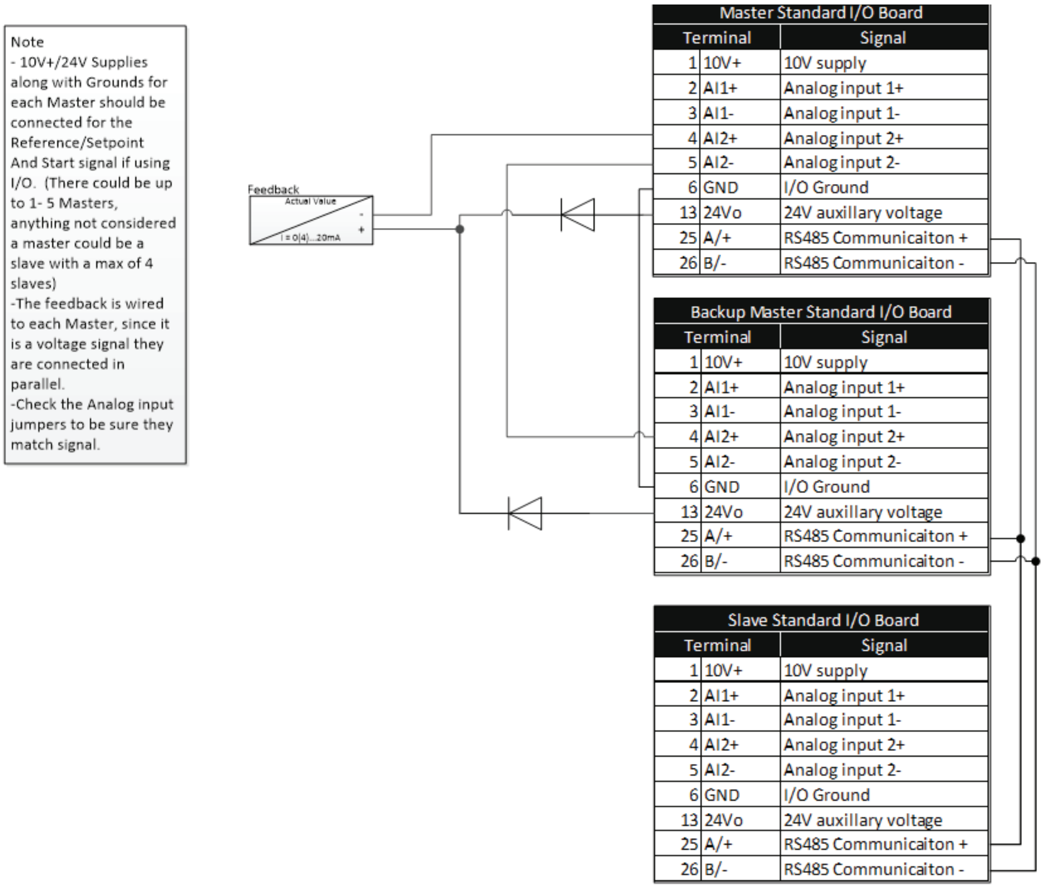
Backup Master Standard I/O Board

Terminal		Signal
1	10V +	10V supply
2	AI1+	Analog input 1+
3	AI1–	Analog input 1–
4	AI2+	Analog input 2+
5	AI2–	Analog input 2–
6	GND	I/O Ground
13	24Vo	24V auxillary voltage
25	A/+	RS485 communicaiton+
26	B/–	RS485 communicaiton–

Slave Standard I/O Board

Terminal		Signal
1	10V +	10V supply
2	AI1+	Analog input 1+
3	AI1–	Analog input 1–
4	AI2+	Analog input 2+
5	AI2–	Analog input 2–
6	GND	I/O Ground
13	24Vo	24V auxillary voltage
25	A/+	RS485 communicaiton+
26	B/–	RS485 communicaiton–

Figure 35. PowerXL drives with 24 V supply with a 4–20 mA transducer



Master Standard I/O Board		
Terminal		Signal
1	10V+	10V supply
2	AI1+	Analog input 1+
3	AI1-	Analog input 1-
4	AI2+	Analog input 2+
5	AI2-	Analog input 2-
6	GND	I/O Ground
13	24Vo	24V auxillary voltage
25	A/+	RS485 Communicaiton +
26	B/-	RS485 Communicaiton -

Backup Master Standard I/O Board		
Terminal		Signal
1	10V+	10V supply
2	AI1+	Analog input 1+
3	AI1-	Analog input 1-
4	AI2+	Analog input 2+
5	AI2-	Analog input 2-
6	GND	I/O Ground
13	24Vo	24V auxillary voltage
25	A/+	RS485 Communicaiton +
26	B/-	RS485 Communicaiton -

Slave Standard I/O Board		
Terminal		Signal
1	10V+	10V supply
2	AI1+	Analog input 1+
3	AI1-	Analog input 1-
4	AI2+	Analog input 2+
5	AI2-	Analog input 2-
6	GND	I/O Ground
13	24Vo	24V auxillary voltage
25	A/+	RS485 Communicaiton +
26	B/-	RS485 Communicaiton -

Figure 36. PowerXL drives with Ext supply with a 4–20 mA transducer

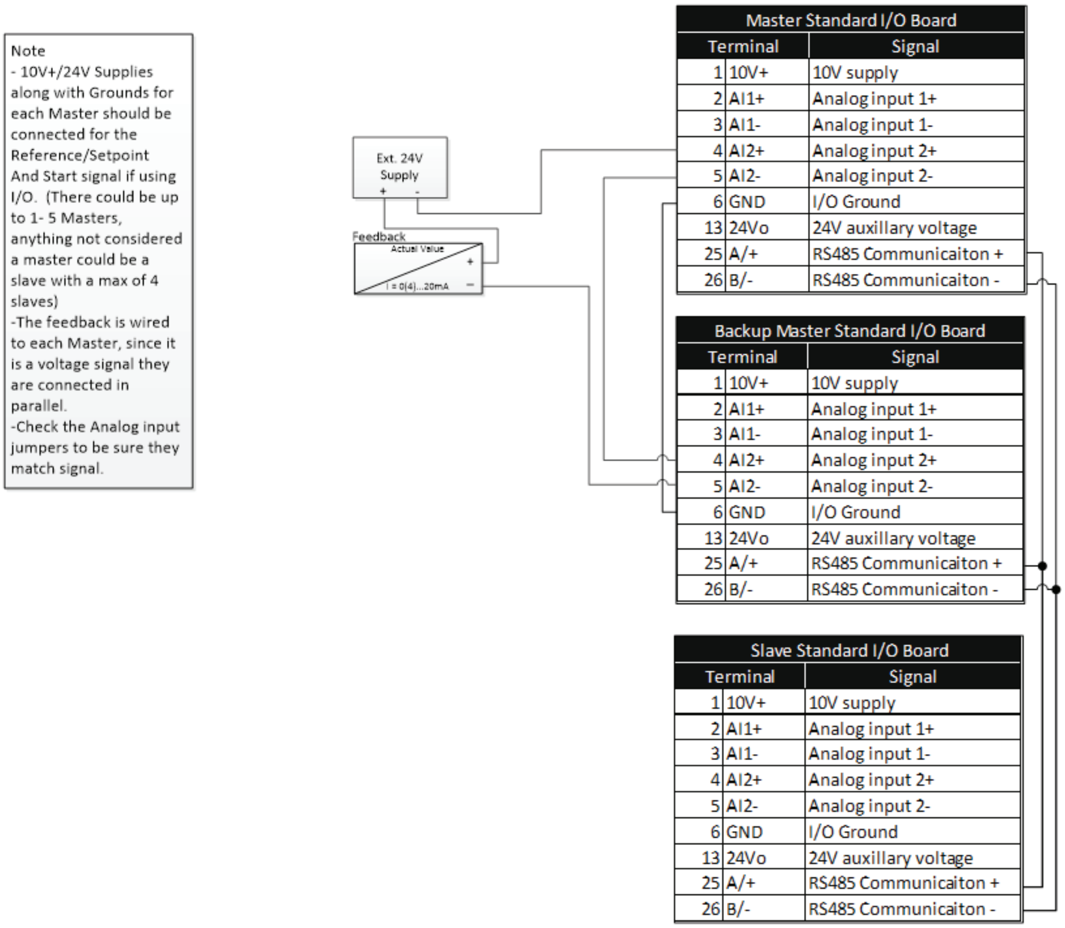
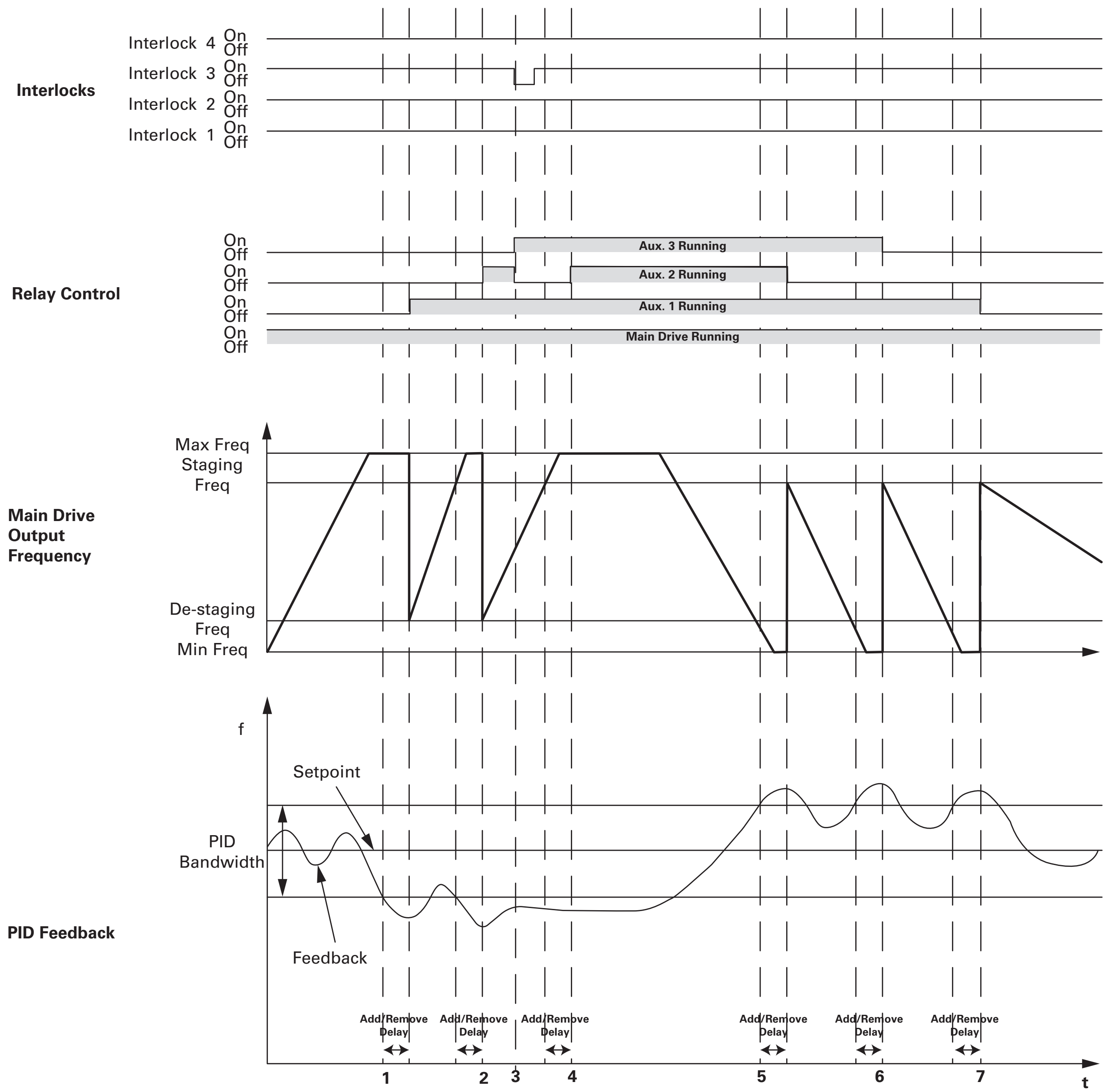


Figure 37. Bandwidth feedback

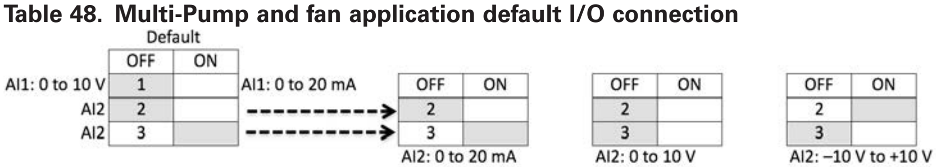


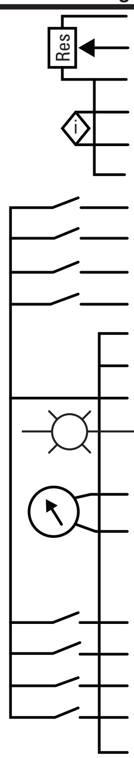
1. Feedback out of bandwidth, output frequency over staging frequency, start delay counter; delay times out, and interlock 2 is ok, add aux 1 motor by closing its corresponding relay.
2. As above, add aux 2 motor.
3. Aux 2's interlock lost, add aux 3 as backup immediately.
4. Add aux 2 motor again since its interlock resumed.
5. Feedback out of bandwidth, output frequency below de-staging frequency, start delay counter; delay times out, remove aux 2 motor first because it's the last one which been added.
6. As above, remove aux 3 motor.
7. As above, remove aux 1 motor.

Control I/O configuration

- Run 240 Vac and 24 Vdc control wiring in separate conduit
- Communication wire to be shielded

Table 48. Multi-Pump and fan application default I/O connection





External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10 V	Ref. Output Voltage	—	10 Vdc Supply Source
	2	AI1+ ①	Analog Input 1	0–10 V	Voltage Speed Reference (Programmable to 4 mA to 20 mA)
	3	AI1–	Analog Input 1 Ground	—	Analog Input 1 Common (Ground)
	4	AI2+ ①	Analog Input 2	4 mA to 20 mA	Current Speed Reference (Programmable to 0–10 V)
	5	AI2–	Analog Input 2 Ground	—	Analog Input 2 Common (Ground)
	6	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	7	DIN5	Digital Input 5	Preset Speed B0	Sets frequency output to Preset Speed 1
	8	DIN6	Digital Input 6	Preset Speed B1	Sets frequency output to Preset Speed 2
	9	DIN7	Digital Input 7	Not Used (TI–)	Input forces VFD output to shut off
	10	DIN8	Digital Input 8	Force Remote (TI+)	Input takes VFD from Local to Remote
	11	CMB	DI5 to DI8 Common	Grounded	Allows source input
	12	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	13	24 V	+24 Vdc Output	—	Control voltage output (100 mA max.)
	14	DO1	Digital Output 1	Ready	Shows the drive is ready to run
	15	24 Vo	+24 Vdc Output	—	Control voltage output (100 mA max.)
	16	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	17	AO1+	Analog Output 1	Output Frequency	Shows Output frequency to motor 0–60 Hz (4 mA to 20 mA)
	18	AO2+	Analog Output 2	Motor Current	Shows Motor current of motor 0–FLA (4 mA to 20 mA)
	19	24 Vi	+24 Vdc Input	—	External control voltage input
	20	DIN1	Digital Input 1	Run Forward	Input starts drive in forward direction (start enable)
	21	DIN2	Digital Input 2	Run Reverse	Input starts drive in reverse direction (start enable)
	22	DIN3	Digital Input 3	External Fault	Input causes drive to fault
	23	DIN4	Digital Input 4	Fault Reset	Input resets active faults
	24	CMA	DI1 to DI4 Common	Grounded	Allows source input
	25	A/+	RS-485 Signal A	—	Fieldbus Communication (Modbus, BACnet)
	26	B/-	RS-485 Signal B	—	Fieldbus Communication (Modbus, BACnet)
	27	R3NO	Relay 3 Normally Open	At Speed	Relay output 3 shows VFD is at Ref. Frequency
	28	R1NC	Relay 1 Normally Closed	Run	Relay output 1 shows VFD is in a run state
	29	R1CM	Relay 1 Common		
	30	R1NO	Relay 1 Normally Open		
	31	R3CM	Relay 3 Common	At Speed	Relay output 3 shows VFD is at Ref. Frequency
	32	R2NC	Relay 2 Normally Closed	Fault	Relay output 2 shows VFD is in a fault state
	33	R2CM	Relay 2 Common		
	34	R2NO	Relay 2 Normally Open		

Note: The above wiring demonstrates a SINK configuration. It is important that CMA and CMB are wired to ground (as shown by dashed line). If a SOURCE configuration is desired, wire 24 V to CMA and CMB and close the inputs to ground. When using the +10 V for AI1, it is important to wire AI1—to ground (as shown by dashed line). If using +10 V for AI1 or AI2, terminals 3, 5, and 6 need to be jumpered together.
① AI1+ and AI2+ Support 10K potentiometer.

Table 49. Drive communication ports

Port	Communication
RJ45 Keypad Port	
Upload/Download Parameters	USB to RJ45
Remote Mount Keypad	Ethernet
Upgrade Drive Firmware	USB to RJ45
RJ45 Ethernet Port	
Upload/Download Parameters	Ethernet
Ethernet IP Communications	Ethernet
Modbus TCP Communications	Ethernet
RS-485 Serial Port ①	
Upload/Download Parameters	Two-Wire Twisted Pair
Upgrade Drive Firmware	Two-Wire Twisted Pair
Modbus RTU Communications	Two-Wire Twisted Pair
BACnet MS/TP Communications	Two-Wire Twisted Pair
SmartWire-DT Communications	Two-Wire Shielded Cable

① Shielded wire recommended.

Pump and fan application—parameters list

On the next pages you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given on **Page 69,** "Description of Parameters." The descriptions are arranged according to the parameter number.

Column explanations:

Code = Location indication on the keypad; shows the operator the present parameter number
Parameter = Name of parameter
Min = Minimum value of parameter
Max = Maximum value of parameter
Unit = Unit of parameter value; given if available
Default = Value preset by factory
ID = ID number of the parameter

Table 50. Monitor—M

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1	Output Frequency			Hz		1	
M2	Freq Reference			Hz		24	
M3	Motor Speed			rpm		2	
M4	Motor Current			A		3	
M5	Motor Torque			%		4	
M6	Motor Power			%		5	
M7	Motor Voltage			V		6	
M8	DC-link Voltage			V		7	
M9	Unit Temperature			°C		8	
M10	Motor Temperature			%		9	
M12	Analog Input 1			Varies		10	
M13	Analog Input 2			Varies		11	
M14	Analog Output 1			Varies		25	
M15	Analog Output 2			Varies		575	
M16	DI1, DI2, DI3					12	
M17	DI4, DI5, DI6					13	
M18	DI7, DI8					576	
M19	DO1,Virtual RO1,Virtual RO2					14	
M20	RO1, RO2, RO3					557	
M21	TC1, TC2, TC3					558	
M22	Interval 1					559	0 = Inactive 1 = Active
M23	Interval 2					560	See Par ID 559
M24	Interval 3					561	See Par ID 559
M25	Interval 4					562	See Par ID 559
M26	Interval 5					563	See Par ID 559
M27	Timer 1			s	0	569	
M28	Timer 2			s	0	571	
M29	Timer 3			s	0	573	
M30	PID1 Set Point			Varies		16	
M31	PID1 Feedback			Varies		18	
M32	PID1 Error Value			Varies		20	
M33	PID1 Output			%		22	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 50. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M34	PID1 Status					23	0 = Stopped 1 = Running 2 = Sleep Mode
M40	Running Motors					26	
M41	PT100 Temperture			°C	1000.0	27	
M42	Latest Fault Code					28	
M43	RTC Battery Status				0	583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = OverVoltage
M44	Instant Motor Power			kW		1686	
M45 ②	Energy Savings			Varies	0.000	2120	
M46	Control Board DIDO Status					2209	
M47	SlotA DIDO Status					2210	
M48	SlotB DIDO Status					2211	
M49	Application Status Word					29	
M50	Standard Status Word					2414	
M51	Output			Varies		2445	
M52	Reference			Varies		2447	
M53	Total MWh Count			Mwh		601	
M54	Total Power Day Count					603	
M55	Total Power Hr Count					606	
M56	Trip MWh Count			Mwh		604	
M57	Trip Power Day Count					636	
M58	Trip Power Hr Count					637	
M59	Total Run time Count			h		2827	
M60	Numbers Of Start					2830	
M61	Trip Run Time Count			h		2829	
M62	Multi-Monitoring				2,1,3	30	
M63	FB Status Word					2101	
M64	FB Ctrol Word					2001	
M65	FB Speed Reference	0.00	100.00	%		2003	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Parameters

Table 51. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ②	Min Frequency	0.00	See Par ID 102	Hz	0.00	101	
P1.2 ②	Max Frequency	See Par ID 101	400.00	Hz	MaxFreqMFG	102	
P1.3 ②	Accel Time 1	0.1	3000.0	s	3.0	103	
P1.4 ②	Decel Time 1	0.1	3000.0	s	3.0	104	
P1.5 ①	Motor Nom Current	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT	486	
P1.6 ①	Motor Nom Speed	300	24000	rpm	MotorNomSpeedMFG	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	MotorNomVoltMFG	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	MotorNomFreqMFG	488	
P1.10 ②	Power Up Local Remote Select				0	1685	0 = Hold Last 1 = Local Control 2 = Remote control
P1.11 ②	Remote 1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal Start 2 3 = Keypad
P1.12 ②	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.13 ②	Bumpless Enable				0	2462	0 = Disabled 1 = Enabled
P1.14 ①②	Local Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 - AI2 12 = AI2 - AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = AI2),MIN(AI1,AI2) 16 = AI2),MAX(AI1,AI2) 17 = PID1 Control Output
P1.15 ①②	Remote 1 Reference				0	137	See Par ID 136
P1.16 ①	Reverse Enable				1	1679	See Par ID 2462
P1.17 ②	Run Delay Time	0	32500	s	0	2423	
P1.18 ②	HOA Source				0	2465	0 = Disabled 1 = IO Terminal 2 = Keypad
P1.19 ①②	Minimum Run Time	0	32500	s	0	1813	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Analog input

Table 52. Basic Setting—P2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1 ②	AI Ref Scale Min Value	0.00	See Par ID 145	Hz	0.00	144	
P2.1.2 ②	AI Ref Scale Max Value	See Par ID 144	400.00	Hz	0.00	145	

Table 53. AI1 Settings—P2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10 V
P2.2.2 ②	AI1 Signal Range				0	175	0 = 0–100%/ 0–20 mA/0–10 V 1 = 20–100%/ 4–20 mA/2–10 V 2 = Customized
P2.2.3 ②	AI1 Custom Min	0.00	See Par ID 177	%	0.00	176	
P2.2.4 ②	AI1 Custom Max	See Par ID 176	100.00	%	100.00	177	
P2.2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.2.6 ②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.2.10 ②	AI1 Joystick Offset	-50.00	50.00	%	0.00	133	

Table 54. AI2 Settings—P2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.3.1	AI2 Mode				0	223	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V
P2.3.2 ②	AI2 Signal Range				1	183	0 = 0–100%/0–20 mA/ 0–10 V –10 to +10 V 1 = 20–100%/ 4–20 mA/2–10 V/–6 to 10 V 2 = Customized
P2.3.3 ②	AI2 Custom Min	0.00	See Par ID 185	%	0.00	184	
P2.3.4 ②	AI2 Custom Max	See Par ID 184	100.00	%	100.00	185	
P2.3.5 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.3.6 ②	AI2 Signal Invert				0	189	See Par ID 181
P2.3.7 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.3.8 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.3.9 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
P2.3.10 ②	AI2 Joystick Offset	-50.00	50.00	%	0.00	134	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 55. Fine Adjust—P2.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.4.1 ①②	Fine Tuning Input				0	2484	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = Fieldbus
P2.4.2 ①②	Fine Tuning Min	0.0	100.0	%	0.0	2485	
P2.4.3 ①②	Fine Tuning Max	0.0	100.0	%	0.0	2486	

Table 56. Digital Input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	IO Terminal 1 Start Stop Logic				0	143	0 = Forward - Reverse 1 = Start - Reverse 2 = Start - Enable 3 = 3 Wire Control
P3.2 ② ⑤	IO Terminal 1 Start Signal 1				2	190	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = RO1 Function 32 = RO2 Function 33 = RO3 Function 34 = Virtual RO1 Function 35 = Virtual RO2 Function
P3.3 ②⑤	IO Terminal 1 Start Signal 2				3	191	See Par ID 190
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②③	Reverse				0	198	See Par ID 190
P3.6 ②③	Ext. Fault 1 NO				4	192	See Par ID 190
P3.7 ②③	Ext. Fault 1 NC				1	193	See Par ID 190
P3.8 ②④	Fault Reset				5	200	See Par ID 190
P3.9 ②③	Run Enable				1	194	See Par ID 190
P3.10 ②③	Preset Speed B0				6	205	See Par ID 190

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 56. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.11 ②③	Preset Speed B1				7	206	See Par ID 190
P3.12 ②③	Preset Speed B2				0	207	See Par ID 190
P3.13 ②③	PID1 Control Enable				1	550	See Par ID 190
P3.15 ②③	Accel/Decel Time Set				0	195	See Par ID 190
P3.16 ②③	Accel/Decel Prohibit				0	201	See Par ID 190
P3.17 ②④	No Access To Param				0	215	See Par ID 190
P3.21 ②③	Remote Control				9	196	See Par ID 190
P3.22 ②③	Local Control				0	197	See Par ID 190
P3.23 ②③	Remote 1/2 Select				0	209	See Par ID 190
P3.24 ②③	Second Motor Para Select				0	217	See Par ID 190
P3.25 ②③	Force Bypass				0	218	See Par ID 190
P3.26 ②③	DC Brake Active				0	202	See Par ID 190
P3.27 ②③	Smoke Mode				0	219	See Par ID 190
P3.28 ②③	Fire Mode				0	220	See Par ID 190
P3.29 ②③	Fire Mode Ref 1/2 Select				0	221	See Par ID 190
P3.30 ②③	PID1 Set Point Select				0	351	See Par ID 190
P3.32 ②③	Jog Enable				0	199	See Par ID 190
P3.33 ②③	Start Timer 1				0	224	See Par ID 190
P3.34 ②③	Start Timer 2				0	225	See Par ID 190
P3.35 ②③	Start Timer 3				0	226	See Par ID 190
P3.36 ②③	AI Ref Source Select				0	208	See Par ID 190
P3.37 ②③	Motor Interlock 1				0	210	See Par ID 190
P3.38 ②③	Motor Interlock 2				0	211	See Par ID 190
P3.39 ②③	Motor Interlock 3				0	212	See Par ID 190
P3.40 ②③	Motor Interlock 4				0	213	See Par ID 190
P3.41 ②③	Motor Interlock 5				0	214	See Par ID 190
P3.42 ②③	Ext Fault-AR				1	747	See Par ID 190
P3.43 ②③	Bypass Overload				0	1246	See Par ID 190
P3.44 ②③	Fire Mode Direction Invert				0	2119	See Par ID 190
P3.45 ①②	IO Terminal 2 Start Stop Logic				0	2206	See Par ID 143
P3.46 ②⑤	IO Terminal 2 Start Signal 1				2	2207	See Par ID 190
P3.47 ②⑤	IO Terminal 2 Start Signal 2				3	2208	See Par ID 190
P3.48 ②③	Ext. Fault 2 NO				0	2293	See Par ID 190
P3.49 ②③	Ext. Fault 2 NC				1	2294	See Par ID 190
P3.50 ②③	Ext. Fault 3 NO				0	2295	See Par ID 190
P3.51 ②③	Ext. Fault 3 NC				1	2296	See Par ID 190

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 56. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.52 ②	Ext. Fault 1 Text					2297	0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage
P3.53 ②	Ext. Fault 2 Text				1	2298	See Par ID 2297
P3.54 ②	Ext. Fault 3 Text				2	2299	See Par ID 2297
P3.55 ②④	Parameter Set1/2 Sel				0	2312	See Par ID 190
P3.56 ②③	Deragging Enable				0	2394	See Par ID 190
P3.57 ②③	HOA On/Off				1	2395	See Par ID 190
P3.58 ②③	Multi-pump Mode 1/2 Select				0	2658	See Par ID 190
P3.59 ②③	OP Cont Interlock NO				4	2801	See Par ID 190
P3.60 ②③	OP Cont Interlock NC				1	2802	See Par ID 190

Table 57. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	See Par ID 222
P4.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0-Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 9 = PID1 Setpoint 10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 19 = AI1 20 = AI2 21 = Output Freq (-2-+2N) 22 = Motor Torque (-2-+2N) 23 = Motor Power (-2-+2N) 24 = PT100 Temperature 25 = FB Process Data Input 1 26 = FB Process Data Input 2 27 = FB Process Data Input 3 28 = FB Process Data Input 4 29 = FB Process Data Input 5 30 = FB Process Data Input 6 31 = FB Process Data Input 7 32 = FB Process Data Input 8 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2 35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 57. Analog Output—P4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.2 ②, continued	AO1 Function				1	146	37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current (-2-+2N)
P4.3 ②	AO1 Minimum				1	149	0 = 0 V / 0 mA 1 = 2 V / 4 mA
P4.4 ②	AO1 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	AO1 Scale	10	1000	%	100	150	
P4.6 ②	AO1 Inversion				0	148	See Par ID 181
P4.7 ②	AO1 Offset	-100.00	100.00	%	0.00	173	
P4.8 ②	AO2 Mode				0	228	See Par ID 222
P4.9 ②	AO2 Function				4	229	See Par ID 146
P4.10 ②	AO2 Minimum				1	232	See Par ID 149
P4.11 ②	AO2 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	AO2 Scale	10	1000	%	100	233	
P4.13 ②	AO2 Inversion				0	231	See Par ID 181
P4.14 ②	AO2 Offset	-100.00	100.00	%	0.00	234	

Table 58. Digital Output—P5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1 ②	DO1 Function				1	151	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 11 = PID1 Superv 13 = OverHeat Fault 14 = OverCurrent Regular 15 = OverVoltage Regular 16 = UnderVoltage Regular 17 = 4mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Therm Protection 31 = FB Digital Input 1 32 = FB Digital Input 2 33 = FB Digital Input 3 34 = FB Digital Input 4

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 58. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1 ②, continued	DO1 Function				1	151	35 = Damper Control 36 = TC1 Status 37 = TC2 Status 38 = TC3 Status 39 = In E-Stop 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 43 = Motor 1 Control 44 = Motor 2 Control 45 = Motor 3 Control 46 = Motor 4 Control 47 = Motor 5 Control 49 = PID1 Sleep 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 57 = Prime Pump Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = FieldBus_RTU_ Fault,FieldBus RTU Fault 65 = FieldBus_TCP_ Fault,FieldBus TCP Fault 66 = FieldBus_MSTP_ Fault,FieldBus MSTP Fault 67 = FieldBus_EIP_ Fault,FieldBus EIP Fault 68 = FieldBus_SlotA_ Fault,FieldBus SlotA Fault 69 = FieldBus_SlotB_ Fault,FieldBus SlotB Fault 70 = FieldBus SMDT Fault 71 = Jockey Pump Active 72 = Lube Pump Active 73 = PID1 Low Feedback 74 = PID1 High Feedback
P5.2 ②	RO1 Function				2	152	See Par ID 151
P5.3 ②	RO2 Function				3	153	See Par ID 151
P5.4 ②	RO3 Function				7	538	See Par ID 151
P5.5 ②	Virtual RO1 Function				0	2463	See Par ID 151
P5.6 ②	Virtual RO2 Function				0	2464	See Par ID 151
P5.7 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 1 Supv Val	0.00	See Par ID 102	Hz	0.00	155	
P5.9 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10 ②	Freq Limit 2 Supv Val	0.00	See Par ID 102	Hz	0.00	158	
P5.11 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Torque Limit Supv Val	-1000.0	1000.0	%	100.0	160	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 58. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.13 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.14 ②	Ref Limit Supv Val	0.00	See Par ID 102	Hz	0.00	162	
P5.17 ②	Temp Limit Supv				0	165	See Par ID 161
P5.18 ②	Temp Limit Supv Val	-10.0	75.0	°C	40.0	166	
P5.19 ②	Power Limit Supv				0	167	See Par ID 161
P5.20 ②	Power Limit Supv Val	-200.0	200.0	%	0.0	168	
P5.21 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.22 ②	AI Limit Supv				0	171	See Par ID 161
P5.23 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.24 ②	PID1 Superv Enable				0	1346	See Par ID 2462
P5.25 ②	PID1 Superv Upper Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1347	
P5.26 ②	PID1 Superv Lower Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1349	
P5.27 ②	PID1 Superv Delay	0	3000	s	0	1351	
P5.32 ②	RO1 On Delay	0.0	320.0	s	0.0	2112	
P5.33 ②	RO1 Off Delay	0.0	320.0	s	0.0	2113	
P5.34 ②	RO2 On Delay	0.0	320.0	s	0.0	2114	
P5.35 ②	RO2 Off Delay	0.0	320.0	s	0.0	2115	
P5.36 ②	RO3 On Delay	0.0	320.0	s	0.0	2116	
P5.37 ②	RO3 Off Delay	0.0	320.0	s	0.0	2117	
P5.38 ②	RO3 Reverse				0	2118	0 = No 1 = Yes
P5.39 ②	Motor Current 1 Supv				0	2189	See Par ID 159
P5.40 ②	Motor Current 1 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190	
P5.41 ②	Motor Current 2 Supv				0	2191	See Par ID 159
P5.42 ②	Motor Current 2 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192	
P5.43 ②	Second AI Supv Select				0	2193	See Par ID 170
P5.44 ②	Second AI Limit Supv				0	2194	See Par ID 161
P5.45 ②	Second AI Limit Supv Val	0.00	100.00	%	0.00	2195	
P5.46 ②	Motor Current 1 Supv Hyst	0.1	1.0	A	0.1	2196	
P5.47 ②	Motor Current 2 Supv Hyst	0.1	1.0	A	0.1	2197	
P5.48 ②	AI Supv Hyst	1.00	10.00	%	1.00	2198	
P5.49 ②	Second AI Supv Hyst	1.00	10.00	%	1.00	2199	
P5.50 ②	Freq Limit 1 Supv Hyst	0.10	1.00	Hz	0.10	2200	
P5.51 ②	Freq Limit 2 Supv Hyst	0.10	1.00	Hz	0.10	2201	
P5.52 ②	Torque Limit Supv Hyst	1.0	5.0	%	1.0	2202	
P5.53 ②	Ref Limit Supv Hyst	0.10	1.00	Hz	0.10	2203	
P5.54 ②	Temp Limit Supv Hyst	1.0	10.0	°C	1.0	2204	
P5.55 ②	Power Limit Supv Hyst	0.1	10.0	%	0.1	2205	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 59. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See Par ID 135
P7.2 ①②	Remote 2 Reference				7	139	See Par ID 136
P7.3 ②	Keypad Reference	See Par ID 101	See Par ID 102	Hz	0.00	141	
P7.4 ②	Keypad Direction				0	116	0 = Forward 1 = Reverse
P7.5 ②	Keypad Stop				1	114	0 = Enabled-Keypad Operation 1 = Always Enabled
P7.6 ②	Jog Reference	0.00	See Par ID 102	Hz	5.00	117	
P7.9 ②	Start Mode				0	252	0 = Ramp 1 = Flying Start From Stop Frequency 2 = Flying Start From Max Frequency
P7.10 ②	Stop Mode					2531	0 = Coasting 1 = Ramp
P7.11 ②	Ramp 1 Shape	0.0	10.0	s	0.0	247	
P7.12 ②	Ramp 2 Shape	0.0	10.0	s	0.0	248	
P7.13 ②	Accel Time 2	0.1	3000.0	s	10.0	249	
P7.14 ②	Decel Time 2	0.1	3000.0	s	10.0	250	
P7.15 ②	Skip F1 Low Limit	0.00	See Par ID 257	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	See Par ID 256	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	See Par ID 259	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	See Par ID 258	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	See Par ID 261	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	See Par ID 260	400.00	Hz	0.00	261	
P7.21 ②	Skip Range Ramp Factor	0.1	10.0		1.0	264	
P7.22 ②	Power Loss Function				0	267	See Par ID 2462
P7.23 ②	Power Loss Time	0.3	5.0	s	2.0	268	
P7.24 ②	Currency				0	2122	0 = $ 1 = £ 2 = € 3 = ¥ 4 = Rs 5 = R$ 6 = Fr 7 = kr
P7.25 ②	Energy Cost			Varies	0.00	2123	
P7.26 ②	Data Type				0	2124	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P7.27	Energy Savings Reset					2125	0 = Not Reset 1 = Reset
P7.28 ①②	2th Stage Ramp Frequency	See Par ID 101	See Par ID 102	Hz	30.00	2444	
P7.29	Change PhaseSequence Motor				0	2515	0 = Change Disable 1 = Change Enable
P7.30 ②	Run Remove Stop Mode				0	2667	See Par ID 253

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 60. Motor Control—P8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.1 ①②	Motor Control Mode				0	287	0 = Freq Control 1 = Speed Control
P8.2 ①	Current Limit	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrVT	107	
P8.3 ①②	V/Hz Optimization				0	109	See Par ID 2462
P8.4 ①②	V/Hz Ratio				0	108	0 = Linear 1 = Squared 2 = Programmable 3 = Linear + Flux Optimization
P8.5 ①②	Field Weakening Point	8.00	400.00	Hz	FieldWeakPointMFG	289	
P8.6 ①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7 ①②	V/Hz Mid Frequency	0.00	See Par ID 289	Hz	VHzCurveMidFreqMFG	291	
P8.8 ①②	V/Hz Mid Voltage	0.00	100.00	%	100.00	292	
P8.9 ①②	Zero Frequency Voltage	0.00	40.00	%	0.00	293	
P8.10 ②	Switching Frequency	MinSwitchFreq	MaxSwitchFreq	kHz	DefaultSwitchFreqCT	2522	
P8.11 ②	Sine Filter Enable				0	1665	See Par ID 2462
P8.12 ①②	OverVoltage Control				3	297	0 = Disabled 1 = REF + 8Hz 2 = Max Freq 3 = Max Freq + 8Hz
P8.17 ②	Frequency Ramp Out FilterTime Constant	0	3000	ms	0	1585	
P8.55	VF Stable Kd	0	3000	%	100	1656	
P8.56	VF Stable Kq	0	3000	%	100	1657	
P8.57 ①②	Overmodulation Enable				0	2835	See Par ID 2462

Table 61. Protections—P9

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.1 ①②	4mA Input Fault				0	306	0 = No Action 1 = Warning 2 = Warning: Previous Freq 3 = Warning: Preset Freq 4 = Fault 5 = Fault, Coast
P9.2 ①②	4mA Fault Frequency	0.00	See Par ID 102	Hz	0.00	331	
P9.3 ①②	External Fault				2	307	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P9.4 ①②	Input Phase Fault				2	332	See Par ID 307
P9.5 ①②	Uvolt Fault Response				2	330	See Par ID 307
P9.6 ①②	Output Phase Fault				2	308	See Par ID 307
P9.7 ①②	Ground Fault				2	309	See Par ID 307
P9.8 ①②	Motor Thermal Protection				2	310	See Par ID 307
P9.9 ②	Motor Thermal F0 Current	0.0	150.0	%	40.0	311	
P9.10 ②	Motor Thermal Time	1	200	min	45	312	
P9.11 ①②	Stall Protection				0	313	See Par ID 307
P9.12 ②	Stall Current Limit	0.1	ActiveMotor NomCurr*2	A	ActiveMotor NomCurr*13/10	314	
P9.13 ②	Stall Time Limit	1.0	120.0	s	15.0	315	
P9.14 ②	Stall Frequency Limit	1.00	See Par ID 102	Hz	25.00	316	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 61. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.15 ①②	Underload Protection				0	317	See Par ID 307
P9.16 ②	Underload Fnom Torque	10.0	150.0	%	50.0	318	
P9.17 ②	Underload F0 Torque	5.0	150.0	%	10.0	319	
P9.18 ②	Underload Time Limit	2.00	600.00	s	20.00	320	
P9.19 ①②	Thermistor Fault Response				2	333	See Par ID 307
P9.20 ②	Line Start Lockout				2	750	0 = Disabled, No Change 1 = Enable, No Change 2 = Disabled, Changed 3 = Enable, Changed
P9.21 ①②	Fieldbus Fault Response				2	334	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast 4 = Warning, Coast 5 = Warning, Auto Switch To Local 6 = Warning, Auto Switch To Preset Speed 1
P9.22 ①②	OPTCard Fault Response				2	335	See Par ID 307
P9.23 ①②	Unit Under Temp Prot				2	1564	See Par ID 307
P9.24 ②	AR Wait Time	1.00	300.00	s	1.00	321	
P9.25 ②	AR Trail Time	0.00	600.00	s	30.00	322	
P9.26 ②	AR Start Function				0	323	0 = Flying Start From Stop Frequency 1 = Ramp 2 = Flying Start From Max Frequency
P9.27 ②	Undervoltage Attempts	0	10		1	324	
P9.28 ②	OverVoltage Attempts	0	10		1	325	
P9.29 ②	OverCurrent Attempts	0	3		1	326	
P9.30 ②	4mA Fault Attempts	0	10		1	327	
P9.31 ②	Motor Temp Fault Attempts	0	10		1	329	
P9.32 ②	External Fault Attempts	0	10		1	328	
P9.33 ②	Underload Attempts	0	10		1	336	
P9.34 ①②	RTC Fault				1	955	See Par ID 307
P9.35 ①②	PT100 Fault Response				2	337	See Par ID 307
P9.36 ①②	Replace Battery Fault Response				1	1256	See Par ID 307
P9.37 ①②	Replace Fan Fault Response				1	1257	See Par ID 307
P9.38 ①②	IP Address Confliction Resp				1	1678	See Par ID 307
P9.39 ②	Cold Weather Mode				0	2126	See Par ID 2462
P9.40 ②	Cold Weather Volt. Level	0.0	20.0	%	2.0	2127	
P9.41 ②	Cold Weather Time Out	0	10	min	3	2128	
P9.42	Cold Weather Password					2129	

Note: ① Parameter value can only be changed after the drive has stopped.
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③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 61. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.43	Under Temp Fault Override					2130	See Par ID 2118
P9.44 ②	Ground Fault Limit	0	30	%	15	2158	
P9.45 ①②	Keypad Comm Fault Response				2	2157	See Par ID 307
P9.46 ②	Preheat Mode				0	2159	See Par ID 2462
P9.47 ②	Preheat Control Source				31	2160	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = SlotA PT100 Temp Channel 1 33 = SlotA PT100 Temp Channel 2 34 = SlotA PT100 Temp Channel 3 35 = SlotA Max PT100 Temp 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = SlotB Max PT100 Temp 40 = SlotA and SlotB Max PT100 Temp
P9.48 ②	Preheat Enter Temp	0.0	19.9	°C	10.0	2161	
P9.49 ②	Preheat Quit Temp	20.0	40.0	°C	20.0	2162	
P9.50 ②	Preheat Output Volt	0.0	20.0	%	2.0	2163	
P9.51 ①②	PID Feedback AI Loss Response				0	2401	0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Freq 4 = Warning: Analog->Net
P9.52 ①②	PID Feedback AI Loss Pre Freq	0.00	400.00	Hz	0.00	2402	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 61. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.53 ②	PID Feedback AI Loss Pipe Fill Loss Level	0.0	1000.0	Varies	0.0	2403	
P9.54 ②	PID Feedback AI Loss PreFreq Timeout	0	6000	s	0	2404	
P9.55 ②	PID Feedback AI Loss Attempts	0	10		1	2405	
P9.56 ②	STO Fault Response				2	2427	0 = No Action 1 = Warning 2 = Fault
P9.57 ②	Fault Reset Start				0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset
P9.58	Warning Operation Mode				1	2657	0 = No Action 1 = Warning, No Store 2 = Warning, Store
P9.59 ②	Fan Protection				2	2664	See Par ID 307
P9.60	Under Voltage Trip Level	DCLinkUnderVolt StopLimit	DCLinkOverVolt StopLimit	V	DCLinkUnderVolt ProtectLimit	2666	
P9.61 ②	OP Cont Interlock Attempts	0	10		1	2803	
P9.62 ①②	OP Cont Interlock Protection				2	2831	See Par ID 307

Table 62. PID Controller 1—P10

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.1 ②	PID1 Control Gain	0.00	200.00	%	100.00	1294	
P10.2 ②	PID1 Control ITime	0.00	600.00	s	1.00	1295	
P10.3 ②	PID1 Control DTime	0.00	100.00	s	0.00	1296	
P10.4 ①②	PID1 Process Unit				0	1297	0 = % 1 = 1/min 2 = rpm 3 = ppm 4 = pps 5 = l/s 6 = l/min 7 = l/h 8 = kg/s 9 = kg/min 10 = kg/h 11 = m3/s 12 = m3/min 13 = m3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVS 20 = kW 21 = °C 22 = GPM 23 = gal/s 24 = gal/min 25 = gal/h 26 = lb/s 27 = lb/min 28 = lb/h 29 = CFM

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 62. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.4 ①②, continued	PID1 Process Unit				0	1297	30 = ft3/s 31 = ft3/min 32 = ft3/h 33 = ft/s 34 = in wg 35 = ft wg 36 = PSI 37 = lb/in2 38 = HP 39 = °F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m
P10.5 ②	PID1 Process Unit Min	-99999.99	See Par ID 1300	Varies	0.00	1298	
P10.6 ②	PID1 Process Unit Max	See Par ID 1298	99999.99	Varies	100.00	1300	
P10.7 ②	PID1 Process Unit Decimal	0	4		2	1302	
P10.8 ①②	PID1 Error Inversion				0	1303	See Par ID 181
P10.9 ②	PID1 Dead Band	0.00	99999.99	Varies	0.00	1304	
P10.10 ②	PID1 Dead Band Delay	0.00	320.00	s	0.00	1306	
P10.11 ②	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307	
P10.12 ②	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309	
P10.13 ②	PID1 Ramp Time	0.00	300.00	s	0.00	1311	
P10.14 ①②	PID1 Set Point 1 Source				1	1312	0 = Not Used 1 = PID1 Keypad Set Point 1 2 = PID1 Keypad Set Point 2 3 = AI1 4 = AI2 5 = Slot A: AI1 6 = Slot B: AI1 7 = FB Process Data Input 1 8 = FB Process Data Input 2 9 = FB Process Data Input 3 10 = FB Process Data Input 4 11 = FB Process Data Input 5 12 = FB Process Data Input 6 13 = FB Process Data Input 7 14 = FB Process Data Input 8 16 = Multi Drive Network 17 = FB PID1 Set Point 1 18 = FB PID1 Set Point 2
P10.15 ②	PID1 Set Point 1 Min	-200.00	200.00	%	0.00	1313	
P10.16 ②	PID1 Set Point 1 Max	-200.00	200.00	%	100.00	1314	
P10.17 ①②	PID1 Set Point 1 Sleep Enable				0	1315	See Par ID 2462
P10.18 ①②	PID1 Set Point 1 Sleep Unit Sel				0	2396	0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback
P10.19 ②	PID1 Set Point 1 Sleep Level			Varies	0.00	2450	
P10.20 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.21 ②	PID1 Set Point 1 Wake Up Level	-99999.99	99999.99	Varies	0.00	1318	
P10.22 ②	PID1 Set Point 1 Boost	-2.0	2.0		1.0	1320	

Note: ① Parameter value can only be changed after the drive has stopped.
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③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 62. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.23 ①②	PID1 Set Point 2 Source				2	1321	See Par ID 1312
P10.24 ②	PID1 Set Point 2 Min	-200.00	200.00	%	0.00	1322	
P10.25 ②	PID1 Set Point 2 Max	-200.00	200.00	%	100.00	1323	
P10.26 ①②	PID1 Set Point 2 Sleep Enable				0	1324	See Par ID 2462
P10.27 ①②	PID1 Set Point 2 Sleep Unit Sel				0	2397	See Par ID 2396
P10.28 ②	PID1 Set Point 2 Sleep Level			Varies	0.00	2452	
P10.29 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.30 ②	PID1 Set Point 2 Wake Up Level	-99999.99	99999.99	Varies	0.00	1327	
P10.31 ②	PID1 Set Point 2 Boost	-2.0	2.0		1.0	1329	
P10.32 ①②	PID1 Feedback Function				0	1330	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1 - Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1 - Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2) 9 = Source1*Source2
P10.33 ②	PID1 Feedback Gain	-1000.0	1000.0	%	100.0	1331	
P10.34 ①②	PID1 Feedback 1 Source				2	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID1 Feedback 1 22 = FB PID1 Feedback 2
P10.35 ②	PID1 Feedback 1 Min	-200.00	200.00	%	0.00	1333	
P10.36 ②	PID1 Feedback 1 Max	-200.00	200.00	%	100.00	1334	
P10.37 ①②	PID1 Feedback 2 Source				0	1335	See Par ID 1332
P10.38 ②	PID1 Feedback 2 Min	-200.00	200.00	%	0.00	1336	
P10.39 ②	PID1 Feedback 2 Max	-200.00	200.00	%	100.00	1337	

Note: ① Parameter value can only be changed after the drive has stopped.
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③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 62. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.40 ①②	PID1 Feedforward Func				0	1338	See Par ID 1330
P10.41 ②	PID1 Feedforward Gain	-1000.0	1000.0	%	100.0	1339	
P10.42 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID1 Feedforward 1 22 = FB PID1 Feedforward 2
P10.43 ②	PID1 Feedforward 1 Min	-200.00	200.00	%	0.00	1341	
P10.44 ②	PID1 Feedforward 1 Max	-200.00	200.00	%	100.00	1342	
P10.45 ①②	PID1 Feedforward 2 Source				0	1343	See Par ID 1340
P10.46 ②	PID1 Feedforward 2 Min	-200.00	200.00	%	0.00	1344	
P10.47 ②	PID1 Feedforward 2 Max	-200.00	200.00	%	100.00	1345	
P10.48 ②	PID1 Set Point 1 Comp Enable				0	1352	See Par ID 2462
P10.49 ②	PID1 Set Point 1 Comp Max	-200.00	200.00	%	0.00	1353	
P10.50 ②	PID1 Set Point 2 Comp Enable				0	1354	See Par ID 2462
P10.51 ②	PID1 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1355	
P10.52 ②	PID1 Wake Up Action				0	2466	0 = Below Wake Up Level 1 = Above Wake Up Level 2 = Below Wake Up Level (PID ref.) 3 = Above Wake Up Level (PID ref.)
P10.53	FB PID1 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2542	
P10.54	FB PID1 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2544	
P10.55	FB PID1 Feedback 1			%		2550	
P10.56	FB PID1 Feedback 2			%		2551	
P10.57	FB PID1 Feedforward 1			%		2554	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 62. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.58	FB PID1 Feedforward 2			%		2555	
P10.59 ②	PID1 Sleep Boost level	-9999	9999	Varies	0	2660	
P10.60 ②	PID1 Sleep Boost Max Time	1	300	s	30	2661	
P10.61 ②	PID1 Low Feedback Level	0.0	6000.0	Varies	0.0	2811	
P10.62 ②	PID1 Low Feedback Time	0	3600	s	10	2812	
P10.63 ①②	PID1 Low Feedback Protection				0	2813	See Par ID 307
P10.64 ②	PID1 High Feedback Level	0.0	6000.0	Varies	150.0	2814	
P10.65 ②	PID1 High Feedback Time	0	3600	s	5	2815	
P10.66 ①②	PID1 High Feedback Protection				0	2816	See Par ID 307
P10.67 ①②	PID1 Hysteresis Level	0.0	100.0	Varies	0.0	2817	
P10.68 ②	PID1 Backup Feedback Source				0	2825	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1

Table 63. Preset Speed—P12

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1 ②	Preset Speed 1	0.00	See Par ID 102	Hz	5.00	105	
P12.2 ②	Preset Speed 2	0.00	See Par ID 102	Hz	10.00	106	
P12.3 ②	Preset Speed 3	0.00	See Par ID 102	Hz	15.00	118	
P12.4 ②	Preset Speed 4	0.00	See Par ID 102	Hz	20.00	119	
P12.5 ②	Preset Speed 5	0.00	See Par ID 102	Hz	25.00	120	
P12.6 ②	Preset Speed 6	0.00	See Par ID 102	Hz	30.00	121	
P12.7 ②	Preset Speed 7	0.00	See Par ID 102	Hz	35.00	122	

Table 64. Brake—P14

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P14.1 ①②	DC-Brake Current	Drive NomCurrCT*15/100	Drive NomCurrCT*15/10	A	DriveNomCurrCT*1/2	254	
P14.2 ①②	Start DC-Brake Time	0.00	600.00	s	0.00	263	
P14.3 ①②	Stop DC-Brake Frequency	0.10	10.00	Hz	1.50	262	
P14.4 ①②	Stop DC-Brake Time	0.00	600.00	s	0.00	255	
P14.5 ①②	Brake Chopper Mode				0	251	0 = Disabled 1 = B(Run) T(Rdy) 2 = External 3 = B(Rdy) T(Rdy) 4 = B(Run) T(No)
P14.6 ①②	Flux Brake				0	266	0 = Off 1 = On
P14.7 ①②	Flux Brake Current	ActiveMotor NomCurr*1/10	See Par ID 107	A	ActiveMotorNomCurr*1/2	265	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 65. Fire Mode—P15

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P15.1 ①②	Fire Mode Function				0	535	0 = Closing Contact 1 = Opening Contact
P15.2 ①②	Fire Mode Ref Select Function				0	536	0 = Fire Mode Min Frequency 1 = Fire Mode Ref 2 = Fieldbus Ref 3 = AI1 4 = AI2 5 = AI1 + AI2 6 = PID1 Control Output
P15.3 ②	Fire Mode Frequency	See Par ID 101	See Par ID 102	Hz	60.00	537	
P15.4 ②	Fire Mode % Speed Ref 1	0.0	100.0	%	75.0	565	
P15.5 ②	Fire Mode % Speed Ref 2	0.0	100.0	%	100.0	564	
P15.6 ①②	Smoke Purge Frequency	0.0	100.0	%	50.0	554	
P15.7	Fire Mode Test Enable					2443	See Par ID 2462

Table 66. Second Motor Parameter—P16

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P16.1 ①	Motor Nom Current 2	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT	577	
P16.2 ①	Motor Nom Speed 2	300	20000	rpm	SecdMotorNomSpeedMFG	578	
P16.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P16.4 ①	Motor Nom Volt 2	180	690	V	SecdMotorNomVoltMFG	580	
P16.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	SecdMotorNomFreqMFG	581	

Bypass

Table 67. Basic Setting—P17.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1.1 ①②	Bypass Enable				0	1418	See Par ID 2462
P17.1.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.1.3 ①②	Auto Bypass				0	542	See Par ID 2462
P17.1.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.1.5 ①②	OverCurrent Bypass Enable				0	547	See Par ID 2462
P17.1.6 ①②	IGBT Fault Bypas Enable				0	546	See Par ID 2462
P17.1.7 ①②	4mA Fault Bypass Enable				0	548	See Par ID 2462
P17.1.8 ①②	UnderVoltage Bypass Enable				0	545	See Par ID 2462
P17.1.9 ①②	OverVoltage Bypass Enable				0	549	See Par ID 2462
P17.1.10 ①②	Motor OverTemp Bypass Enable				0	1698	See Par ID 2462
P17.1.11 ①②	UnderLoad Bypass Enable				0	1699	See Par ID 2462
P17.1.12 ①②	External Bypass Enable				0	1700	See Par ID 2462
P17.1.13 ①②	Charge Switch Fault Bypass Enable				0	1701	See Par ID 2462

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 67. Basic Setting—P17.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1.14 ①②	Saturation Trip Fault Bypass Enable				0	1702	See Par ID 2462
P17.1.15 ①②	Under Temp Fault Bypass Enable				0	1703	See Par ID 2462
P17.1.16 ①②	EEPROM Fault Bypass Enable				0	1704	See Par ID 2462
P17.1.17 ①②	FRAM Fault Bypass Enable				0	1705	See Par ID 2462
P17.1.18 ①②	Watchdog Fault Bypass Enable				0	1706	See Par ID 2462
P17.1.19 ①②	Fan Cooling Fault Bypass Enable				0	1707	See Par ID 2462
P17.1.20 ①②	Keypad Com Fault Bypass Enable				0	1708	See Par ID 2462
P17.1.21 ①②	Option Card Fault Bypass Enable				0	1709	See Par ID 2462
P17.1.22 ①②	RTC Clock Fault Bypass Enable				0	1710	See Par ID 2462
P17.1.23 ①②	Ctrl Board OverTemp Fault Bypass Enable				0	1711	See Par ID 2462
P17.1.24 ①②	Fieldbus Fault Bypass Enable				0	1713	See Par ID 2462
P17.1.25 ①②	Op Cont Interlock Fault Bypass Enable				0	2832	See Par ID 2462

Table 68. Redundant Drive—P17.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.2.1 ①②	Redundant Drive Enable				0	2476	See Par ID 2462
P17.2.2 ①②	Drive ID	0	5		0	2278	
P17.2.3 ②	Redundant Run Time Enable				0	2477	See Par ID 2462
P17.2.4	Redundant Run Time Reset					2478	See Par ID 2125
P17.2.5 ②	Redundant RunTime Limit	0.0	300000.0	h	0.0	2479	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Pump parameters

Table 69. Basic Setting—P18.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.1 ①②	Multi-pump Mode				0	2279	0 = Disabled 1 = Single Drive Control 2 = Multi Drive Network
P18.1.2 ①②	Drive ID	0	5		0	2278	
P18.1.3 ②	PID Bandwidth	0.00	6000.00	Varies	10.00	2458	
P18.1.4 ①②	Staging Frequency	See Par ID 101	400.00		50.00	2315	
P18.1.5 ①②	De-Staging Frequency	0.00	See Par ID 102		0.00	2316	
P18.1.6 ②	Add/Remove Delay	0	3600	s	10	344	
P18.1.7 ②	Interlock Enable				0	350	See Par ID 2462
P18.1.8 ①②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.1.9 ①②	Damper Time Out	1	32500	s	5	484	
P18.1.10 ①②	Damper Delay	1	32500	s	5	485	
P18.1.11 ②	Derag Cycles	0	10		3	2468	
P18.1.12 ②	Derag at Start/Stop				0	2469	0 = Off 1 = Start 2 = Stop 3 = Start and Stop 4 = Digital Input
P18.1.13 ②	Deragging Run Time	0	3600	s	0	2470	
P18.1.14 ②	Derag Speed	See Par ID 101	See Par ID 102	Hz	5.00	2471	
P18.1.15 ②	Derag Off Delay	1	600	s	10	2472	
P18.1.16 ①②	Multi-pump Mode 2				0	2659	See Par ID 2279

Multi-pump status

Table 70. Operation Mode—P18.2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.1.1	Drive 1					2218	0 = Offline 1 = Slave Drive 2 = Master Drive 3 = Redundant Drive
P18.2.1.2	Drive 2					2230	See Par ID 2218
P18.2.1.3	Drive 3					2242	See Par ID 2218
P18.2.1.4	Drive 4					2254	See Par ID 2218
P18.2.1.5	Drive 5					2266	See Par ID 2218

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 71. Multi-Pump Status—P18.2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.2.1	Drive 1				5	2219	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.2	Drive 2				5	2231	See Par ID 2219
P18.2.2.3	Drive 3				5	2243	See Par ID 2219
P18.2.2.4	Drive 4				5	2255	See Par ID 2219
P18.2.2.5	Drive 5				5	2267	See Par ID 2219

Table 72. Network Status—P18.2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.3.1	Drive 1					2220	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.2	Drive 2					2232	See Par ID 2220
P18.2.3.3	Drive 3					2244	See Par ID 2220
P18.2.3.4	Drive 4					2256	See Par ID 2220
P18.2.3.5	Drive 5					2268	See Par ID 2220

Multi-pump measurement

Table 73. Latest Fault Code—P18.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.1.1	Drive 1					2221	
P18.3.1.2	Drive 2					2233	
P18.3.1.3	Drive 3					2245	
P18.3.1.4	Drive 4					2257	
P18.3.1.5	Drive 5					2269	

Table 74. Output Frequency—P18.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.2.1	Drive 1			Hz		2222	
P18.3.2.2	Drive 2			Hz		2234	
P18.3.2.3	Drive 3			Hz		2246	
P18.3.2.4	Drive 4			Hz		2258	
P18.3.2.5	Drive 5			Hz		2270	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 75. Motor Voltage—P18.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.3.1	Drive 1			V		2223	
P18.3.3.2	Drive 2			V		2235	
P18.3.3.3	Drive 3			V		2247	
P18.3.3.4	Drive 4			V		2259	
P18.3.3.5	Drive 5			V		2271	

Table 76. Motor Current—P18.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.4.1	Drive 1			A		2224	
P18.3.4.2	Drive 2			A		2236	
P18.3.4.3	Drive 3			A		2248	
P18.3.4.4	Drive 4			A		2260	
P18.3.4.5	Drive 5			A		2272	

Table 77. Motor Torque—P18.3.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.5.1	Drive 1			%		2225	
P18.3.5.2	Drive 2			%		2237	
P18.3.5.3	Drive 3			%		2249	
P18.3.5.4	Drive 4			%		2261	
P18.3.5.5	Drive 5			%		2273	

Table 78. Motor Power—P18.3.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.6.1	Drive 1			%		2226	
P18.3.6.2	Drive 2			%		2238	
P18.3.6.3	Drive 3			%		2250	
P18.3.6.4	Drive 4			%		2262	
P18.3.6.5	Drive 5			%		2274	

Table 79. Motor Speed—P18.3.7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.7.1	Drive 1			rpm		2227	
P18.3.7.2	Drive 2			rpm		2239	
P18.3.7.3	Drive 3			rpm		2251	
P18.3.7.4	Drive 4			rpm		2263	
P18.3.7.5	Drive 5			rpm		2275	

Table 80. Run Time—P18.3.8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.8.1	Drive 1			h		2228	
P18.3.8.2	Drive 2			h		2240	
P18.3.8.3	Drive 3			h		2252	
P18.3.8.4	Drive 4			h		2264	
P18.3.8.5	Drive 5			h		2276	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 81. Multi-Pump Single Drive—P18.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.4.1 ①②	Number of Pumps	1	5		1	342	
P18.4.2 ②	Include Freq Converter				1	346	See Par ID 2462
P18.4.3 ②	Auto-Change Enable				0	345	See Par ID 2462
P18.4.4 ②	Auto-Change Interval	0.0	3000.0	h	48.0	347	
P18.4.5 ②	Auto-Change Freq Limit	See Par ID 101	See Par ID 102	Hz	25.00	349	
P18.4.6 ②	Auto-Change Pump Limit	0	5		1	348	
P18.4.7 ①②	Pipe Fill Aux Pump Select				0	2439	0 = Disabled 1 = Aux Motor 1 2 = Aux Motor 2 3 = Aux Motor 3 4 = Aux Motor 4
P18.4.8 ①②	Pipe Fill Aux Pump Run Time	0.0	3600.0	min	0.0	2440	
P18.4.9 ①②	Pipe Fill Aux Pump Operation				0	2441	0 = Automatic 1 = Stop
P18.4.10 ①②	Pipe Fill Aux Pump Delay	0.0	600.0	min	2.0	2442	
P18.4.1 ①②	Number of Pumps	1	5		1	342	
P18.4.2 ②	Include Freq Converter				1	346	See Par ID 2462
P18.4.3 ②	Auto-Change Enable				0	345	See Par ID 2462
P18.4.4 ②	Auto-Change Interval	0.0	3000.0	h	48.0	347	
P18.4.5 ②	Auto-Change Freq Limit	See Par ID 101	See Par ID 102	Hz	25.00	349	
P18.4.6 ②	Auto-Change Pump Limit	0	5		1	348	
P18.4.7 ①②	Pipe Fill Aux Pump Select				0	2439	0 = Disabled 1 = Aux Motor 1 2 = Aux Motor 2 3 = Aux Motor 3 4 = Aux Motor 4
P18.4.8 ①②	Pipe Fill Aux Pump Run Time	0.0	3600.0	min	0.0	2440	
P18.4.9 ①②	Pipe Fill Aux Pump Operation				0	2441	0 = Automatic 1 = Stop
P18.4.10 ①②	Pipe Fill Aux Pump Delay	0.0	600.0	min	2.0	2442	

Table 82. Multi-Pump Multi Drive—P18.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.5.1 ①②	Number of Drives	1	5		1	2449	
P18.5.2 ①②	Regulation Source				0	2284	0 = Network Only 1 = PID Controller 1
P18.5.3 ①②	Recovery Method				0	2285	See Par ID 2441
P18.5.4 ①②	Callback Source				0	2286	0 = No Action 1 = Safety Torque Off
P18.5.5 ②	Add/Remove Drive Selection				0	2311	0 = Drive ID 1 = Run Time
P18.5.6 ②	Run Time Enable				0	2280	See Par ID 2462
P18.5.7 ②	Run Time Limit	0.0	300000.0	h	0.0	2281	
P18.5.8	Run Time Reset					2283	0 = No Action 1 = Reset

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 82. Multi-Pump Multi Drive—P18.5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.5.9 ②	Master Drive Mode				0	2473	0 = Follow PID 1 = Fixed Speed 2 = Turn Off
P18.5.10 ②	Master Fixed Speed	See Par ID 101	See Par ID 102	Hz	50.00	2474	
P18.5.11 ②	Master Fixed Speed Delay	0	1000	s	5	2475	

Table 83. Protections—P18.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.6.1 ①②	Pipe Fill Loss Detection Method				0	2406	0 = Motor Current 1 = Motor Power 2 = Motor Torque
P18.6.2 ②	Pipe Fill Loss Level	0.0	1000.0	Varies	0.0	2407	
P18.6.3 ②	Pipe Fill Loss Time	0	600	s	0	2408	
P18.6.4 ①②	Pipe Fill Loss Frequency	0.00	See Par ID 102	Hz	0.00	2409	
P18.6.5 ①②	Pipe Fill Loss Response				0	2410	See Par ID 2427
P18.6.6 ②	Pipe Fill Loss Attempts	0	10		1	2411	
P18.6.7 ②	Prime Pump Enable				0	2428	See Par ID 190
P18.6.8 ②	Prime Pump Level	0.00	6000.00	Varies	0.00	2429	
P18.6.9 ②	Prime Pump Frequency	See Par ID 101	See Par ID 102	Hz	0.00	2431	
P18.6.10 ②	Prime Pump Delay Time	0.0	3600.0	min	0.0	2432	
P18.6.11 ②	Prime Pump Loss of Prime Level	0.0	1000.0	Varies	0.0	2433	
P18.6.12 ②	Prime Pump Level 2	0.00	6000.00	Varies	0.00	2434	
P18.6.13 ②	Prime Pump Frequency 2	See Par ID 101	See Par ID 102	Hz	0.00	2436	
P18.6.14 ②	Prime Pump Delay Time 2	0.0	3600.0	min	0.0	2437	
P18.6.15 ②	Prime Pump Loss of Prime Level 2	0.0	1000.0	Varies	0.0	2438	
P18.6.16 ①②	Broken Pipe Fault Response				0	1853	See Par ID 307
P18.6.17 ②	Broken Pipe Level	0.0	6000.0	Varies	15.0	1854	
P18.6.18 ②	Broken Pipe Delay	1.0	120.0	s	15.0	1855	
P18.6.19 ②	Broken Pipe Frequency	1.00	See Par ID 102	Hz	25.00	1856	
P18.6.20 ②	Jockey Pump Enable				0	2804	0 = Not Used 1 = PID Sleep 2 = PID Sleep(Level)
P18.6.21 ②	Jockey Start Level	-99999.99	See Par ID 2807	Varies	0.00	2805	
P18.6.22 ②	Jockey Stop Level	See Par ID 2805	99999.99	Varies	0.00	2807	
P18.6.23 ②	Lube Pump Enable				0	2809	See Par ID 2462
P18.6.24 ②	Lube Pump Time	0.0	300.0	s	0.0	2810	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 84. Real Time Clock—P19

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P19.1 ②	Interval 1 On Time				0,0,0	491	
P19.2 ②	Interval 1 Off Time				0,0,0	493	
P19.3 ②	Interval 1 From Day				0	517	0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday
P19.4 ②	Interval 1 To Day				0	518	See Par ID 517
P19.5 ②	Interval 1 Channel				0	519	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.6 ②	Interval 2 On Time				0,0,0	495	
P19.7 ②	Interval 2 Off Time				0,0,0	497	
P19.8 ②	Interval 2 From Day				0	520	See Par ID 517
P19.9 ②	Interval 2 To Day				0	521	See Par ID 517
P19.10 ②	Interval 2 Channel				0	522	See Par ID 519
P19.11 ②	Interval 3 On Time				0,0,0	499	
P19.12 ②	Interval 3 Off Time				0,0,0	501	
P19.13 ②	Interval 3 From Day				0	523	See Par ID 517
P19.14 ②	Interval 3 To Day				0	524	See Par ID 517
P19.15 ②	Interval 3 Channel				0	525	See Par ID 519
P19.16 ②	Interval 4 On Time				0,0,0	503	
P19.17 ②	Interval 4 Off Time				0,0,0	505	
P19.18 ②	Interval 4 From Day				0	526	See Par ID 517
P19.19 ②	Interval 4 To Day				0	527	See Par ID 517
P19.20 ②	Interval 4 Channel				0	528	See Par ID 519
P19.21 ②	Interval 5 On Time				0,0,0	507	
P19.22 ②	Interval 5 Off Time				0,0,0	509	
P19.23 ②	Interval 5 From Day				0	529	See Par ID 517
P19.24 ②	Interval 5 To Day				0	530	See Par ID 517
P19.25 ②	Interval 5 Channel				0	531	See Par ID 519
P19.26 ②	Timer 1 Duration	0	72000	s	0	511	
P19.27 ②	Timer 1 Channel				0	532	See Par ID 519
P19.28 ②	Timer 2 Duration	0	72000	s	0	513	
P19.29 ②	Timer 2 Channel				0	533	See Par ID 519
P19.30 ②	Timer 3 Duration	0	72000	s	0	515	
P19.31 ②	Timer 3 Channel				0	534	See Par ID 519
P19.32 ②	Interval 1 Setting				0	2487	0 = Weekly 1 = Daily

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 84. Real Time Clock—P19, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P19.33 ②	Interval 2 Setting				0	2488	See Par ID 2487
P19.34 ②	Interval 3 Setting				0	2489	See Par ID 2487
P19.35 ②	Interval 4 Setting				0	2490	See Par ID 2487
P19.36 ②	Interval 5 Setting				0	2491	See Par ID 2487

Communication

Table 85. FB Process Data Input Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1 ②	FB Process Data Input 1 Sel	0	2663		2541	2533	
P20.1.2 ②	FB Process Data Input 2 Sel	0	See Par ID 2533		2542	2534	
P20.1.3 ②	FB Process Data Input 3 Sel	0	See Par ID 2533		2550	2535	
P20.1.4 ②	FB Process Data Input 4 Sel	0	See Par ID 2533		0	2536	
P20.1.5 ②	FB Process Data Input 5 Sel	0	See Par ID 2533		0	2537	
P20.1.6 ②	FB Process Data Input 6 Sel	0	See Par ID 2533		0	2538	
P20.1.7 ②	FB Process Data Input 7 Sel	0	See Par ID 2533		0	2539	
P20.1.8 ②	FB Process Data Input 8 Sel	0	See Par ID 2533		0	2540	

Table 86. FB Process Data Output Sel—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1 ②	FB Process Data Output 1 Sel				1	1556	
P20.2.2 ②	FB Process Data Output 2 Sel				2	1557	
P20.2.3 ②	FB Process Data Output 3 Sel				3	1558	
P20.2.4 ②	FB Process Data Output 4 Sel				4	1559	
P20.2.5 ②	FB Process Data Output 5 Sel				5	1560	
P20.2.6 ②	FB Process Data Output 6 Sel				6	1561	
P20.2.7 ②	FB Process Data Output 7 Sel				7	1562	
P20.2.8 ②	FB Process Data Output 8 Sel				28	1563	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 86. FB Process Data Output Sel—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.9 ②	Standard Status Word Bit0 Function Select				1	2415	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 11 = PID1 Superv 13 = OverHeat Fault 14 = OverCurrent Regular 15 = OverVoltage Regular 16 = UnderVoltage Regular 17 = 4mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Therm Protection 31 = FB Digital Input 1 32 = FB Digital Input 2 33 = FB Digital Input 3 34 = FB Digital Input 4 35 = Damper Control 36 = TC1 Status 37 = TC2 Status 38 = TC3 Status 39 = In E-Stop 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 43 = Motor 1 Control 44 = Motor 2 Control 45 = Motor 3 Control 46 = Motor 4 Control 47 = Motor 5 Control 49 = PID1 Sleep 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 57 = Prime Pump Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = FieldBus_RTU_ Fault,FieldBus RTU Fault 65 = FieldBus_TCP_ Fault,FieldBus TCP Fault

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 86. FB Process Data Output Sel—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.9 ②, continued	Standard Status Word Bit0 Function Select				1	2415	66 = FieldBus_MSTP_ Fault,FieldBus MSTP Fault 67 = FieldBus_EIP_ Fault,FieldBus EIP Fault 68 = FieldBus_SlotA_ Fault,FieldBus SlotA Fault 69 = FieldBus_SlotB_ Fault,FieldBus SlotB Fault 70 = FieldBus SMDT Fault 71 = Jockey Pump Active 72 = Lube Pump Active 73 = PID1 Low Feedback 74 = PID1 High Feedback
P20.2.10 ②	Standard Status Word Bit1 Function Select				2	2416	See Par ID 2415
P20.2.11 ②	Standard Status Word Bit2 Function Select				3	2417	See Par ID 2415
P20.2.12 ②	Standard Status Word Bit3 Function Select				4	2418	See Par ID 2415
P20.2.13 ②	Standard Status Word Bit4 Function Select				5	2419	See Par ID 2415
P20.2.14 ②	Standard Status Word Bit5 Function Select				6	2420	See Par ID 2415
P20.2.15 ②	Standard Status Word Bit6 Function Select				7	2421	See Par ID 2415
P20.2.16 ②	Standard Status Word Bit7 Function Select				8	2422	See Par ID 2415

RS-485 bus

Table 87. Basic Setting—P20.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.1.1 ①	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP 2 = SWD

Table 88. Modbus RTU—P20.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.2.1 ①	Slave Address	1	247		1	587	
P20.3.2.2 ①	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.2.3 ①	Parity Type				2	585	0 = None 1 = Odd 2 = Even
P20.3.2.4	Modbus RTU Protocol Status					588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.3.2.5	Comm Timeout Modbus RTU	0	60000	ms	10000	593	
P20.3.2.6	Modbus RTU Fault Response				0	2516	0 = in Fieldbus Control 1 = in all Control

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 89. BACnet MS/TP—P20.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.1	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P20.3.3.2	MSTP MS/TP Device Address	0	127		1	595	
P20.3.3.3	MSTP Instance Number	0	4194302		0	596	
P20.3.3.4	MSTP Comm Timeout MSTP	0	60000	ms	10000	598	
P20.3.3.5	MSTP Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.3.3.6	MSTP Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud rate fault
P20.3.3.7	MSTP Fault Response				0	2526	See Par ID 2516
P20.3.3.8 ①	MSTP Max Master	1	127		127	1537	

Table 90. Terminal: SWD—P20.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.4.1 ②	Parameter Access				1	2360	0 = Local Control 1 = Fieldbus
P20.3.4.2 ①②	Process Data Access				4	2631	0 = Local Control 1 = Fieldbus 2 = Mixed Interface 4 = NET, Local on Fault 5 = Dual Mode
P20.3.4.3	Fault Situation Counter					2632	
P20.3.4.4	Board Status					2609	
P20.3.4.5	Firmware Version					2610	
P20.3.4.6	Protocol Status					2612	0 = Not Configured 1 = Operational 2 = Diagnostics
P20.3.4.7	Operation Mode					2613	0 = PD2x16Bit Profil 1 = 8Bit Profil 2 = 1-0-A Switch
P20.3.4.8 ②	PDP-Telegram Selection				1	2614	1 = Standard Telegram 1
P20.3.4.9	Fault Counter PDP				0	2615	
P20.3.4.10 ②	Fault Situations Max				8,8	2616	
P20.3.4.11 ②	PDP-Profil Number				809	2618	
P20.3.4.12	PDP-Control Word					2619	
P20.3.4.13 ②	PDP-Status Word				64	2620	
P20.3.4.14	PDP-MaxBlockLength				30	2621	
P20.3.4.15	PDP-NoOfMultiparameter				1	2622	
P20.3.4.16	PDP-MaxLatency				2	2623	
P20.3.4.17	PDP-DO Manufacturer				413	2624	
P20.3.4.18	PDP-DO Device Type				CONST_PROD_CODE	1451	
P20.3.4.19	PDP-DO FW-Interface				FIRMWARE_MAJOR_NUM * 100 + FIRMWARE_MINOR_NUM	2625	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 90. Terminal: SWD—P20.3.4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.4.20	PDP-DO FW-Year					2626	
P20.3.4.21	PDP-DO FW-DayMonth					2627	
P20.3.4.22	PDP-DO NoOfDOs				1	2628	
P20.3.4.23	PDP-DO Subclass				1	2629	

Table 91. EtherNet/IP—P20.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.4.1 ①	IP Address Mode				0	1500	0 = Static IP 1 = DHCP with AutoIP
P20.4.2	Active IP Address					1507	
P20.4.3	Active Subnet Mask					1509	
P20.4.4	Active Default Gateway					1511	
P20.4.5	MAC Address					1513	
P20.4.6 ①	Static IP Address				192.168.1.254	1501	
P20.4.7 ①	Static Subnet Mask				255.255.255.0	1503	
P20.4.8 ①	Static Default Gateway				192.168.1.1	1505	
P20.4.9	Ethernet IP Protocol Status					608	0 = Off 1 = Operational 2 = Faulted
P20.4.10	EIP Fault Response				0	2518	See Par ID 2516

Table 92. Modbus TCP—P20.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.5.1	Connection Limit				5	609	
P20.5.2	Modbus TCP Unit ID				1	610	
P20.5.3	Comm Timeout Modbus TCP	0	60000	ms	10000	611	
P20.5.4	Modbus TCP Protocol Status					612	See Par ID 599
P20.5.5	Modbus TCP Fault Response				0	2517	See Par ID 2516
P20.5.6	Modbus TCP Trusted IP Enable				1	74	See Par ID 2462
P20.5.7	Trusted IP White List				0xC0.0xA8.0x01.0xFF. 0x00.0x00.0x00.0x00. 0x00.0x00.0x00.0x00	68	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

System

Table 93. Basic Setting—P21.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.1	Language				0	340	0 = English 1 = 中文 2 = Deutsch
P21.1.2 ①	Application					142	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
P21.1.3 ①	Parameter Sets					619	0 = No 1 = Reload Defaults 2 = Reload Set 1 3 = Reload Set 2 4 = Store Set 1 5 = Store Set 2 6 = Reset 7 = Reload Defaults VM
P21.1.4	Up To Keypad					620	See Par ID 2118
P21.1.5 ①	Down From Keypad					621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters
P21.1.6	Parameter Comparison					623	0 = No 1 = Compare with Keypad 2 = Compare with Default 3 = Compare with Set 1 4 = Compare with Set 2
P21.1.7	Password	0	9999		0	624	
P21.1.8	Parameter Lock				0	625	0 = Change Enable 1 = Change Disable
P21.1.9	Multimonitor Set				0	627	See Par ID 625
P21.1.10	Default Page				2	628	
P21.1.11	Timeout Time	0	65535	s	30	629	
P21.1.12	Contrast Adjust	5	18		12	630	
P21.1.13	Backlight Time	1	65535	min	10	631	
P21.1.14	Fan Control				1	632	
P21.1.15	Keypad ACK Timeout	200	5000	ms	200	633	
P21.1.16	Keypad Retry Number	1	10		5	634	
P21.1.17	Startup Wizard				0	626	
P21.1.18 ②	Jog Softkey Hidden				0	2412	See Par ID 2462
P21.1.19 ②	Reverse Softkey Hidden				0	2413	See Par ID 2462
P21.1.20 ②	Output Display Unit				45	2424	
P21.1.21 ②	Output Display Unit Min	-60000.00	See Par ID 2425	Varies	0.00	2460	
P21.1.22 ②	Output Display Unit Max	See Par ID 2460	60000.00	Varies	MotorNomFreqMFG	2425	
P21.1.23	Keypad Lock Password	0	9999		0	75	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 94. Version Info—P21.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.2.1	Keypad Software Version					640	
P21.2.2	Motor Control Software Version					642	
P21.2.3	Application Software Version					644	
P21.2.4	Software Bundle Version					1714	

Table 95. Application Info—P21.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.3.1	Brake Chopper Status					646	See Par ID 2118
P21.3.2	Brake Resistor Status					647	See Par ID 2118
P21.3.3	Serial Number					648	
P21.3.4	Power Unit Serail Number					1270	
P21.3.5	Control Unit Serial Number					1276	

Table 96. User Info—P21.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.4.1	Real Time Clock				0.0.0.1:1:13	566	
P21.4.2	Daylight Saving				0	582	
P21.4.3	Total MWh Count			Mwh		601	0 = Off 1 = EU 2 = US
P21.4.4	Total Power Day Count					603	
P21.4.5	Total Power Hr Count					606	
P21.4.6	Trip MWh Count			Mwh		604	
P21.4.7	Clear Trip MWh Count					635	See Par ID 2125
P21.4.8	Trip Power Day Count					636	
P21.4.9	Trip Power Hr Count					637	
P21.4.10	Clear Trip Power Count					639	See Par ID 2125

Table 97. Operate Mode—O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz		1	
O2	Freq Reference			Hz		24	
O3	Motor Speed			rpm		2	
O4	Motor Current			A		3	
O5	Motor Torque			%		4	
O6	Motor Power			%		5	
O7	Motor Voltage			V		6	
O8	DC-link Voltage			V		7	
O9	Unit Temperature			°C		8	
O10	Motor Temperature			%		9	
R12 ②	Keypad Reference	See Par ID 101	See Par ID 102	Hz	0.00	141	
R13 ②	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307	
R14 ②	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Chapter 7—Multi-PID Application

Introduction

The Multi-PID Application is designed to be used with up to 2 PID Control applications determined by the use of a digital input; it is typically used with pumps and fans to maintain a desired set-point. With PID, the frequency converter is given a set reference from a keypad, analog inputs, or fieldbus data-in. It also uses an analog probe that measures flow, temperature, and pressure in the system referred to as feedback. The frequency converter takes the feedback signal and compares it to the set point. From there based off the Gain, Integral time, and Derivative time, it corrects the speed of the motor to meet the set point value and maintain it; no additional components. Drive controlwise it provides the ability to have 2 control and reference locations with 8 digital inputs, 2 analog inputs, 3 relay outputs, 1 digital output, and 2 analog outputs that are programmable. Motor control is customizable to frequency or speed control, and the V/Hz curve can be programmable. Drive/Motor protection selections can be programmable to defined actions. Below is a list of additional features available in addition to the Standard and Multi-Pump and Fan Application features that are available in the Multi-PID Application.

Multi-PID Application includes all the functions in Multi-Pump and Fan Application, and Additional functions:

- The Second PID control

I/O Controls

- “Terminal To Function” (TTF) Programming

The design behind the programming of the digital inputs in the DG1 drive is to use “Terminal To Function” programming, which is composed of multiple functions that get assigned a digital input to that function. The parameters in the drive are set up with specific functions and by defining the digital input and slot in some cases, depending on which options are available. For use of the drives control board inputs, they will be referred to as DigIN:1 through DigIN:8. When additional option cards are used, they will be defined as DigIN:X:IOY:Z. The X indicates the slot that the card is being installed in, which will be either A or B. The IOY determines the type of card it is, which would be IO1 or IO5. The Z indicates which input is being used on that available option card.

- “Function To Terminal” (FTT) Programming

The design behind the programming of the relay outputs and digital output in the DG1 drive is to use “Function To Terminal” programming. It is composed of a terminal, be it a relay output or a digital output, that is assigned a parameter. Within that parameter, it has different functions that can be set.

The parameters of the Multi-PID Application are explained on **Page 107** of this manual, “Description of Parameters.” The explanations are arranged according to the parameter number.

Force Open/Force Close Selection

The Force Open Selection would make the selected function always off. Essentially this is a virtual switch that is always open.

The Force Close Selection would make the selected function always on. Essentially this is a virtual switch that is always closed.

These options are assigned to a function if we want to force a state without using a hardware input.

Example:

If we set Run Enable to Force Closed the drive is always enabled. If we set the same function to Force Open the drive would never be Enabled. If a Digital input is to be used to activate this Run Enable the function should be assigned to a hardware input(See below for DIGIN Selections).

DIGIN Selection

This allows Assignment of a hardware digital input to a function, this is set in a format of DigIN:X where X is one of the 8 Digital inputs on the Main control board.

Example:

If we set Run Enable to DigIN:6 the drive will be enabled when digital input 6 (Terminal 8) is closed, and would not be enabled when digital input 6 (Terminal 8) is open.

Option Board DigIN Selection

This allows Assignment of a hardware digital input on an option card to a function, this is set in a format of DigIN: Y:IO1:X where Y is the slot the option card is inserted on the Main control board and X is the Input on the Board and IO1 is the type of option board used.

Example:

If we set Run Enable to DigIN:A:IO5:6 the drive will be enabled when digital input 6 is closed on the IO5 option card which is inserted in Slot A, and would not be enabled when digital input 6 on the option card is open.

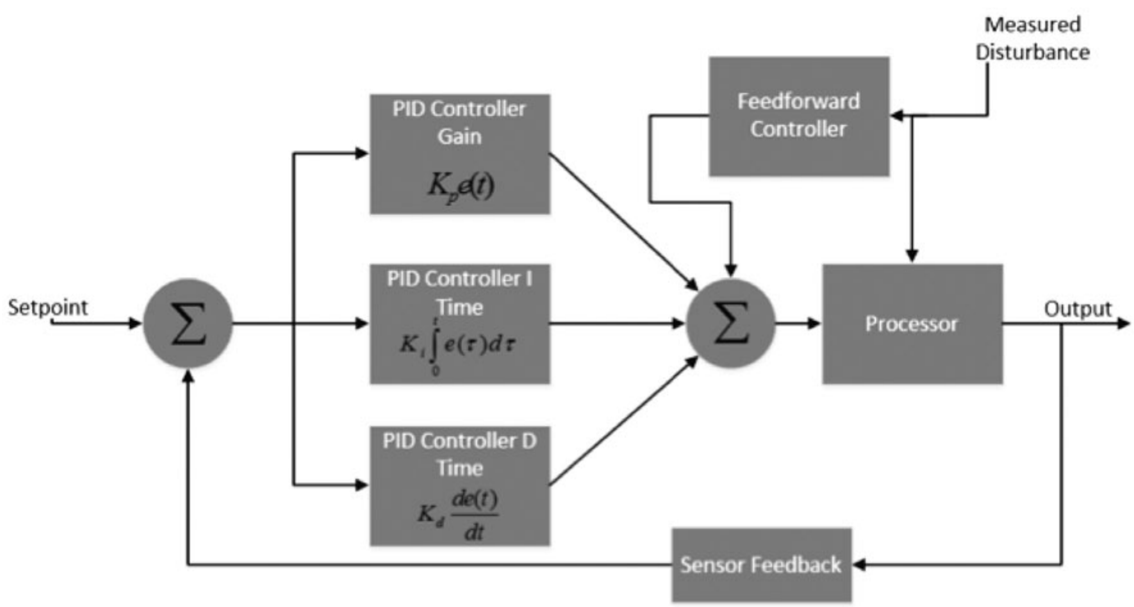
Timer Channel Selection

A Time Channel is a virtual path to link the digital output of a timer function to a digital input function. To utilize this feature a timer or interval would need to be assigned to a time channel 1 through 3, and the input function to be controlled would need to be assigned to the same time channel.

Example:

If we set Run Enable to DigIN:TimeChannel1 the drive will be enabled when the timer assigned to Time Channel 1 is active or High, and would not be enabled when the Time Channel is inactive or Low.

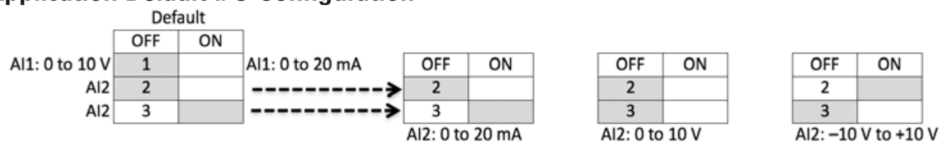
Figure 38. PID Controller Flowchart

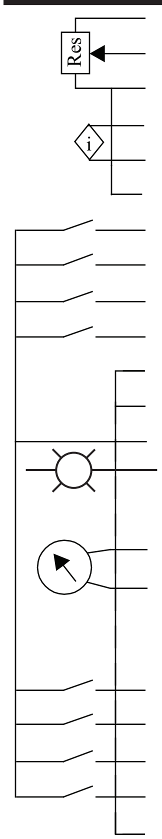


Control I/O Configuration

- Run 240 Vac and 24 Vdc control wiring in separate conduit
- Communication wire to be shielded

Table 98. Multi-PID Application Default I/O Configuration





External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10 V	Ref. Output Voltage	—	10 Vdc Supply Source
	2	AI1+ ①	Analog Input 1	0–10 V	Voltage Speed Reference (Programmable to 4 mA to 20 mA)
	3	AI1–	Analog Input 1 Ground	—	Analog Input 1 Common (Ground)
	4	AI2+ ①	Analog Input 2	4 mA to 20 mA	Current Speed Reference (Programmable to 0–10 V)
	5	AI2–	Analog Input 2 Ground	—	Analog Input 2 Common (Ground)
	6	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	7	DIN5	Digital Input 5	Preset Speed B0	Sets frequency output to Preset Speed 1
	8	DIN6	Digital Input 6	Preset Speed B1	Sets frequency output to Preset Speed 2
	9	DIN7	Digital Input 7	Not Used (TI–)	Input forces VFD output to shut off
	10	DIN8	Digital Input 8	Force Remote (TI+)	Input takes VFD from Local to Remote
	11	CMB	DI5 to DI8 Common	Grounded	Allows source input
	12	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	13	24 V	+24 Vdc Output	—	Control voltage output (100 mA max.)
	14	DO1	Digital Output 1	Ready	Shows the drive is ready to run
	15	24 Vo	+24 Vdc Output	—	Control voltage output (100 mA max.)
	16	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	17	AO1+	Analog Output 1	Output Frequency	Shows Output frequency to motor 0–60 Hz (4 mA to 20 mA)
	18	AO2+	Analog Output 2	Motor Current	Shows Motor current of motor 0–FLA (4 mA to 20 mA)
	19	24 Vi	+24 Vdc Input	—	External control voltage input
	20	DIN1	Digital Input 1	Run Forward	Input starts drive in forward direction (start enable)
	21	DIN2	Digital Input 2	Run Reverse	Input starts drive in reverse direction (start enable)
	22	DIN3	Digital Input 3	External Fault	Input causes drive to fault
	23	DIN4	Digital Input 4	Fault Reset	Input resets active faults
	24	CMA	DI1 to DI4 Common	Grounded	Allows source input
	25	A/+	RS-485 Signal A	—	Fieldbus Communication (Modbus, BACnet)
	26	B/-	RS-485 Signal B	—	Fieldbus Communication (Modbus, BACnet)
	27	R3NO	Relay 3 Normally Open	At Speed	Relay output 3 shows VFD is at Ref. Frequency
	28	R1NC	Relay 1 Normally Closed	Run	Relay output 1 shows VFD is in a run state
	29	R1CM	Relay 1 Common		
	30	R1NO	Relay 1 Normally Open		
	31	R3CM	Relay 3 Common	At Speed	Relay output 3 shows VFD is at Ref. Frequency
	32	R2NC	Relay 2 Normally Closed	Fault	Relay output 2 shows VFD is in a fault state
	33	R2CM	Relay 2 Common		
	34	R2NO	Relay 2 Normally Open		

Notes: The above wiring demonstrates a SINK configuration. It is important that CMA and CMB are wired to ground (as shown by dashed line). If a SOURCE configuration is desired, wire 24 V to CMA and CMB and close the inputs to ground. When using the +10 V for AI1, it is important to wire AI1—to ground (as shown by dashed line). If using +10 V for AI1 or AI2, terminals 3, 5, and 6 need to be jumpered together.
① AI1+ and AI2+ Support 10K potentiometer.

Table 99. Drive Communication Ports

Port	Communication
RJ45 Keypad Port	
Upload/Download Parameters	USB to RJ45
Remote Mount Keypad	Ethernet
Upgrade Drive Firmware	USB to RJ45
RJ45 Ethernet Port	
Upload/Download Parameters	Ethernet
Ethernet IP Communications	Ethernet
Modbus TCP Communications	Ethernet
RS-485 Serial Port ①	
Upload/Download Parameters	Two-Wire Twisted Pair
Upgrade Drive Firmware	Two-Wire Twisted Pair
Modbus RTU Communications	Two-Wire Twisted Pair
BACnet MS/TP Communications	Two-Wire Twisted Pair

① Shielded wire recommended.

Multi-PID Application—Parameters List

On the next pages you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given on **Page 186**, "Description of Parameters." The descriptions are arranged according to the parameter number.

Column explanations:

Code = Location indication on the keypad; shows the operator the present parameter number
Parameter = Name of parameter
Min = Minimum value of parameter
Max = Maximum value of parameter
Unit = Unit of parameter value; given if available
Default = Value preset by factory
ID = ID number of the parameter

Table 100. Monitor—M

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1	Output Frequency			Hz		1	
M2	Freq Reference			Hz		24	
M3	Motor Speed			rpm		2	
M4	Motor Current			A		3	
M5	Motor Torque			%		4	
M6	Motor Power			%		5	
M7	Motor Voltage			V		6	
M8	DC-link Voltage			V		7	
M9	Unit Temperature			°C		8	
M10	Motor Temperature			%		9	
M12	Analog Input 1			Varies		10	
M13	Analog Input 2			Varies		11	
M14	Analog Output 1			Varies		25	
M15	Analog Output 2			Varies		575	
M16	DI1, DI2, DI3					12	
M17	DI4, DI5, DI6					13	
M18	DI7, DI8					576	
M19	DO1,Virtual RO1,Virtual RO2					14	
M20	RO1, RO2, RO3					557	
M21	TC1, TC2, TC3					558	
M22	Interval 1					559	0 = Inactive 1 = Active
M23	Interval 2					560	See Par ID 559
M24	Interval 3					561	See Par ID 559
M25	Interval 4					562	See Par ID 559
M26	Interval 5					563	See Par ID 559
M27	Timer 1			s	0	569	
M28	Timer 2			s	0	571	
M29	Timer 3			s	0	573	
M30	PID1 Set Point			Varies		16	
M31	PID1 Feedback			Varies		18	
M32	PID1 Error Value			Varies		20	
M33	PID1 Output			%		22	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 100. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M34	PID1 Status					23	0 = Stopped 1 = Running 2 = Sleep Mode
M35	PID2 Set Point			Varies		32	
M36	PID2 Feedback			Varies		34	
M37	PID2 Error Value			Varies		36	
M38	PID2 Output			%		38	
M39	PID2 Status					39	See Par ID 23
M40	Running Motors					26	
M41	PT100 Temperture			°C	1000.0	27	
M42	Latest Fault Code					28	
M43	RTC Battery Status				0	583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = OverVoltage
M44	Instant Motor Power			kW		1686	
M45 ②	Energy Savings			Varies	0.000	2120	
M46	Control Board DIDO Status					2209	
M47	SlotA DIDO Status					2210	
M48	SlotB DIDO Status					2211	
M49	Application Status Word					29	
M50	Standard Status Word					2414	
M51	Output			Varies		2445	
M52	Reference			Varies		2447	
M53	Total MWh Count			Mwh		601	
M54	Total Power Day Count					603	
M55	Total Power Hr Count					606	
M56	Trip MWh Count			Mwh		604	
M57	Trip Power Day Count					636	
M58	Trip Power Hr Count					637	
M59	Total Run time Count			h		2827	
M60	Numbers Of Start					2830	
M61	Trip Run Time Count			h		2829	
M62	Multi-Monitoring				2,1,3	30	
M63	FB Status Word					2101	
M64	FB Ctrol Word					2001	
M65	FB Speed Reference	0.00	100.00	%		2003	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Parameters

Table 101. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ②	Min Frequency	0.00	See Par ID 102	Hz	0.00	101	
P1.2 ②	Max Frequency	See Par ID 101	400.00	Hz	MaxFreqMFG	102	
P1.3 ②	Accel Time 1	0.1	3000.0	s	3.0	103	
P1.4 ②	Decel Time 1	0.1	3000.0	s	3.0	104	
P1.5 ①	Motor Nom Current	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT	486	
P1.6 ①	Motor Nom Speed	300	24000	rpm	MotorNomSpeedMFG	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	MotorNomVoltMFG	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	MotorNomFreqMFG	488	
P1.10 ②	Power Up Local Remote Select				0	1685	0 = Hold Last 1 = Local Control 2 = Remote control
P1.11 ②	Remote 1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal Start 2 3 = Keypad
P1.12 ②	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.13 ②	Bumpless Enable				0	24620	0 = Disabled 1 = Enabled
P1.14 ①②	Local Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 - AI2 12 = AI2 - AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = AI2),MIN(AI1,AI2) 16 = AI2),MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output
P1.15 ①②	Remote 1 Reference				0	137	See Par ID 136
P1.16 ①	Reverse Enable				1	1679	See Par ID 2462
P1.17 ②	Run Delay Time	0	32500	s	0	2423	
P1.18 ②	HOA Source				0	2465	0 = Disabled 1 = IO Terminal 2 = Keypad
P1.19 ①②	Minimum Run Time	0	32500	s	0	1813	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Analog input

Table 102. Basic Setting—P2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1 ②	AI Ref Scale Min Value	0.00	See Par ID 145	Hz	0.00	144	
P2.1.2 ②	AI Ref Scale Max Value	See Par ID 144	400.00	Hz	0.00	145	

Table 103. AI1 Settings—P2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10 V
P2.2.2 ②	AI1 Signal Range				0	175	0 = 0–100%/ 0–20 mA/0–10 V 1 = 20–100%/ 4–20 mA/2–10 V 2 = Customized
P2.2.3 ②	AI1 Custom Min	0.00	See Par ID 177	%	0.00	176	
P2.2.4 ②	AI1 Custom Max	See Par ID 176	100.00	%	100.00	177	
P2.2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.2.6 ②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.2.10 ②	AI1 Joystick Offset	-50.00	50.00	%	0.00	133	

Table 104. AI2 Settings—P2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.3.1	AI2 Mode				0	223	0 = 0–20 mA 1 = 0 -10 V 2 = –10 to +10 V
P2.3.2 ②	AI2 Signal Range				1	183	0 = 0–100%/ 0–20 mA/0–10 V/–10 to 10 V 1 = 20–100%/ 4–20 mA/2–10 V/–6- to 10 V 2 = Customized
P2.3.3 ②	AI2 Custom Min	0.00	See Par ID 185	%	0.00	184	
P2.3.4 ②	AI2 Custom Max	See Par ID 184	100.00	%	100.00	185	
P2.3.5 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.3.6 ②	AI2 Signal Invert				0	189	See Par ID 181
P2.3.7 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.3.8 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.3.9 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
P2.3.10 ②	AI2 Joystick Offset	-50.00	50.00	%	0.00	134	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 105. Fine Adjust—P2.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.4.1 ①②	Fine Tuning Input				0	2484	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = Fieldbus
P2.4.2 ①②	Fine Tuning Min	0.0	100.0	%	0.0	2485	
P2.4.3 ①②	Fine Tuning Max	0.0	100.0	%	0.0	2486	

Table 106. Digital Input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	IO Terminal 1 Start Stop Logic				0	143	0 = Forward - Reverse 1 = Start - Reverse 2 = Start - Enable 3 = 3 Wire Control
P3.2 ②⑤	IO Terminal 1 Start Signal 1				2	190	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = RO1 Function 32 = RO2 Function 33 = RO3 Function 34 = Virtual RO1 Function 35 = Virtual RO2 Function
P3.3 ② ⑤	IO Terminal 1 Start Signal 2				3	191	See Par ID 190
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②③	Reverse				0	198	See Par ID 190
P3.6 ②③	Ext. Fault 1 NO				4	192	See Par ID 190
P3.7 ②③	Ext. Fault 1 NC				1	193	See Par ID 190
P3.8 ②④	Fault Reset				5	200	See Par ID 190
P3.9 ②③	Run Enable				1	194	See Par ID 190
P3.10 ②③	Preset Speed B0				6	205	See Par ID 190

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 106. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.11 ②③	Preset Speed B1				7	206	See Par ID 190
P3.12 ②③	Preset Speed B2				0	207	See Par ID 190
P3.13 ②③	PID1 Control Enable				1	550	See Par ID 190
P3.14 ②③	PID2 Control Enable				1	553	See Par ID 190
P3.15 ②③	Accel/Decel Time Set				0	195	See Par ID 190
P3.16 ②③	Accel/Decel Prohibit				0	201	See Par ID 190
P3.17 ②④	No Access To Param				0	215	See Par ID 190
P3.21 ②③	Remote Control				9	196	See Par ID 190
P3.22 ②③	Local Control				0	197	See Par ID 190
P3.23 ②③	Remote 1/2 Select				0	209	See Par ID 190
P3.24 ②③	Second Motor Para Select				0	217	See Par ID 190
P3.25 ②③	Force Bypass				0	218	See Par ID 190
P3.26 ②③	DC Brake Active				0	202	See Par ID 190
P3.27 ②③	Smoke Mode				0	219	See Par ID 190
P3.28 ②③	Fire Mode				0	220	See Par ID 190
P3.29 ②③	Fire Mode Ref 1/2 Select				0	221	See Par ID 190
P3.30 ②③	PID1 Set Point Select				0	351	See Par ID 190
P3.31 ②③	PID2 Set Point Select				0	352	See Par ID 190
P3.32 ②③	Jog Enable				0	199	See Par ID 190
P3.33 ②③	Start Timer 1				0	224	See Par ID 190
P3.34 ②③	Start Timer 2				0	225	See Par ID 190
P3.35 ②③	Start Timer 3				0	226	See Par ID 190
P3.36 ②③	AI Ref Source Select				0	208	See Par ID 190
P3.37 ②③	Motor Interlock 1				0	210	See Par ID 190
P3.38 ②③	Motor Interlock 2				0	211	See Par ID 190
P3.39 ②③	Motor Interlock 3				0	212	See Par ID 190
P3.40 ②③	Motor Interlock 4				0	213	See Par ID 190
P3.41 ②③	Motor Interlock 5				0	214	See Par ID 190
P3.42 ②③	Ext Fault-AR				1	747	See Par ID 190
P3.43 ②③	Bypass Overload				0	1246	See Par ID 190
P3.44 ②③	Fire Mode Direction Invert				0	2119	See Par ID 190
P3.45 ①②	IO Terminal 2 Start Stop Logic				0	2206	See Par ID 143
P3.46 ②⑤	IO Terminal 2 Start Signal 1				2	2207	See Par ID 190
P3.47 ②⑤	IO Terminal 2 Start Signal 2				3	2208	See Par ID 190
P3.48 ②③	Ext. Fault 2 NO				0	2293	See Par ID 190
P3.49 ②③	Ext. Fault 2 NC				1	2294	See Par ID 190
P3.50 ②③	Ext. Fault 3 NO				0	2295	See Par ID 190
P3.51 ②③	Ext. Fault 3 NC				1	2296	See Par ID 190

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 106. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.52 ②	Ext. Fault 1 Text				0	2297	0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage
P3.53 ②	Ext. Fault 2 Text				1	2298	See Par ID 2297
P3.54 ②	Ext. Fault 3 Text				2	2299	See Par ID 2297
P3.55 ②④	Parameter Set1/2 Sel				0	2312	See Par ID 190
P3.56 ②③	Deragging Enable				0	2394	See Par ID 190
P3.57 ②③	HOA On/Off				1	2395	See Par ID 190
P3.58 ②③	Multi-pump Mode 1/2 Select				0	2658	See Par ID 190
P3.59 ②③	OP Cont Interlock NO				4	2801	See Par ID 190
P3.60 ②③	OP Cont Interlock NC				1	2802	See Par ID 190

Table 107. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	See Par ID 222
P4.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0-Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 9 = PID1 Setpoint 10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 14 = PID2 Setpoint 15 = PID2 Feedback 1 16 = PID2 Feedback 2 17 = PID2 Control Error Value 18 = PID2 Control Output 19 = AI1 20 = AI2 21 = Output Freq (-2-+2N) 22 = Motor Torque (-2-+2N) 23 = Motor Power (-2-+2N) 24 = PT100 Temperature 25 = FB Process Data Input 1 26 = FB Process Data Input 2 27 = FB Process Data Input 3 28 = FB Process Data Input 4 29 = FB Process Data Input 5 30 = FB Process Data Input 6 31 = FB Process Data Input 7 32 = FB Process Data Input 8

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 107. Analog Output—P4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.2 ②, continued	AO1 Function				1	146	33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2 35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current (-2-+2N)
P4.3 ②	AO1 Minimum				1	149	0 = 0V / 0 mA 1 = 2V / 4 mA
P4.4 ②	AO1 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	AO1 Scale	10	1000	%	100	150	
P4.6 ②	AO1 Inversion				0	148	See Par ID 181
P4.7 ②	AO1 Offset	-100.00	100.00	%	0.00	173	
P4.8 ②	AO2 Mode				0	228	See Par ID 222
P4.9 ②	AO2 Function				4	229	See Par ID 146
P4.10 ②	AO2 Minimum				1	232	See Par ID 149
P4.11 ②	AO2 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	AO2 Scale	10	1000	%	100	233	
P4.13 ②	AO2 Inversion				0	231	See Par ID 181
P4.14 ②	AO2 Offset	-100.00	100.00	%	0.00	234	

Table 108. Digital Output—P5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1 ②	DO1 Function				1	151	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 11 = PID1 Superv 12 = PID2 Superv 13 = OverHeat Fault 14 = OverCurrent Regular 15 = OverVoltage Regular 16 = UnderVoltage Regular 17 = 4mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 108. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1 ②, continued	DO1 Function				1	151	30 = Motor Therm Protection 31 = FB Digital Input 1 32 = FB Digital Input 2 33 = FB Digital Input 3 34 = FB Digital Input 4 35 = Damper Control 36 = TC1 Status 37 = TC2 Status 38 = TC3 Status 39 = In E-Stop 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 43 = Motor 1 Control 44 = Motor 2 Control 45 = Motor 3 Control 46 = Motor 4 Control 47 = Motor 5 Control 49 = PID1 Sleep 50 = PID2 Sleep 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 57 = Prime Pump Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = FieldBus_RTU_ Fault,FieldBus RTU Fault 65 = FieldBus_TCP_ Fault,FieldBus TCP Fault 66 = FieldBus_MSTP_ Fault,FieldBus MSTP Fault 67 = FieldBus_EIP_ Fault,FieldBus EIP Fault 68 = FieldBus_SlotA_ Fault,FieldBus SlotA Fault 69 = FieldBus_SlotB_ Fault,FieldBus SlotB Fault 70 = FieldBus SMDT Fault 71 = Jockey Pump Active 72 = Lube Pump Active 73 = PID1 Low Feedback 74 = PID1 High Feedback 75 = PID2 Low Feedback 76 = PID2 High Feedback
P5.2 ②	RO1 Function				2	152	See Par ID 151
P5.3 ②	RO2 Function				3	153	See Par ID 151
P5.4 ②	RO3 Function				7	538	See Par ID 151
P5.5 ②	Virtual RO1 Function				0	2463	See Par ID 151
P5.6 ②	Virtual RO2 Function				0	2464	See Par ID 151
P5.7 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 1 Supv Val	0.00	See Par ID 102	Hz	0.00	155	
P5.9 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 108. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.10 ②	Freq Limit 2 Supv Val	0.00	See Par ID 102	Hz	0.00	158	
P5.11 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Torque Limit Supv Val	-1000.0	1000.0	%	100.0	160	
P5.13 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.14 ②	Ref Limit Supv Val	0.00	See Par ID 102	Hz	0.00	162	
P5.17 ②	Temp Limit Supv				0	165	See Par ID 161
P5.18 ②	Temp Limit Supv Val	-10.0	75.0	°C	40.0	166	
P5.19 ②	Power Limit Supv				0	167	See Par ID 161
P5.20 ②	Power Limit Supv Val	-200.0	200.0	%	0.0	168	
P5.21 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.22 ②	AI Limit Supv				0	171	See Par ID 161
P5.23 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.24 ②	PID1 Superv Enable				0	1346	See Par ID 2462
P5.25 ②	PID1 Superv Upper Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1347	
P5.26 ②	PID1 Superv Lower Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1349	
P5.27 ②	PID1 Superv Delay	0	3000	s	0	1351	
P5.28 ②	PID2 Superv Enable				0	1408	See Par ID 2462
P5.29 ②	PID2 Superv Upper Limit	See Par ID 1360	See Par ID 1362	Varies	0.00	1409	
P5.30 ②	PID2 Superv Lower Limit	See Par ID 1360	See Par ID 1362	Varies	0.00	1411	
P5.31 ②	PID2 Superv Delay	0	3000	s	0	1413	
P5.32 ②	RO1 On Delay	0.0	320.0	s	0.0	2112	
P5.33 ②	RO1 Off Delay	0.0	320.0	s	0.0	2113	
P5.34 ②	RO2 On Delay	0.0	320.0	s	0.0	2114	
P5.35 ②	RO2 Off Delay	0.0	320.0	s	0.0	2115	
P5.36 ②	RO3 On Delay	0.0	320.0	s	0.0	2116	
P5.37 ②	RO3 Off Delay	0.0	320.0	s	0.0	2117	
P5.38 ②	RO3 Reverse				0	2118	0 = No 1 = Yes
P5.39 ②	Motor Current 1 Supv				0	2189	See Par ID 159
P5.40 ②	Motor Current 1 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190	
P5.41 ②	Motor Current 2 Supv				0	2191	See Par ID 159
P5.42 ②	Motor Current 2 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192	
P5.43 ②	Second AI Supv Select				0	2193	See Par ID 170
P5.44 ②	Second AI Limit Supv				0	2194	See Par ID 161
P5.45 ②	Second AI Limit Supv Val	0.00	100.00	%	0.00	2195	
P5.46 ②	Motor Current 1 Supv Hyst	0.1	1.0	A	0.1	2196	
P5.47 ②	Motor Current 2 Supv Hyst	0.1	1.0	A	0.1	2197	
P5.48 ②	AI Supv Hyst	1.00	10.00	%	1.00	2198	
P5.49 ②	Second AI Supv Hyst	1.00	10.00	%	1.00	2199	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 108. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.50 ②	Freq Limit 1 Supv Hyst	0.10	1.00	Hz	0.10	2200	
P5.51 ②	Freq Limit 2 Supv Hyst	0.10	1.00	Hz	0.10	2201	
P5.52 ②	Torque Limit Supv Hyst	1.0	5.0	%	1.0	2202	
P5.53 ②	Ref Limit Supv Hyst	0.10	1.00	Hz	0.10	2203	
P5.54 ②	Temp Limit Supv Hyst	1.0	10.0	°C	1.0	2204	
P5.55 ②	Power Limit Supv Hyst	0.1	10.0	%	0.1	2205	

Table 109. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See Par ID 135
P7.2 ①②	Remote 2 Reference				7	139	See Par ID 136
P7.3 ②	Keypad Reference	See Par ID 101	See Par ID 102	Hz	0.00	141	
P7.4 ②	Keypad Direction				0	116	0 = Forward 1 = Reverse
P7.5 ②	Keypad Stop				1	114	0 = Enabled-Keypad Operation 1 = Always Enabled
P7.6 ②	Jog Reference	0.00	See Par ID 102	Hz	5.00	117	
P7.9 ②	Start Mode				0	252	0 = Ramp 1 = Flying Start From Stop Frequency 2 = Flying Start From Max Frequency
P7.10 ②	Stop Mode				1	253	0 = Coasting 1 = Ramp
P7.11 ②	Ramp 1 Shape	0.0	10.0	s	0.0	247	
P7.12 ②	Ramp 2 Shape	0.0	10.0	s	0.0	248	
P7.13 ②	Accel Time 2	0.1	3000.0	s	10.0	249	
P7.14 ②	Decel Time 2	0.1	3000.0	s	10.0	250	
P7.15 ②	Skip F1 Low Limit	0.00	See Par ID 257	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	See Par ID 256	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	See Par ID 259	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	See Par ID 258	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	See Par ID 261	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	See Par ID 260	400.00	Hz	0.00	261	
P7.21 ②	Skip Range Ramp Factor	0.1	10.0		1.0	264	
P7.22 ②	Power Loss Function				0	267	See Par ID 2462
P7.23 ②	Power Loss Time	0.3	5.0	s	2.0	268	
P7.24 ②	Currency				0	2122	0 = $ 1 = £ 2 = € 3 = ¥ 4 = Rs 5 = R$ 6 = Fr 7 = kr
P7.25 ②	Energy Cost			Varies	0.00	2123	
P7.26 ②	Data Type				0	2124	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 109. Drive Control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.27	Energy Savings Reset					2125	0 = Not Reset 1 = Reset
P7.28 ①②	2th Stage Ramp Frequency	See Par ID 101	See Par ID 102	Hz	30.00	2444	
P7.29	Change PhaseSequence Motor				0	2515	0 = Change Disable 1 = Change Enable
P7.30 ②	Run Remove Stop Mode				0	2667	See Par ID 253

Table 110. Motor Control—P8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.1 ①②	Motor Control Mode				0	287	0 = Freq Control 1 = Speed Control
P8.2 ①	Current Limit	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrVT	107	
P8.3 ①②	V/Hz Optimization				0	109	See Par ID 2462
P8.4 ①②	V/Hz Ratio				0	108	0 = Linear 1 = Squared 2 = Programmable 3 = Linear + Flux Optimization
P8.5 ①②	Field Weakening Point	8.00	400.00	Hz	FieldWeakPointMFG	289	
P8.6 ①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7 ①②	V/Hz Mid Frequency	0.00	See Par ID 289	Hz	VHzCurveMidFreqMFG	291	
P8.8 ①②	V/Hz Mid Voltage	0.00	100.00	%	100.00	292	
P8.9 ①②	Zero Frequency Voltage	0.00	40.00	%	0.00	293	
P8.10 ②	Switching Frequency	MinSwitchFreq	MaxSwitchFreq	kHz	DefaultSwitchFreqCT	2522	
P8.11 ②	Sine Filter Enable				0	1665	See Par ID 2462
P8.12 ①②	OverVoltage Control				3	294	0 = Disabled 1 = REF + 8Hz 2 = Max Freq 3 = Max Freq + 8Hz
P8.17 ②	Frequency Ramp Out FilterTime Constant	0	3000	ms	0	1585	
P8.55	VF Stable Kd	0	3000	%	100	1656	
P8.56	VF Stable Kq	0	3000	%	100	1657	
P8.57 ①②	Overmodulation Enable				0	2835	See Par ID 2462

Table 111. Protections—P9

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.1 ①②	4mA Input Fault				0	306	0 = No Action 1 = Warning 2 = Warning: Previous Freq 3 = Warning: Preset Freq 4 = Fault 5 = Fault, Coast
P9.2 ①②	4mA Fault Frequency	0.00	See Par ID 102	Hz	0.00	331	
P9.3 ①②	External Fault				2	307	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P9.4 ①②	Input Phase Fault				2	332	See Par ID 307
P9.5 ①②	Uvolt Fault Response				2	330	See Par ID 307
P9.6 ①②	Output Phase Fault				2	308	See Par ID 307

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 111. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.7 ①②	Ground Fault				2	309	See Par ID 307
P9.8 ①②	Motor Thermal Protection				2	310	See Par ID 307
P9.9 ②	Motor Thermal F0 Current	0.0	150.0	%	40.0	311	
P9.10 ②	Motor Thermal Time	1	200	min	45	312	
P9.11 ①②	Stall Protection				0	313	See Par ID 307
P9.12 ②	Stall Current Limit	0.1	ActiveMotor NomCurr*2	A	ActiveMotor NomCurr*13/10	314	
P9.13 ②	Stall Time Limit	1.0	120.0	s	15.0	315	
P9.14 ②	Stall Frequency Limit	1.00	See Par ID 102	Hz	25.00	316	
P9.15 ①②	Underload Protection				0	317	See Par ID 307
P9.16 ②	Underload Fnom Torque	10.0	150.0	%	50.0	318	
P9.17 ②	Underload F0 Torque	5.0	150.0	%	10.0	319	
P9.18 ②	Underload Time Limit	2.00	600.00	s	20.00	320	
P9.19 ①②	Thermistor Fault Response				2	333	See Par ID 307
P9.20 ②	Line Start Lockout				2	750	0 = Disabled, No Change 1 = Enable, No Change 2 = Disabled, Changed 3 = Enable, Changed
P9.21 ①②	Fieldbus Fault Response				2	334	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast 4 = Warning, Coast 5 = Warning, Auto Switch To Local 6 = Warning, Auto Switch To Preset Speed 1
P9.22 ①②	OPTCard Fault Response				2	335	See Par ID 307
P9.23 ①②	Unit Under Temp Prot				2	1564	See Par ID 307
P9.24 ②	AR Wait Time	1.00	300.00	s	1.00	321	
P9.25 ②	AR Trail Time	0.00	600.00	s	30.00	322	
P9.26 ②	AR Start Function				0	323	0 = Flying Start From Stop Frequency 1 = Ramp 2 = Flying Start From Max Frequency
P9.27 ②	Undervoltage Attempts	0	10		1	324	
P9.28 ②	OverVoltage Attempts	0	10		1	325	
P9.29 ②	OverCurrent Attempts	0	3		1	326	
P9.30 ②	4mA Fault Attempts	0	10		1	327	
P9.31 ②	Motor Temp Fault Attempts	0	10		1	329	
P9.32 ②	External Fault Attempts	0	10		1	328	
P9.33 ②	Underload Attempts	0	10		1	336	
P9.34 ①②	RTC Fault				1	955	See Par ID 307
P9.35 ①②	PT100 Fault Response				2	337	See Par ID 307
P9.36 ①②	Replace Battery Fault Response				1	1256	See Par ID 307

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 111. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.37 ①②	Replace Fan Fault Response				1	1257	See Par ID 307
P9.38 ①②	IP Address Confliction Resp				1	1678	See Par ID 307
P9.39 ②	Cold Weather Mode				0	2126	See Par ID 2462
P9.40 ②	Cold Weather Volt. Level	0.0	20.0	%	2.0	2127	
P9.41 ②	Cold Weather Time Out	0	10	min	3	2128	
P9.42	Cold Weather Password					2129	
P9.43	Under Temp Fault Override					2130	See Par ID 2118
P9.44 ②	Ground Fault Limit	0	30	%	15	2158	
P9.45 ①②	Keypad Comm Fault Response				2	2157	See Par ID 307
P9.46 ②	Preheat Mode				0	2159	See Par ID 2462
P9.47 ②	Preheat Control Source				31	2160	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = SlotA PT100 Temp Channel 1 33 = SlotA PT100 Temp Channel 2 34 = SlotA PT100 Temp Channel 3 35 = SlotA Max PT100 Temp 36 = SlotB PT100 Temp Channel 1

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 111. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.47 ②, continued	Preheat Control Source				31	2160	37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = SlotB Max PT100 Temp 40 = SlotA and SlotB Max PT100 Temp
P9.48 ②	Preheat Enter Temp	0.0	19.9	°C	10.0	2161	
P9.49 ②	Preheat Quit Temp	20.0	40.0	°C	20.0	2162	
P9.50 ②	Preheat Output Volt	0.0	20.0	%	2.0	2163	
P9.51 ①②	PID Feedback AI Loss Response				0	2410	0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Freq 4 = Warning: Analog->Net
P9.52 ①②	PID Feedback AI Loss Pre Freq	0.00	400.00	Hz	0.00	2402	
P9.53 ②	PID Feedback AI Loss Pipe Fill Loss Level	0.0	1000.0	Varies	0.0	2403	
P9.54 ②	PID Feedback AI Loss PreFreq Timeout	0	6000	s	0	2404	
P9.55 ②	PID Feedback AI Loss Attempts	0	10		1	2405	
P9.56 ②	STO Fault Response				2	2427	0 = No Action 1 = Warning 2 = Fault
P9.57 ②	Fault Reset Start				0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset
P9.58	Warning Operation Mode				1	2657	0 = No Action 1 = Warning, No Store 2 = Warning, Store
P9.59 ②	Fan Protection				2	2664	See Par ID 307
P9.60	Under Voltage Trip Level	DCLinkUnderVolt StopLimit	DCLinkOverVolt StopLimit	V	DCLinkUnderVolt ProtectLimit	2666	
P9.61 ②	OP Cont Interlock Attempts	0	10		1	2803	
P9.62 ①②	OP Cont Interlock Protection				2	2831	See Par ID 307

Table 112. PID Controller 1—P10

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.1 ②	PID1 Control Gain	0.00	200.00	%	100.00	1294	
P10.2 ②	PID1 Control ITime	0.00	600.00	s	1.00	1295	
P10.3 ②	PID1 Control DTime	0.00	100.00	s	0.00	1296	
P10.4 ①②	PID1 Process Unit				0	1297	0 = % 1 = 1/min 2 = rpm 3 = ppm 4 = pps 5 = l/s 6 = l/min 7 = l/h

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 112. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.4 ①②, continued	PID1 Process Unit				0	1297	8 = kg/s 9 = kg/min 10 = kg/h 11 = m3/s 12 = m3/min 13 = m3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVS 20 = kW 21 = °C 22 = GPM 23 = gal/s 24 = gal/min 25 = gal/h 26 = lb/s 27 = lb/min 28 = lb/h 29 = CFM 30 = ft3/s 31 = ft3/min 32 = ft3/h 33 = ft/s 34 = in wg 35 = ft wg 36 = PSI 37 = lb/in2 38 = HP 39 = °F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m
P10.5 ②	PID1 Process Unit Min	-99999.99	See Par ID 1300	Varies	0.00	1298	
P10.6 ②	PID1 Process Unit Max	See Par ID 1298	99999.99	Varies	100.00	1300	
P10.7 ②	PID1 Process Unit Decimal	0	4		2	1302	
P10.8 ①②	PID1 Error Inversion				0	1303	See Par ID 181
P10.9 ②	PID1 Dead Band	0.00	99999.99	Varies	0.00	1304	
P10.10 ②	PID1 Dead Band Delay	0.00	320.00	s	0.00	1306	
P10.11 ②	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307	
P10.12 ②	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309	
P10.13 ②	PID1 Ramp Time	0.00	300.00	s	0.00	1311	
P10.14 ①②	PID1 Set Point 1 Source				1	1312	0 = Not Used 1 = PID1 Keypad Set Point 1 2 = PID1 Keypad Set Point 2 3 = AI1 4 = AI2 5 = Slot A: AI1 6 = Slot B: AI1 7 = FB Process Data Input 1 8 = FB Process Data Input 2 9 = FB Process Data Input 3 10 = FB Process Data Input 4 11 = FB Process Data Input 5

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 112. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.14 ①②, continued	PID1 Set Point 1 Source				1	1312	12 = FB Process Data Input 6 13 = FB Process Data Input 7 14 = FB Process Data Input 8 15 = PID2 Output 16 = Multi Drive Network 17 = FB PID1 Set Point 1 18 = FB PID1 Set Point 2
P10.15 ②	PID1 Set Point 1 Min	-200.00	200.00	%	0.00	1313	
P10.16 ②	PID1 Set Point 1 Max	-200.00	200.00	%	100.00	1314	
P10.17 ①②	PID1 Set Point 1 Sleep Enable				0	1315	See Par ID 2462
P10.18 ①②	PID1 Set Point 1 Sleep Unit Sel				0	2396	0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback
P10.19 ②	PID1 Set Point 1 Sleep Level			Varies	0.00	2450	
P10.20 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.21 ②	PID1 Set Point 1 Wake Up Level	-99999.99	99999.99	Varies	0.00	1318	
P10.22 ②	PID1 Set Point 1 Boost	-2.0	2.0		1.0	1320	
P10.23 ①②	PID1 Set Point 2 Source				2	1321	See Par ID 1312
P10.24 ②	PID1 Set Point 2 Min	-200.00	200.00	%	0.00	1322	
P10.25 ②	PID1 Set Point 2 Max	-200.00	200.00	%	100.00	1323	
P10.26 ①②	PID1 Set Point 2 Sleep Enable				0	1324	See Par ID 2462
P10.27 ①②	PID1 Set Point 2 Sleep Unit Sel				0	2397	See Par ID 2396
P10.28 ②	PID1 Set Point 2 Sleep Level			Varies	0.00	2452	
P10.29 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.30 ②	PID1 Set Point 2 Wake Up Level	-99999.99	99999.99	Varies	0.00	1327	
P10.31 ②	PID1 Set Point 2 Boost	-2.0	2.0		1.0	1329	
P10.32 ①②	PID1 Feedback Function				0	1330	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1 - Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1 - Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2) 9 = Source1*Source2
P10.33 ②	PID1 Feedback Gain	-1000.0	1000.0	%	100.0	1331	
P10.34 ①②	PID1 Feedback 1 Source				2	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 112. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.34 ①②, continued	PID1 Feedback 1 Source				2	1332	10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 14 = PID2 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID1 Feedback 1 22 = FB PID1 Feedback 2
P10.35 ②	PID1 Feedback 1 Min	-200.00	200.00	%	0.00	1333	
P10.36 ②	PID1 Feedback 1 Max	-200.00	200.00	%	100.00	1334	
P10.37 ①②	PID1 Feedback 2 Source				0	1335	See Par ID 1332
P10.38 ②	PID1 Feedback 2 Min	-200.00	200.00	%	0.00	1336	
P10.39 ②	PID1 Feedback 2 Max	-200.00	200.00	%	100.00	1337	
P10.40 ①②	PID1 Feedforward Func				0	1338	See Par ID 1330
P10.41 ②	PID1 Feedforward Gain	-1000.0	1000.0	%	100.0	1339	
P10.42 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 14 = PID2 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID1 Feedforward 1 22 = FB PID1 Feedforward 2
P10.43 ②	PID1 Feedforward 1 Min	-200.00	200.00	%	0.00	1341	
P10.44 ②	PID1 Feedforward 1 Max	-200.00	200.00	%	100.00	1342	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 112. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.45 ①②	PID1 Feedforward 2 Source				0	1343	See Par ID 1340
P10.46 ②	PID1 Feedforward 2 Min	-200.00	200.00	%	0.00	1344	
P10.47 ②	PID1 Feedforward 2 Max	-200.00	200.00	%	100.00	1345	
P10.48 ②	PID1 Set Point 1 Comp Enable				0	1352	See Par ID 2462
P10.49 ②	PID1 Set Point 1 Comp Max	-200.00	200.00	%	0.00	1353	
P10.50 ②	PID1 Set Point 2 Comp Enable				0	1354	See Par ID 2462
P10.51 ②	PID1 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1355	
P10.52 ②	PID1 Wake Up Action				0	2466	0 = Below Wake Up Level 1 = Above Wake Up Level 2 = Below Wake Up Level (PID ref.) 3 = Above Wake Up Level (PID ref.)
P10.53	FB PID1 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2542	
P10.54	FB PID1 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2544	
P10.55	FB PID1 Feedback 1			%		2550	
P10.56	FB PID1 Feedback 2			%		2551	
P10.57	FB PID1 Feedforward 1			%		2554	
P10.58	FB PID1 Feedforward 2			%		2555	
P10.59 ②	PID1 Sleep Boost level	-9999	9999	Varies	0	2660	
P10.60 ②	PID1 Sleep Boost Max Time	1	300	s	30	2661	
P10.61 ②	PID1 Low Feedback Level	0.0	6000.0	Varies	0.0	2811	
P10.62 ②	PID1 Low Feedback Time	0	3600	s	10	2812	
P10.63 ①②	PID1 Low Feedback Protection				0	2813	See Par ID 307
P10.64 ②	PID1 High Feedback Level	0.0	6000.0	Varies	150.0	2814	
P10.65 ②	PID1 High Feedback Time	0	3600	s	5	2815	
P10.66 ①②	PID1 High Feedback Protection				0	2816	See Par ID 307
P10.67 ①②	PID1 Hysteresis Level	0.0	100.0	Varies	0.0	2817	
P10.68 ②	PID1 Backup Feedback Source				0	2825	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1

Table 113. PID Controller 2—P11

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.1 ②	PID2 Control Gain	0.00	200.00	%	100.00	1356	
P11.2 ②	PID2 Control I Time	0.00	600.00	s	1.00	1357	
P11.3 ②	PID2 Control D Time	0.00	100.00	s	0.00	1358	
P11.4 ①②	PID2 Process Unit				0	1359	See Par ID 1297
P11.5 ②	PID2 Process Unit Min	-99999.99	See Par ID 1362	Varies	0.00	1360	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 113. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.6 ②	PID2 Process Unit Max	See Par ID 1360	99999.99	Varies	100.00	1362	
P11.7 ②	PID2 Process Unit Decimal	0	4		2	1364	
P11.8 ①②	PID2 Error Inversion				0	1365	See Par ID 181
P11.9 ②	PID2 Dead Band	0.00	99999.99	Varies	0.00	1366	
P11.10 ②	PID2 Dead Band Delay	0.00	320.00	s	0.00	1368	
P11.11 ②	PID2 Keypad Set Point 1	See Par ID 1360	See Par ID 1362	Varies	0.00	1369	
P11.12 ②	PID2 Keypad Set Point 2	See Par ID 1360	See Par ID 1362	Varies	0.00	1371	
P11.13 ②	PID2 Ramp Time	0.00	300.00	s	0.00	1373	
P11.14 ①②	PID2 Set Point 1 Source				1	1374	0 = Not Used 1 = PID2 Keypad Set Point 1 2 = PID2 Keypad Set Point 2 3 = AI1 4 = AI2 5 = Slot A: AI1 6 = Slot B: AI1 7 = FB Process Data Input 1 8 = FB Process Data Input 2 9 = FB Process Data Input 3 10 = FB Process Data Input 4 11 = FB Process Data Input 5 12 = FB Process Data Input 6 13 = FB Process Data Input 7 14 = FB Process Data Input 8 15 = PID1 Output 16 = Multi Drive Network 17 = FB PID2 Set Point 1 18 = FB PID2 Set Point 2
P11.15 ②	PID2 Set Point 1 Min	-200.00	200.00	%	0.00	1375	
P11.16 ②	PID2 Set Point 1 Max	-200.00	200.00	%	100.00	1376	
P11.17 ①②	PID2 Set Point 1 Sleep Enable				0	1377	See Par ID 2462
P11.18 ①②	PID2 Set Point 1 Sleep Unit Sel				0	2398	0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID2 Feedback
P11.19 ②	PID2 Set Point 1 Sleep Level			Varies	0.00	2454	
P11.20 ②	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379	
P11.21 ②	PID2 Set Point 1 WakeUp Level	-99999.99	99999.99	Varies	0.00	1380	
P11.22 ②	PID2 Set Point 1 Boost	-2.0	2.0		1.0	1382	
P11.23 ①②	PID2 Set Point 2 Source				2	1383	See Par ID 1374
P11.24 ②	PID2 Set Point 2 Min	-200.00	200.00	%	0.00	1384	
P11.25 ②	PID2 Set Point 2 Max	-200.00	200.00	%	100.00	1385	
P11.26 ①②	PID2 Set Point 2 Sleep Enable				0	1386	See Par ID 2462
P11.27 ①②	PID2 Set Point 2 Sleep Unit Sel				0	2399	See Par ID 2398
P11.28 ②	PID2 Set Point 2 Sleep Level			Varies	0.00	2456	
P11.29 ②	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 113. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.30 ②	PID2 Set Point 2 WakeUp Level	-99999.99	99999.99	Varies	0.00	1389	
P11.31 ②	PID2 Set Point 2 Boost	-2.0	2.0		1.0	1391	
P11.32 ①②	PID2 Feedback Func				0	1392	See Par ID 1330
P11.33 ②	PID2 Feedback Gain	-1000.0	1000.0	%	100.0	1393	
P11.34 ①②	PID2 Feedback 1 Source				2	1394	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 14 = PID1 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID2 Feedback 1 22 = FB PID2 Feedback 2
P11.35 ②	PID2 Feedback 1 Min	-200.00	200.00	%	0.00	1395	
P11.36 ②	PID2 Feedback 1 Max	-200.00	200.00	%	100.00	1396	
P11.37 ①②	PID2 Feedback 2 Source				0	1397	See Par ID 1394
P11.38 ②	PID2 Feedback 2 Min	-200.00	200.00	%	0.00	1398	
P11.39 ②	PID2 Feedback 2 Max	-200.00	200.00	%	100.00	1399	
P11.40 ①②	PID2 Feedforward Func				0	1400	See Par ID 1330
P11.41 ②	PID2 Feedforward Gain	-1000.0	1000.0	%	100.0	1401	
P11.42 ①②	PID2 Feedforward 1 Source				0	1402	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 14 = PID1 Output 15 = SlotA PT100 Temp Channel 1

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 113. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.42 ①②, continued	PID2 Feedforward 1 Source				0	1402	16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID2 Feedforward 1 22 = FB PID2 Feedforward 2
P11.43 ②	PID2 Feedforward 1 Min	-200.00	200.00	%	0.00	1403	
P11.44 ②	PID2 Feedforward 1 Max	-200.00	200.00	%	100.00	1404	
P11.45 ①②	PID2 Feedforward 2 Source				0	1405	See Par ID 1402
P11.46 ②	PID2 Feedforward 2 Min	-200.00	200.00	%	0.00	1406	
P11.47 ②	PID2 Feedforward 2 Max	-200.00	200.00	%	100.00	1407	
P11.48 ②	PID2 Set Point1 Comp Enable				0	1414	See Par ID 2462
P11.49 ②	PID2 Set Point1 Comp Max	-200.00	200.00	%	0.00	1415	
P11.50 ②	PID2 Set Point 2 Comp Enable				0	1416	See Par ID 2462
P11.51 ②	PID2 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1417	
P11.52 ②	PID2 Wake Up Action				0	2467	See Par ID 2466
P11.53	FB PID2 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2546	
P11.54	FB PID2 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2548	
P11.55	FB PID2 Feedback 1			%		2552	
P11.56	FB PID2 Feedback 2			%		2553	
P11.57	FB PID2 Feedforward 1			%		2556	
P11.58	FB PID2 Feedforward 2			%		2557	
P11.59 ②	PID2 Sleep Boost level	-9999	9999	Varies	0	2662	
P11.60 ②	PID2 Sleep Boost Max Time	1	300	s	30	2663	
P11.61 ②	PID2 Low Feedback Level	0.0	6000.0	Varies	0.0	2818	
P11.62 ②	PID2 Low Feedback Time	0	3600	s	10	2819	
P11.63 ①②	PID2 Low Feedback Protection				0	2820	See Par ID 307
P11.64 ②	PID2 High Feedback Level	0.0	6000.0	Varies	150.0	2821	
P11.65 ②	PID2 High Feedback Time	0	3600	s	5	2822	
P11.66 ①②	PID2 High Feedback Protection				0	2823	See Par ID 307
P11.67 ①②	PID2 Hysteresis Level	0.0	100.0	Varies	0.0	2824	
P11.68 ②	PID2 Backup Feedback Source				0	2826	See Par ID 2825

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 114. Preset Speed—P12

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1 ②	Preset Speed 1	0.00	See Par ID 102	Hz	5.00	105	
P12.2 ②	Preset Speed 2	0.00	See Par ID 102	Hz	10.00	106	
P12.3 ②	Preset Speed 3	0.00	See Par ID 102	Hz	15.00	118	
P12.4 ②	Preset Speed 4	0.00	See Par ID 102	Hz	20.00	119	
P12.5 ②	Preset Speed 5	0.00	See Par ID 102	Hz	25.00	120	
P12.6 ②	Preset Speed 6	0.00	See Par ID 102	Hz	30.00	121	
P12.7 ②	Preset Speed 7	0.00	See Par ID 102	Hz	35.00	122	

Table 115. Brake—P14

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P14.1 ①②	DC-Brake Current	Drive NomCurrCT*15/100	Drive NomCurrCT*15/10	A	DriveNomCurrCT*1/2	254	
P14.2 ①②	Start DC-Brake Time	0.00	600.00	s	0.00	263	
P14.3 ①②	Stop DC-Brake Frequency	0.10	10.00	Hz	1.50	262	
P14.4 ①②	Stop DC-Brake Time	0.00	600.00	s	0.00	255	
P14.5 ①②	Brake Chopper Mode				0	251	0 = Disabled 1 = B(Run) T(Rdy) 2 = External 3 = B(Rdy) T(Rdy) 4 = B(Run) T(No)
P14.6 ①②	Flux Brake				0	266	0 = Off 1 = On
P14.7 ①②	Flux Brake Current	ActiveMotor NomCurr*1/10	See Par ID 107	A	ActiveMotorNomCurr*1/2	265	

Table 116. Fire Mode—P15

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P15.1 ①②	Fire Mode Function				0	535	0 = Closing Contact 1 = Opening Contact
P15.2 ①②	Fire Mode Ref Select Function				0	536	0 = Fire Mode Min Frequency 1 = Fire Mode Ref 2 = Fieldbus Ref 3 = AI1 4 = AI2 5 = AI1 + AI2 6 = PID1 Control Output 7 = PID2 Control Output
P15.3 ②	Fire Mode Frequency	See Par ID 101	See Par ID 102	Hz	60.00	537	
P15.4 ②	Fire Mode % Speed Ref 1	0.0	100.0	%	75.0	565	
P15.5 ②	Fire Mode % Speed Ref 2	0.0	100.0	%	100.0	564	
P15.6 ①②	Smoke Purge Frequency	0.0	100.0	%	50.0	554	
P15.7	Fire Mode Test Enable					2443	See Par ID 2462

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 117. Second Motor Parameter—P16

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P16.1 ①	Motor Nom Current 2	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT	577	
P16.2 ①	Motor Nom Speed 2	300	20000	rpm	SecdMotorNomSpeedMFG	578	
P16.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P16.4 ①	Motor Nom Volt 2	180	690	V	SecdMotorNomVoltMFG	580	
P16.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	SecdMotorNomFreqMFG	581	

Bypass

Table 118. Basic Setting—P17.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1.1 ①②	Bypass Enable				0	1418	See Par ID 2462
P17.1.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.1.3 ①②	Auto Bypass				0	542	See Par ID 2462
P17.1.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.1.5 ①②	OverCurrent Bypass Enable				0	547	See Par ID 2462
P17.1.6 ①②	IGBT Fault Bypas Enable				0	546	See Par ID 2462
P17.1.7 ①②	4mA Fault Bypass Enable				0	548	See Par ID 2462
P17.1.8 ①②	UnderVoltage Bypass Enable				0	545	See Par ID 2462
P17.1.9 ①②	OverVoltage Bypass Enable				0	549	See Par ID 2462
P17.1.10 ①②	Motor OverTemp Bypass Enable				0	1698	See Par ID 2462
P17.1.11 ①②	UnderLoad Bypass Enable				0	1699	See Par ID 2462
P17.1.12 ①②	External Bypass Enable				0	1700	See Par ID 2462
P17.1.13 ①②	Charge Switch Fault Bypass Enable				0	1701	See Par ID 2462
P17.1.14 ①②	Saturation Trip Fault Bypass Enable				0	1702	See Par ID 2462
P17.1.15 ①②	Under Temp Fault Bypass Enable				0	1703	See Par ID 2462
P17.1.16 ①②	EEPROM Fault Bypass Enable				0	1704	See Par ID 2462
P17.1.17 ①②	FRAM Fault Bypass Enable				0	1705	See Par ID 2462
P17.1.18 ①②	Watchdog Fault Bypass Enable				0	1706	See Par ID 2462
P17.1.19 ①②	Fan Cooling Fault Bypass Enable				0	1707	See Par ID 2462
P17.1.20 ①②	Keypad Com Fault Bypass Enable				0	1708	See Par ID 2462
P17.1.21 ①②	Option Card Fault Bypass Enable				0	1709	See Par ID 2462
P17.1.22 ①②	RTC Clock Fault Bypass Enable				0	1710	See Par ID 2462
P17.1.23 ①②	Ctrl Board OverTemp Fault Bypass Enable				0	1711	See Par ID 2462
P17.1.24 ①②	Fieldbus Fault Bypass Enable				0	1713	See Par ID 2462
P17.1.25 ①②	Op Cont Interlock Fault Bypass Enable				0	2832	See Par ID 2462

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 119. Redundant Drive—P17.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.2.1 ①②	Redundant Drive Enable				0	2476	See Par ID 2462
P17.2.2 ①②	Drive ID	0	5		0	2278	
P17.2.3 ②	Redundant Run Time Enable				0	2477	See Par ID 2462
P17.2.4	Redundant Run Time Reset					2478	See Par ID 2125
P17.2.5 ②	Redundant RunTime Limit	0.0	300000.0	h	0.0	2479	

Pump parameters

Table 120. Basic Setting—P18.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.1 ①②	Multi-pump Mode				0	2279	0 = Disabled 1 = Single Drive Control 2 = Multi Drive Network
P18.1.2 ①②	Drive ID	0	5		0	2278	
P18.1.3 ②	PID Bandwidth	0.00	6000.00	Varies	10.00	2458	
P18.1.4 ①②	Staging Frequency	See Par ID 101	400.00		50.00	2315	
P18.1.5 ①②	De-Staging Frequency	0.00	See Par ID 102		0.00	2316	
P18.1.6 ②	Add/Remove Delay	0	3600	s	10	344	
P18.1.7 ②	Interlock Enable				0	350	See Par ID 2462
P18.1.8 ①②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.1.9 ①②	Damper Time Out	1	32500	s	5	484	
P18.1.10 ①②	Damper Delay	1	32500	s	5	485	
P18.1.11 ②	Derag Cycles	0	10		3	2468	
P18.1.12 ②	Derag at Start/Stop				0	2469	0 = Off 1 = Start 2 = Stop 3 = Start and Stop 4 = Digital Input
P18.1.13 ②	Deragging Run Time	0	3600	s	0	2470	
P18.1.14 ②	Derag Speed	See Par ID 101	See Par ID 102	Hz	5.00	2471	
P18.1.15 ②	Derag Off Delay	1	600	s	10	2472	
P18.1.16 ①②	Multi-pump Mode 2				0	2659	See Par ID 2279

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Multi-pump status

Table 121. Operation Mode—P18.2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.1.1	Drive 1					2218	0 = Offline 1 = Slave Drive 2 = Master Drive 3 = Redundant Drive
P18.2.1.2	Drive 2					2230	See Par ID 2218
P18.2.1.3	Drive 3					2242	See Par ID 2218
P18.2.1.4	Drive 4					2254	See Par ID 2218
P18.2.1.5	Drive 5					2266	See Par ID 2218

Table 122. Multi-Pump Status—P18.2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.2.1	Drive 1				5	2219	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.2	Drive 2				5	2231	See Par ID 2219
P18.2.2.3	Drive 3				5	2243	See Par ID 2219
P18.2.2.4	Drive 4				5	2255	See Par ID 2219
P18.2.2.5	Drive 5				5	2267	See Par ID 2219

Table 123. Network Status—P18.2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.3.1	Drive 1					2220	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.2	Drive 2					2232	See Par ID 2220
P18.2.3.3	Drive 3					2244	See Par ID 2220
P18.2.3.4	Drive 4					2256	See Par ID 2220
P18.2.3.5	Drive 5					2268	See Par ID 2220

Multi-pump measurement

Table 124. Latest Fault Code—P18.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.1.1	Drive 1					2221	
P18.3.1.2	Drive 2					2233	
P18.3.1.3	Drive 3					2245	
P18.3.1.4	Drive 4					2257	
P18.3.1.5	Drive 5					2269	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 125. Output Frequency—P18.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.2.1	Drive 1			Hz		2222	
P18.3.2.2	Drive 2			Hz		2234	
P18.3.2.3	Drive 3			Hz		2246	
P18.3.2.4	Drive 4			Hz		2258	
P18.3.2.5	Drive 5			Hz		2270	

Table 126. Motor Voltage—P18.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.3.1	Drive 1			V		2223	
P18.3.3.2	Drive 2			V		2235	
P18.3.3.3	Drive 3			V		2247	
P18.3.3.4	Drive 4			V		2259	
P18.3.3.5	Drive 5			V		2271	

Table 127. Motor Current—P18.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.4.1	Drive 1			A		2224	
P18.3.4.2	Drive 2			A		2236	
P18.3.4.3	Drive 3			A		2248	
P18.3.4.4	Drive 4			A		2260	
P18.3.4.5	Drive 5			A		2272	

Table 128. Motor Torque—P18.3.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.5.1	Drive 1			%		2225	
P18.3.5.2	Drive 2			%		2237	
P18.3.5.3	Drive 3			%		2249	
P18.3.5.4	Drive 4			%		2261	
P18.3.5.5	Drive 5			%		2273	

Table 129. Motor Power—P18.3.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.6.1	Drive 1			%		2226	
P18.3.6.2	Drive 2			%		2238	
P18.3.6.3	Drive 3			%		2250	
P18.3.6.4	Drive 4			%		2262	
P18.3.6.5	Drive 5			%		2274	

Table 130. Motor Speed—P18.3.7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.7.1	Drive 1			rpm		2227	
P18.3.7.2	Drive 2			rpm		2239	
P18.3.7.3	Drive 3			rpm		2251	
P18.3.7.4	Drive 4			rpm		2263	
P18.3.7.5	Drive 5			rpm		2275	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 131. Run Time—P18.3.8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.8.1	Drive 1			h		2228	
P18.3.8.2	Drive 2			h		2240	
P18.3.8.3	Drive 3			h		2252	
P18.3.8.4	Drive 4			h		2264	
P18.3.8.5	Drive 5			h		2276	

Table 132. Multi-Pump Single Drive—P18.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.4.1 ①②	Number of Pumps	1	5		1	342	
P18.4.2 ②	Include Freq Converter				1	346	See Par ID 2462
P18.4.3 ②	Auto-Change Enable				0	345	See Par ID 2462
P18.4.4 ②	Auto-Change Interval	0.0	3000.0	h	48.0	347	
P18.4.5 ②	Auto-Change Freq Limit	See Par ID 101	See Par ID 102	Hz	25.00	349	
P18.4.6 ②	Auto-Change Pump Limit	0	5		1	348	
P18.4.7 ①②	Pipe Fill Aux Pump Select				0	2439	0 = Disabled 1 = Aux Motor 1 2 = Aux Motor 2 3 = Aux Motor 3 4 = Aux Motor 4
P18.4.8 ①②	Pipe Fill Aux Pump Run Time	0.0	3600.0	min	0.0	2440	
P18.4.9 ①②	Pipe Fill Aux Pump Operation				0	2441	0 = Automatic 1 = Stop
P18.4.10 ①②	Pipe Fill Aux Pump Delay	0.0	600.0	min	2.0	2442	

Table 133. Multi-Pump Multi Drive—P18.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.5.1 ①②	Number of Drives	1	5		1	2449	
P18.5.2 ①②	Regulation Source				0	2284	0 = Network Only 1 = PID Controller 1
P18.5.3 ①②	Recovery Method				0	2285	See Par ID 2441
P18.5.4 ①②	Callback Source				0	2286	0 = No Action 1 = Safety Torque Off
P18.5.5 ②	Add/Remove Drive Selection				0	2311	0 = Drive ID 1 = Run Time
P18.5.6 ②	Run Time Enable				0	2280	See Par ID 2462
P18.5.7 ②	Run Time Limit	0.0	300000.0	h	0.0	2281	
P18.5.8	Run Time Reset				0	2283	0 = No Action 1 = Reset
P18.5.9 ②	Master Drive Mode				0	2473	0 = Follow PID 1 = Fixed Speed 2 = Turn Off
P18.5.10 ②	Master Fixed Speed	See Par ID 101	See Par ID 102	Hz	50.00	2474	
P18.5.11 ②	Master Fixed Speed Delay	0	1000	s	5	2475	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 134. Protections—P18.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.6.1 ①②	Pipe Fill Loss Detection Method				0	2406	0 = Motor Current 1 = Motor Power 2 = Motor Torque
P18.6.2 ②	Pipe Fill Loss Level	0.0	1000.0	Varies	0.0	2407	
P18.6.3 ②	Pipe Fill Loss Time	0	600	s	0	2408	
P18.6.4 ①②	Pipe Fill Loss Frequency	0.00	See Par ID 102	Hz	0.00	2409	
P18.6.5 ①②	Pipe Fill Loss Response				0	2410	See Par ID 2427
P18.6.6 ②	Pipe Fill Loss Attempts	0	10		1	2411	
P18.6.7 ②	Prime Pump Enable				0	2428	See Par ID 190
P18.6.8 ②	Prime Pump Level	0.00	6000.00	Varies	0.00	2429	
P18.6.9 ②	Prime Pump Frequency	See Par ID 101	See Par ID 102	Hz	0.00	2431	
P18.6.10 ②	Prime Pump Delay Time	0.0	3600.0	min	0.0	2432	
P18.6.11 ②	Prime Pump Loss of Prime Level	0.0	1000.0	Varies	0.0	2433	
P18.6.12 ②	Prime Pump Level 2	0.00	6000.00	Varies	0.00	2434	
P18.6.13 ②	Prime Pump Frequency 2	See Par ID 101	See Par ID 102	Hz	0.00	2436	
P18.6.14 ②	Prime Pump Delay Time 2	0.0	3600.0	min	0.0	2437	
P18.6.15 ②	Prime Pump Loss of Prime Level 2	0.0	1000.0	Varies	0.0	2438	
P18.6.16 ①②	Broken Pipe Fault Response				0	1853	See Par ID 307
P18.6.17 ②	Broken Pipe Level	0.0	6000.0	Varies	15.0	1854	
P18.6.18 ②	Broken Pipe Delay	1.0	120.0	s	15.0	1855	
P18.6.19 ②	Broken Pipe Frequency	1.00	See Par ID 102	Hz	25.00	1856	
P18.6.20 ②	Jockey Pump Enable				0	2804	0 = Not Used 1 = PID Sleep 2 = PID Sleep(Level)
P18.6.21 ②	Jockey Start Level	-99999.99	See Par ID 2807	Varies	0.00	2805	
P18.6.22 ②	Jockey Stop Level	See Par ID 2805	99999.99	Varies	0.00	2807	
P18.6.23 ②	Lube Pump Enable				0	2809	See Par ID 2462
P18.6.24 ②	Lube Pump Time	0.0	300.0	s	0.0	2810	

Table 135. Real Time Clock—P19

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P19.1 ②	Interval 1 On Time				0,0,0	491	
P19.2 ②	Interval 1 Off Time				0,0,0	493	
P19.3 ②	Interval 1 From Day				0	517	0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday
P19.4 ②	Interval 1 To Day				0	518	See Par ID 517
P19.5 ②	Interval 1 Channel				0	519	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.6 ②	Interval 2 On Time				0,0,0	495	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 135. Real Time Clock—P19, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P19.7 ②	Interval 2 Off Time				0,0,0	497	
P19.8 ②	Interval 2 From Day				0	520	See Par ID 517
P19.9 ②	Interval 2 To Day				0	521	See Par ID 517
P19.10 ②	Interval 2 Channel				0	522	See Par ID 519
P19.11 ②	Interval 3 On Time				0,0,0	499	
P19.12 ②	Interval 3 Off Time				0,0,0	501	
P19.13 ②	Interval 3 From Day				0	523	See Par ID 517
P19.14 ②	Interval 3 To Day				0	524	See Par ID 517
P19.15 ②	Interval 3 Channel				0	525	See Par ID 519
P19.16 ②	Interval 4 On Time				0,0,0	503	
P19.17 ②	Interval 4 Off Time				0,0,0	505	
P19.18 ②	Interval 4 From Day				0	526	See Par ID 517
P19.19 ②	Interval 4 To Day				0	527	See Par ID 517
P19.20 ②	Interval 4 Channel				0	528	See Par ID 519
P19.21 ②	Interval 5 On Time				0,0,0	507	
P19.22 ②	Interval 5 Off Time				0,0,0	509	
P19.23 ②	Interval 5 From Day				0	529	See Par ID 517
P19.24 ②	Interval 5 To Day				0	530	See Par ID 517
P19.25 ②	Interval 5 Channel				0	531	See Par ID 519
P19.26 ②	Timer 1 Duration	0	72000	s	0	511	
P19.27 ②	Timer 1 Channel				0	532	See Par ID 519
P19.28 ②	Timer 2 Duration	0	72000	s	0	513	
P19.29 ②	Timer 2 Channel				0	533	See Par ID 519
P19.30 ②	Timer 3 Duration	0	72000	s	0	515	
P19.31 ②	Timer 3 Channel				0	534	See Par ID 519
P19.32 ②	Interval 1 Setting				0	2487	0 = Weekly 1 = Daily
P19.33 ②	Interval 2 Setting				0	2488	See Par ID 2487
P19.34 ②	Interval 3 Setting				0	2489	See Par ID 2487
P19.35 ②	Interval 4 Setting				0	2490	See Par ID 2487
P19.36 ②	Interval 5 Setting				0	2491	See Par ID 2487

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Communication

Table 136. FB Process Data Input Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1 ②	FB Process Data Input 1 Sel	0	2663		2541	2533	
P20.1.2 ②	FB Process Data Input 2 Sel	0	See Par ID 2533		2542	2534	
P20.1.3 ②	FB Process Data Input 3 Sel	0	See Par ID 2533		2550	2535	
P20.1.4 ②	FB Process Data Input 4 Sel	0	See Par ID 2533		0	2536	
P20.1.5 ②	FB Process Data Input 5 Sel	0	See Par ID 2533		0	2537	
P20.1.6 ②	FB Process Data Input 6 Sel	0	See Par ID 2533		0	2538	
P20.1.7 ②	FB Process Data Input 7 Sel	0	See Par ID 2533		0	2539	
P20.1.8 ②	FB Process Data Input 8 Sel	0	See Par ID 2533		0	2540	

Table 137. FB Process Data Output Sel—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1 ②	FB Process Data Output 1 Sel				1	1556	
P20.2.2 ②	FB Process Data Output 2 Sel				2	1557	
P20.2.3 ②	FB Process Data Output 3 Sel				3	1558	
P20.2.4 ②	FB Process Data Output 4 Sel				4	1559	
P20.2.5 ②	FB Process Data Output 5 Sel				5	1560	
P20.2.6 ②	FB Process Data Output 6 Sel				6	1561	
P20.2.7 ②	FB Process Data Output 7 Sel				7	1562	
P20.2.8 ②	FB Process Data Output 8 Sel				28	1563	
P20.2.9 ②	Standard Status Word Bit0 Function Select				1	2415	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 11 = PID1 Superv 12 = PID2 Superv 13 = OverHeat Fault 14 = OverCurrent Regular 15 = OverVoltage Regular 16 = UnderVoltage Regular 17 = 4mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 137. FB Process Data Output Sel—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.9 ②, continued	Standard Status Word Bit0 Function Select				1	2415	23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Therm Protection 31 = FB Digital Input 1 32 = FB Digital Input 2 33 = FB Digital Input 3 34 = FB Digital Input 4 35 = Damper Control 36 = TC1 Status 37 = TC2 Status 38 = TC3 Status 39 = In E-Stop 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 43 = Motor 1 Control 44 = Motor 2 Control 45 = Motor 3 Control 46 = Motor 4 Control 47 = Motor 5 Control 49 = PID1 Sleep 50 = PID2 Sleep 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 57 = Prime Pump Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = FieldBus_RTU_ Fault,FieldBus RTU Fault 65 = FieldBus_TCP_ Fault,FieldBus TCP Fault 66 = FieldBus_MSTP_ Fault,FieldBus MSTP Fault 67 = FieldBus_EIP_ Fault,FieldBus EIP Fault 68 = FieldBus_SlotA_ Fault,FieldBus SlotA Fault 69 = FieldBus_SlotB_ Fault,FieldBus SlotB Fault 70 = FieldBus SMDT Fault 71 = Jockey Pump Active 72 = Lube Pump Active 73 = PID1 Low Feedback 74 = PID1 High Feedback 75 = PID2 Low Feedback 76 = PID2 High Feedback

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 137. FB Process Data Output Sel—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.10 ②	Standard Status Word Bit1 Function Select				2	2416	See Par ID 2415
P20.2.11 ②	Standard Status Word Bit2 Function Select				3	2417	See Par ID 2415
P20.2.12 ②	Standard Status Word Bit3 Function Select				4	2418	See Par ID 2415
P20.2.13 ②	Standard Status Word Bit4 Function Select				5	2419	See Par ID 2415
P20.2.14 ②	Standard Status Word Bit5 Function Select				6	2420	See Par ID 2415
P20.2.15 ②	Standard Status Word Bit6 Function Select				7	2421	See Par ID 2415
P20.2.16 ②	Standard Status Word Bit7 Function Select				8	2422	See Par ID 2415

RS-485 bus

Table 138. Basic Setting—P20.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.1.1 ①	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP 2 = SWD

Table 139. Modbus RTU—P20.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.2.1 ①	Slave Address	1	247		1	587	
P20.3.2.2 ①	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.2.3 ①	Parity Type				2	585	0 = None 1 = Odd 2 = Even
P20.3.2.4	Modbus RTU Protocol Status					588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.3.2.5	Comm Timeout Modbus RTU	0	60000	ms	10000	593	
P20.3.2.6	Modbus RTU Fault Response				0	2516	0 = in Fieldbus Control 1 = in all Control

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 140. BACnet MS/TP—P20.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.1	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P20.3.3.2	MSTP MS/TP Device Address	0	127		1	595	
P20.3.3.3	MSTP Instance Number	0	4194302		0	596	
P20.3.3.4	MSTP Comm Timeout MSTP	0	60000	ms	10000	598	
P20.3.3.5	MSTP Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.3.3.6	MSTP Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud rate fault
P20.3.3.7	MSTP Fault Response				0	2526	See Par ID 2516
P20.3.3.8 ①	MSTP Max Master	1	127		127	1537	

Table 141. Terminal: SWD—P20.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.4.1 ②	Parameter Access				1	2630	0 = Local Control 1 = Fieldbus
P20.3.4.2 ①②	Process Data Access				4	2631	0 = Local Control 1 = Fieldbus 2 = Mixed Interface 4 = NET, Local on Fault 5 = Dual Mode
P20.3.4.3	Fault Situation Counter					2632	
P20.3.4.4	Board Status					2609	
P20.3.4.5	Firmware Version					2610	
P20.3.4.6	Protocol Status					2612	0 = Not Configured 1 = Operational 2 = Diagnostics
P20.3.4.7	Operation Mode					2613	0 = PD2x16Bit Profil 1 = 8Bit Profil 2 = 1-0-A Switch
P20.3.4.8 ②	PDP-Telegram Selection				1	2614	1 = Standard Telegram 1
P20.3.4.9	Fault Counter PDP				0	2615	
P20.3.4.10 ②	Fault Situations Max				8,8	2616	
P20.3.4.11 ②	PDP-Profil Number				809	2618	
P20.3.4.12	PDP-Control Word					2619	
P20.3.4.13 ②	PDP-Status Word				64	2620	
P20.3.4.14	PDP-MaxBlockLength				30	2621	
P20.3.4.15	PDP-NoOfMultiparameter				1	2622	
P20.3.4.16	PDP-MaxLatency				2	2623	
P20.3.4.17	PDP-DO Manufacturer				413	2624	
P20.3.4.18	PDP-DO Device Type				CONST_PROD_CODE	1451	
P20.3.4.19	PDP-DO FW-Interface				FIRMWARE_MAJOR_NUM * 100 + FIRMWARE_MINOR_NUM	2625	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 141. Terminal: SWD—P20.3.4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.4.20	PDP-DO FW-Year					2626	
P20.3.4.21	PDP-DO FW-DayMonth					2627	
P20.3.4.22	PDP-DO NoOfDOs				1	2628	
P20.3.4.23	PDP-DO Subclass				1	2629	

Table 142. EtherNet/IP—P20.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.4.1 ①	IP Address Mode				0	1500	0 = Static IP 1 = DHCP with AutoIP
P20.4.2	Active IP Address					1507	
P20.4.3	Active Subnet Mask					1509	
P20.4.4	Active Default Gateway					1511	
P20.4.5	MAC Address					1513	
P20.4.6 ①	Static IP Address				192.168.1.254	1501	
P20.4.7 ①	Static Subnet Mask				255.255.255.0	1503	
P20.4.8 ①	Static Default Gateway				192.168.1.1	1505	
P20.4.9	Ethernet IP Protocol Status					608	0 = Off 1 = Operational 2 = Faulted
P20.4.10	EIP Fault Response				0	2518	See Par ID 2516

Table 143. Modbus TCP—P20.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.5.1	Connection Limit				5	609	
P20.5.2	Modbus TCP Unit ID				1	610	
P20.5.3	Comm Timeout Modbus TCP	0	60000	ms	10000	611	
P20.5.4	Modbus TCP Protocol Status					612	See Par ID 599
P20.5.5	Modbus TCP Fault Response				0	2517	See Par ID 2516
P20.5.6	Modbus TCP Trusted IP Enable				1	74	See Par ID 2462
P20.5.7	Trusted IP White List				0xC0.0xA8.0x01.0xFF. 0x00.0x00.0x00.0x00. 0x00.0x00.0x00.0x00	68	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Sysytem

Table 144. Basic Setting—P21.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.1	Language				0	340	0 = English 1 = 中文 2 = Deutsch
P21.1.2 ①	Application					142	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
P21.1.3 ①	Parameter Sets					619	
P21.1.4	Up To Keypad					620	See Par ID 2118
P21.1.5 ①	Down From Keypad					621	
P21.1.6	Parameter Comparison					623	
P21.1.7	Password	0	9999		0	624	
P21.1.8	Parameter Lock				0	625	
P21.1.9	Multimonitor Set				0	627	
P21.1.10	Default Page				2	628	
P21.1.11	Timeout Time	0	65535	s	30	629	
P21.1.12	Contrast Adjust	5	18		12	630	
P21.1.13	Backlight Time	1	65535	min	10	631	
P21.1.14	Fan Control				1	632	
P21.1.15	Keypad ACK Timeout	200	5000	ms	200	633	
P21.1.16	Keypad Retry Number	1	10		5	634	
P21.1.17	Startup Wizard				0	626	
P21.1.18 ②	Jog Softkey Hidden				0	2412	See Par ID 2462
P21.1.19 ②	Reverse Softkey Hidden				0	2413	See Par ID 2462
P21.1.20 ②	Output Display Unit				45	2424	
P21.1.21 ②	Output Display Unit Min	-60000.00	See Par ID 2425	Varies	0.00	2460	
P21.1.22 ②	Output Display Unit Max	See Par ID 2460	60000.00	Varies	MotorNomFreqMFG	2425	
P21.1.23	Keypad Lock Password	0	9999		0	75	

Table 145. Version Info—P21.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.2.1	Keypad Software Version					640	
P21.2.2	Motor Control Software Version					642	
P21.2.3	Application Software Version					644	
P21.2.4	Software Bundle Version					1714	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 146. Application Info—P21.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.3.1	Brake Chopper Status					646	See Par ID 2118
P21.3.2	Brake Resistor Status					647	See Par ID 2118
P21.3.3	Serial Number					648	
P21.3.4	Power Unit Serail Number					1270	
P21.3.5	Control Unit Serial Number					1276	

Table 147. User Info—P21.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.4.1	Real Time Clock				0.0.0.1:1:13	566	
P21.4.2	Daylight Saving				0	582	
P21.4.3	Total MWh Count			Mwh		601	
P21.4.4	Total Power Day Count					603	
P21.4.5	Total Power Hr Count					606	
P21.4.6	Trip MWh Count			Mwh		604	
P21.4.7	Clear Trip MWh Count					635	See Par ID 2125
P21.4.8	Trip Power Day Count					636	
P21.4.9	Trip Power Hr Count					637	
P21.4.10	Clear Trip Power Count					639	See Par ID 2125

Table 148. Operate Mode—O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
01	Output Frequency			Hz		1	
02	Freq Reference			Hz		24	
03	Motor Speed			rpm		2	
04	Motor Current			A		3	
05	Motor Torque			%		4	
06	Motor Power			%		5	
07	Motor Voltage			V		6	
08	DC-link Voltage			V		7	
09	Unit Temperature			°C		8	
010	Motor Temperature			%		9	
R12 ②	Keypad Reference	See Par ID 101	See Par ID 102	Hz	0.00	141	
R13 ②	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307	
R14 ②	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Chapter 8—Multi-Purpose Application

Introduction

The Multi-Purpose Application is designed for a large set of applications with the ability to have advanced motor control systems. It takes the same functions provided in the Standard, Multi-Pump and Fan, and Multi-PID applications and adds in some additional control techniques. The application is designed with 2 control places that use 8 digital inputs, 2 analog inputs, 3 relay outputs, 1 digital output, and 2 analog outputs that are programmable. Motor controlwise it provides the ability to do frequency and speed control and adds Open Loop Speed Control as well as Torque Control. For tuning the V/Hz curve, it has the ability to go out and ID the motor characteristic and enters those specific measurements into its parameters for better control. Drive/Motor protections are programmable for desired actions depending on the application. Below is a list of additional features available in addition to the Standard, Multi-Pump and Fan, and Multi-PID Application features that are available in the Multi-Purpose Application.

- Motor potentiometer reference control
- External Brake control
- Droop function with multiple loads
- Motor Identification
- Motor Control modes
- I/O Controls
  - "Terminal To Function" (TTF) Programming

    The design behind the programming of the digital inputs in the DG1 drive is to use "Terminal To Function" programming. It is composed of multiple functions that get assigned a digital input to that function, the parameters in the drive are set up with specific functions and by defining the Digital input and slot in some cases depending on the what options are available. For use of the drives control board inputs they will be referred to as DigIN:1 through DigIN:8. When additional option cards are used, they will be defined as DigIN:X:IOY:Z. The X indicates the slot that the card is being installed in which will be either A or B, then the IOY determines the type of card it is, which would be IO1 or IO5, and the Z would indicate which input is being used on that available option card.
  - "Function To Terminal" (FTT) Programming

    The design behind the programming of the relay outputs and digital output in the DG1 drive is to use "Function To Terminal" programming. It is composed of a terminal be it a relay output or a digital output that is assigned a parameter. Within that parameter, it has different functions that can be set.

The parameters of the Multi-Purpose Application are explained on **Page 148** of this manual, "Description of Parameters." The explanations are arranged according to the parameter number.

For the DI function, we use Terminal programming method to function (TTF), where there is a fixed input that gets programmed to a list of functions. This allows for multiple inputs to be used for different functions. Connecting a certain input with a certain parameter function is done by give a parameter an appropriate value. The value is formed by the location of the input, either being on the standard control board or an external option board and the slot it is located in.

Force Open/Force close selection

The Force Open Selection would make the selected function always off. Essentially this is a virtual switch that is always open.

The Force Close Selection would make the selected function always on. Essentially this is a virtual switch that is always closed.

These options are assigned to a function if we want to force a state without using a hardware input.

Example:

If we set Run Enable to Force Closed the drive is always enabled. If we set the same function to Force Open the drive would never be Enabled. If a Digital input is to be used to activate this Run Enable the function should be assigned to a hardware input(See below for DIGIN Selections).

DIGIN selection

This allows Assignment of a hardware digital input to a function, this is set in a format of DigIN:X where X is one of the 8 Digital inputs on the Main control board.

Example:

If we set Run Enable to DigIN:6 the drive will be enabled when digital input 6 (Terminal 8) is closed, and would not be enabled when digital input 6 (Terminal 8) is open.

Option board DigIN selection

This allows Assignment of a hardware digital input on an option card to a function, this is set in a format of DigIN: Y:IO1:X where Y is the slot the option card is inserted on the Main control board and X is the Input on the Board and IO1 is the type of option board used.

Example:

If we set Run Enable to DigIN:A:IO5:6 the drive will be enabled when digital input 6 is closed on the IO5 option card which is inserted in Slot A, and would not be enabled when digital input 6 on the option card is open.

Timer channel selection

A Time Channel is a virtual path to link the digital output of a timer function to a digital input function. To utilize this feature a timer or interval would need to be assigned to a time channel 1 through 3, and the input function to be controlled would need to be assigned to the same time channel.

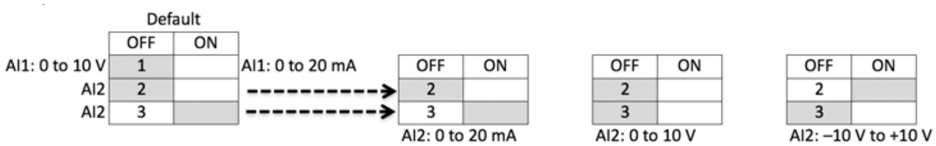
Example:

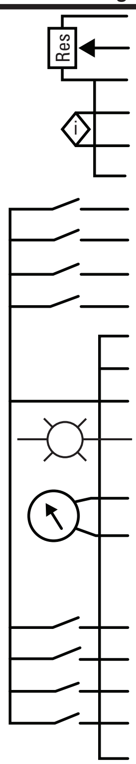
If we set Run Enable to DigIN:TimeChannel1 the drive will be enabled when the timer assigned to Time Channel 1 is active or High, and would not be enabled when the Time Channel is inactive or Low.

Control I/O configuration

- Run 240 Vac and 24 Vdc control wiring in separate conduit
- Communication wire to be shielded

Table 149. Multi-Purpose application default I/O configuration





External wiring	Pin	Signal name	Signal	Default setting	Description
	1	+10 V	Ref. Output Voltage	—	10 Vdc Supply Source
	2	AI1+ ①	Analog Input 1	0–10 V	Voltage Speed Reference (Programmable to 4 mA to 20 mA)
	3	AI1–	Analog Input 1 Ground	—	Analog Input 1 Common (Ground)
	4	AI2+ ①	Analog Input 2	4 mA to 20 mA	Current Speed Reference (Programmable to 0–10 V)
	5	AI2–	Analog Input 2 Ground	—	Analog Input 2 Common (Ground)
	6	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	7	DIN5	Digital Input 5	Preset Speed B0	Sets frequency output to Preset Speed 1
	8	DIN6	Digital Input 6	Preset Speed B1	Sets frequency output to Preset Speed 2
	9	DIN7	Digital Input 7	Not Used (TI–)	Input forces VFD output to shut off
	10	DIN8	Digital Input 8	Force Remote (TI+)	Input takes VFD from Local to Remote
	11	CMB	DI5 to DI8 Common	Grounded	Allows source input
	12	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	13	24 V	+24 Vdc Output	—	Control voltage output (100 mA max.)
	14	DO1	Digital Output 1	Ready	Shows the drive is ready to run
	15	24 Vo	+24 Vdc Output	—	Control voltage output (100 mA max.)
	16	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	17	AO1+	Analog Output 1	Output Frequency	Shows Output frequency to motor 0–60 Hz (4 mA to 20 mA)
	18	AO2+	Analog Output 2	Motor Current	Shows Motor current of motor 0–FLA (4 mA to 20 mA)
	19	24 Vi	+24 Vdc Input	—	External control voltage input
	20	DIN1	Digital Input 1	Run Forward	Input starts drive in forward direction (start enable)
	21	DIN2	Digital Input 2	Run Reverse	Input starts drive in reverse direction (start enable)
	22	DIN3	Digital Input 3	External Fault	Input causes drive to fault
	23	DIN4	Digital Input 4	Fault Reset	Input resets active faults
	24	CMA	DI1 to DI4 Common	Grounded	Allows source input
	25	A/+	RS-485 Signal A	—	Fieldbus Communication (Modbus, BACnet)
	26	B/-	RS-485 Signal B	—	Fieldbus Communication (Modbus, BACnet)
	27	R3NO	Relay 3 Normally Open	At Speed	Relay output 3 shows VFD is at Ref. Frequency
	28	R1NC	Relay 1 Normally Closed	Run	Relay output 1 shows VFD is in a run state
	29	R1CM	Relay 1 Common		
	30	R1NO	Relay 1 Normally Open		
	31	R3CM	Relay 3 Common	At Speed	Relay output 3 shows VFD is at Ref. Frequency
	32	R2NC	Relay 2 Normally Closed	Fault	Relay output 2 shows VFD is in a fault state
	33	R2CM	Relay 2 Common		
	34	R2NO	Relay 2 Normally Open		

Notes: The above wiring demonstrates a SINK configuration. It is important that CMA and CMB are wired to ground (as shown by dashed line). If a SOURCE configuration is desired, wire 24 V to CMA and CMB and close the inputs to ground. When using the +10 V for AI1, it is important to wire AI1—to ground (as shown by dashed line). If using +10 V for AI1 or AI2, terminals 3, 5, and 6 need to be jumpered together.
① AI1+ and AI2+ Support 10K potentiometer.

Table 150. Drive communication ports

Port	Communication
RJ45 Keypad Port	
Upload/Download Parameters	USB to RJ45
Remote Mount Keypad	Ethernet
Upgrade Drive Firmware	USB to RJ45
RJ45 Ethernet Port	
Upload/Download Parameters	Ethernet
Ethernet IP Communications	Ethernet
Modbus TCP Communications	Ethernet
RS-485 Serial Port ①	
Upload/Download Parameters	Two-Wire Twisted Pair
Upgrade Drive Firmware	Two-Wire Twisted Pair
Modbus RTU Communications	Two-Wire Twisted Pair
BACnet MS/TP Communications	Two-Wire Twisted Pair

① Shielded wire recommended.

Multi-Purpose application—parameters list

On the next pages you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given on **Page 148**, "Description of Parameters." The descriptions are arranged according to the parameter number.

Column explanations:

Code = Location indication on the keypad; shows the operator the present parameter number
Parameter = Name of parameter
Min = Minimum value of parameter
Max = Maximum value of parameter
Unit = Unit of parameter value; given if available
Default = Value preset by factory
ID = ID number of the parameter

Table 151. Monitor—M

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1	Output Frequency			Hz		1	
M2	Freq Reference			Hz		24	
M3	Motor Speed			rpm		2	
M4	Motor Current			A		3	
M5	Motor Torque			%		4	
M6	Motor Power			%		5	
M7	Motor Voltage			V		6	
M8	DC-link Voltage			V		7	
M9	Unit Temperature			°C		8	
M10	Motor Temperature			%		9	
M11	Torque Reference			%		15	
M12	Analog Input 1			Varies		10	
M13	Analog Input 2			Varies		11	
M14	Analog Output 1			Varies		25	
M15	Analog Output 2			Varies		575	
M16	DI1, DI2, DI3					12	
M17	DI4, DI5, DI6					13	
M18	DI7, DI8					576	
M19	DO1,Virtual RO1,Virtual RO2					14	
M20	RO1, RO2, RO3					557	
M21	TC1, TC2, TC3					558	
M22	Interval 1					559	0 = Inactive 1 = Active
M23	Interval 2					560	See Par ID 559
M24	Interval 3					561	See Par ID 559
M25	Interval 4					562	See Par ID 559
M26	Interval 5					563	See Par ID 559
M27	Timer 1			s	0	569	
M28	Timer 2			s	0	571	
M29	Timer 3			s	0	573	
M30	PID1 Set Point			Varies		16	
M31	PID1 Feedback			Varies		18	
M32	PID1 Error Value			Varies		20	
M33	PID1 Output			%		22	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 151. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M34	PID1 Status					23	0 = Stopped 1 = Running 2 = Sleep Mode
M35	PID2 Set Point			Varies		32	
M36	PID2 Feedback			Varies		34	
M37	PID2 Error Value			Varies		36	
M38	PID2 Output			%		38	
M39	PID2 Status					39	See Par ID 23
M40	Running Motors					26	
M41	PT100 Temperture			°C	1000.0	27	
M42	Latest Fault Code					28	
M43	RTC Battery Status				0	583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = OverVoltage
M44	Instant Motor Power			kW		1686	
M45 ②	Energy Savings			Varies	0.000	2120	
M46	Control Board DIDO Status					2209	
M47	SlotA DIDO Status					2210	
M48	SlotB DIDO Status					2211	
M49	Application Status Word					29	
M50	Standard Status Word					2414	
M51	Output			Varies		2445	
M52	Reference			Varies		2447	
M53	Total MWh Count			Mwh		601	
M54	Total Power Day Count					603	
M55	Total Power Hr Count					606	
M56	Trip MWh Count			Mwh		604	
M57	Trip Power Day Count					636	
M58	Trip Power Hr Count					637	
M59	Total Run time Count			h		2827	
M60	Numbers Of Start					2830	
M61	Trip Run Time Count			h		2829	
M62	Multi-Monitoring				2,1,3	30	
M63	FB Status Word					2101	
M64	FB Ctrol Word					2001	
M65	FB Speed Reference	0.00	100.00	%		2003	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Parameters

Table 152. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ②	Min Frequency	0.00	See Par ID 102	Hz	0.00	101	
P1.2 ②	Max Frequency	See Par ID 101	400.00	Hz	MaxFreqMFG	102	
P1.3 ②	Accel Time 1	0.1	3000.0	s	3.0	103	
P1.4 ②	Decel Time 1	0.1	3000.0	s	3.0	104	
P1.5 ①	Motor Nom Current	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT	486	
P1.6 ①	Motor Nom Speed	300	24000	rpm	MotorNomSpeedMFG	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	MotorNomVoltMFG	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	MotorNomFreqMFG	488	
P1.10 ②	Power Up Local Remote Select				0	1685	0 = Hold Last 1 = Local Control 2 = Remote control
P1.11 ②	Remote 1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal Start 2 3 = Keypad
P1.12 ②	Local Control Place				0	1685	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.13 ②	Bumpless Enable				0	2462	0 = Disabled 1 = Enabled
P1.14 ①②	Local Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 8 = Motor Pot 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 - AI2 12 = AI2 - AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = AI2),MIN(AI1,AI2) 16 = AI2),MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output
P1.15 ①②	Remote 1 Reference				0	137	See Par ID 136
P1.16 ①	Reverse Enable				1	1679	See Par ID 2462
P1.17 ②	Run Delay Time	0	32500	s	0	2423	
P1.18 ②	HOA Source				0	2465	0 = Disabled 1 = IO Terminal 2 = Keypad
P1.19 ①②	Minimum Run Time	0	32500	s	0	1813	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Analog input

Table 153. Basic Setting—P2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1 ②	AI Ref Scale Min Value	0.00	See Par ID 145	Hz	0.00	144	
P2.1.2 ②	AI Ref Scale Max Value	See Par ID 144	400.00	Hz	0.00	145	

Table 154. AI1 Settings—P2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10 V
P2.2.2 ②	AI1 Signal Range				0	175	0 = 0–100%/ 0–20 mA/0–10 V 1 = 20–100%/ 4–20 mA/2–10 V 2 = Customized
P2.2.3 ②	AI1 Custom Min	0.00	See Par ID 177	%	0.00	176	
P2.2.4 ②	AI1 Custom Max	See Par ID 176	100.00	%	100.00	177	
P2.2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.2.6 ②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.2.10 ②	AI1 Joystick Offset	-50.00	50.00	%	0.00	133	

Table 155. AI2 Settings—P2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.3.1	AI2 Mode				0	223	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V
P2.3.2 ②	AI2 Signal Range				1	183	0 = 0–100%/0–20 mA/ 0–10 V –10 to 10 V 1 = 20–100%/4–20 mA/ 2–10 V/–6- to 10 V 2 = Customized
P2.3.3 ②	AI2 Custom Min	0.00	See Par ID 185	%	0.00	184	
P2.3.4 ②	AI2 Custom Max	See Par ID 184	100.00	%	100.00	185	
P2.3.5 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.3.6 ②	AI2 Signal Invert				0	189	See Par ID 181
P2.3.7 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.3.8 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.3.9 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
P2.3.10 ②	AI2 Joystick Offset	-50.00	50.00	%	0.00	134	

Table 156. Fine Adjust—P2.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.4.1 ①②	Fine Tuning Input				0	2484	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = Fieldbus
P2.4.2 ①②	Fine Tuning Min	0.0	100.0	%	0.0	2485	
P2.4.3 ①②	Fine Tuning Max	0.0	100.0	%	0.0	2486	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 157. Digital Input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	IO Terminal 1 Start Stop Logic				0	143	0 = Forward - Reverse 1 = Start - Reverse 2 = Start - Enable 3 = 3 Wire Control
P3.2 ②⑤	IO Terminal 1 Start Signal 1				2	190	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = RO1 Function 32 = RO2 Function 33 = RO3 Function 34 = Virtual RO1 Function 35 = Virtual RO2 Function
P3.3 ② ⑤	IO Terminal 1 Start Signal 2				3	191	See Par ID 190
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②③	Reverse				0	198	See Par ID 190
P3.6 ②③	Ext. Fault 1 NO				4	192	See Par ID 190
P3.7 ②③	Ext. Fault 1 NC				1	193	See Par ID 190
P3.8 ②④	Fault Reset				5	200	See Par ID 190
P3.9 ②③	Run Enable				1	194	See Par ID 190
P3.10 ②③	Preset Speed B0				6	205	See Par ID 190
P3.11 ②③	Preset Speed B1				7	206	See Par ID 190
P3.12 ②③	Preset Speed B2				0	207	See Par ID 190
P3.13 ②③	PID1 Control Enable				1	550	See Par ID 190
P3.14 ②③	PID2 Control Enable				1	553	See Par ID 190
P3.15 ②③	Accel/Decel Time Set				0	195	See Par ID 190
P3.16 ②③	Accel/Decel Prohibit				0	201	See Par ID 190
P3.17 ②④	No Access To Param				0	215	See Par ID 190
P3.18 ②③	Accel Pot Value				0	203	See Par ID 190
P3.19 ②③	Decel Pot Value				0	204	See Par ID 190
P3.20 ②③	Reset Pot Zero				0	216	See Par ID 190
P3.21 ②③	Remote Control				9	196	See Par ID 190

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 157. AI2 Settings—P2.3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.22 ②③	Local Control				0	197	See Par ID 190
P3.23 ②③	Remote 1/2 Select				0	209	See Par ID 190
P3.24 ②③	Second Motor Para Select				0	217	See Par ID 190
P3.25 ②③	Force Bypass				0	218	See Par ID 190
P3.26 ②③	DC Brake Active				0	202	See Par ID 190
P3.27 ②③	Smoke Mode				0	219	See Par ID 190
P3.28 ②③	Fire Mode				0	220	See Par ID 190
P3.29 ②③	Fire Mode Ref 1/2 Select				0	221	See Par ID 190
P3.30 ②③	PID1 Set Point Select				0	351	See Par ID 190
P3.31 ②③	PID2 Set Point Select				0	352	See Par ID 190
P3.32 ②③	Jog Enable				0	199	See Par ID 190
P3.33 ②③	Start Timer 1				0	224	See Par ID 190
P3.34 ②③	Start Timer 2				0	225	See Par ID 190
P3.35 ②③	Start Timer 3				0	226	See Par ID 190
P3.36 ②③	AI Ref Source Select				0	208	See Par ID 190
P3.37 ②③	Motor Interlock 1				0	210	See Par ID 190
P3.38 ②③	Motor Interlock 2				0	211	See Par ID 190
P3.39 ②③	Motor Interlock 3				0	212	See Par ID 190
P3.40 ②③	Motor Interlock 4				0	213	See Par ID 190
P3.41 ②③	Motor Interlock 5				0	214	See Par ID 190
P3.42 ②③	Ext Fault-AR				1	747	See Par ID 190
P3.43 ②③	Bypass Overload				0	1246	See Par ID 190
P3.44 ②③	Fire Mode Direction Invert				0	2119	See Par ID 190
P3.45 ①②	IO Terminal 2 Start Stop Logic				0	2206	See Par ID 143
P3.46 ② ⑤	IO Terminal 2 Start Signal 1				2	2207	See Par ID 190
P3.47 ② ⑤	IO Terminal 2 Start Signal 2				3	2208	See Par ID 190
P3.48 ②③	Ext. Fault 2 NO				0	2293	See Par ID 190
P3.49 ②③	Ext. Fault 2 NC				1	2294	See Par ID 190
P3.50 ②③	Ext. Fault 3 NO				0	2295	See Par ID 190
P3.51 ②③	Ext. Fault 3 NC				1	2296	See Par ID 190
P3.52 ②	Ext. Fault 1 Text				0	2297	0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage
P3.53 ②	Ext. Fault 2 Text				1	2298	See Par ID 2297
P3.54 ②	Ext. Fault 3 Text				2	2299	See Par ID 2297
P3.55 ②④	Parameter Set1/2 Sel				0	2312	See Par ID 190
P3.56 ②③	Deragging Enable				0	2394	See Par ID 190
P3.57 ②③	HOA On/Off				1	2395	See Par ID 190
P3.58 ②③	Multi-pump Mode 1/2 Select				0	2658	See Par ID 190
P3.59 ②③	OP Cont Interlock NO				4	2801	See Par ID 190
P3.60 ②③	OP Cont Interlock NC				1	2802	See Par ID 190

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 158. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	See Par ID 222
P4.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0-Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 9 = PID1 Setpoint 10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 14 = PID2 Setpoint 15 = PID2 Feedback 1 16 = PID2 Feedback 2 17 = PID2 Control Error Value 18 = PID2 Control Output 19 = AI1 20 = AI2 21 = Output Freq (-2-+2N) 22 = Motor Torque (-2-+2N) 23 = Motor Power (-2-+2N) 24 = PT100 Temperature 25 = FB Process Data Input 1 26 = FB Process Data Input 2 27 = FB Process Data Input 3 28 = FB Process Data Input 4 29 = FB Process Data Input 5 30 = FB Process Data Input 6 31 = FB Process Data Input 7 32 = FB Process Data Input 8 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2 35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current (-2-+2N)
P4.3 ②	AO1 Minimum				1	149	0 = 0V / 0 mA 1 = 2V / 4 mA
P4.4 ②	AO1 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	AO1 Scale	10	1000	%	100	150	
P4.6 ②	AO1 Inversion				0	148	See Par ID 181
P4.7 ②	AO1 Offset	-100.00	100.00	%	0.00	173	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 158. Analog Output—P4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.8 ②	AO2 Mode				0	228	See Par ID 222
P4.9 ②	AO2 Function				4	229	See Par ID 146
P4.10 ②	AO2 Minimum				1	232	See Par ID 149
P4.11 ②	AO2 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	AO2 Scale	10	1000	%	100	233	
P4.13 ②	AO2 Inversion				0	231	See Par ID 181
P4.14 ②	AO2 Offset	-100.00	100.00	%	0.00	234	

Table 159. Digital Output—P5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1 ②	DO1 Function				1	151	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 11 = PID1 Superv 12 = PID2 Superv 13 = OverHeat Fault 14 = OverCurrent Regular 15 = OverVoltage Regular 16 = UnderVoltage Regular 17 = 4mA Ref Fault/ Warning 18 = Ext Brake Control 19 = Ext Brake Inverted 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Therm Protection 31 = FB Digital Input 1 32 = FB Digital Input 2 33 = FB Digital Input 3 34 = FB Digital Input 4 35 = Damper Control 36 = TC1 Status 37 = TC2 Status 38 = TC3 Status 39 = In E-Stop 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 43 = Motor 1 Control 44 = Motor 2 Control 45 = Motor 3 Control

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 159. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1 ②, continued	DO1 Function				1	151	46 = Motor 4 Control 47 = Motor 5 Control 48 = Logic Fulfilled 49 = PID1 Sleep 50 = PID2 Sleep 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 57 = Prime Pump Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = FieldBus_RTU_ Fault,FieldBus RTU Fault 65 = FieldBus_TCP_ Fault,FieldBus TCP Fault 66 = FieldBus_MSTP_ Fault,FieldBus MSTP Fault 67 = FieldBus_EIP_ Fault,FieldBus EIP Fault 68 = FieldBus_SlotA_ Fault,FieldBus SlotA Fault 69 = FieldBus_SlotB_ Fault,FieldBus SlotB Fault 70 = FieldBus SMDT Fault 71 = Jockey Pump Active 72 = Lube Pump Active 73 = PID1 Low Feedback 74 = PID1 High Feedback 75 = PID2 Low Feedback 76 = PID2 High Feedback
P5.2 ②	RO1 Function				2	152	See Par ID 151
P5.3 ②	RO2 Function				3	153	See Par ID 151
P5.4 ②	RO3 Function				7	538	See Par ID 151
P5.5 ②	Virtual RO1 Function				0	2463	See Par ID 151
P5.6 ②	Virtual RO2 Function				0	2464	See Par ID 151
P5.7 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-on Control
P5.8 ②	Freq Limit 1 Supv Val	0.00	See Par ID 102	Hz	0.00	155	
P5.9 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-off Control 4 = Brake-on/off Control
P5.10 ②	Freq Limit 2 Supv Val	0.00	See Par ID 102	Hz	0.00	158	
P5.11 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-off Control
P5.12 ②	Torque Limit Supv Val	-1000.0	1000.0	%	100.0	160	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 159. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.13 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.14 ②	Ref Limit Supv Val	0.00	See Par ID 102	Hz	0.00	162	
P5.15 ②	Ext Brake Off Delay	0.0	100.0	s	0.5	163	
P5.16 ②	Ext Brake On Delay	0.0	100.0	s	1.5	164	
P5.17 ②	Temp Limit Supv				0	165	See Par ID 161
P5.18 ②	Temp Limit Supv Val	-10.0	75.0	°C	40.0	166	
P5.19 ②	Power Limit Supv				0	167	See Par ID 161
P5.20 ②	Power Limit Supv Val	-200.0	200.0	%	0.0	168	
P5.21 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.22 ②	AI Limit Supv				0	171	See Par ID 161
P5.23 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.24 ②	PID1 Superv Enable				0	1346	See Par ID 2462
P5.25 ②	PID1 Superv Upper Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1347	
P5.26 ②	PID1 Superv Lower Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1349	
P5.27 ②	PID1 Superv Delay	0	3000	s	0	1351	
P5.28 ②	PID2 Superv Enable				0	1408	See Par ID 2462
P5.29 ②	PID2 Superv Upper Limit	See Par ID 1360	See Par ID 1362	Varies	0.00	1409	
P5.30 ②	PID2 Superv Lower Limit	See Par ID 1360	See Par ID 1362	Varies	0.00	1411	
P5.31 ②	PID2 Superv Delay	0	3000	s	0	1413	
P5.32 ②	RO1 On Delay	0.0	320.0	s	0.0	2112	
P5.33 ②	RO1 Off Delay	0.0	320.0	s	0.0	2113	
P5.34 ②	RO2 On Delay	0.0	320.0	s	0.0	2114	
P5.35 ②	RO2 Off Delay	0.0	320.0	s	0.0	2115	
P5.36 ②	RO3 On Delay	0.0	320.0	s	0.0	2116	
P5.37 ②	RO3 Off Delay	0.0	320.0	s	0.0	2117	
P5.38 ②	RO3 Reverse				0	2118	0 = No 1 = Yes
P5.39 ②	Motor Current 1 Supv				0	2189	See Par ID 159
P5.40 ②	Motor Current 1 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190	
P5.41 ②	Motor Current 2 Supv				0	2191	See Par ID 159
P5.42 ②	Motor Current 2 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192	
P5.43 ②	Second AI Supv Select				0	2193	See Par ID 170
P5.44 ②	Second AI Limit Supv				0	2194	See Par ID 161
P5.45 ②	Second AI Limit Supv Val	0.00	100.00	%	0.00	2195	
P5.46 ②	Motor Current 1 Supv Hyst	0.1	1.0	A	0.1	2196	
P5.47 ②	Motor Current 2 Supv Hyst	0.1	1.0	A	0.1	2197	
P5.48 ②	AI Supv Hyst	1.00	10.00	%	1.00	2198	
P5.49 ②	Second AI Supv Hyst	1.00	10.00	%	1.00	2199	
P5.50 ②	Freq Limit 1 Supv Hyst	0.10	1.00	Hz	0.10	2200	
P5.51 ②	Freq Limit 2 Supv Hyst	0.10	1.00	Hz	0.10	2201	
P5.52 ②	Torque Limit Supv Hyst	1.0	5.0	%	1.0	2202	
P5.53 ②	Ref Limit Supv Hyst	0.10	1.00	Hz	0.10	2203	
P5.54 ②	Temp Limit Supv Hyst	1.0	10.0	°C	1.0	2204	
P5.55 ②	Power Limit Supv Hyst	0.1	10.0	%	0.1	2205	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 160. Logic Function—P6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.1 ②	Logic Function Select				0	751	0 = AND 1 = OR 2 = XOR
P6.2 ②	Logic Operation Input A				0	752	0 = Not Used 1 = Ready 2 = Run 3 = Fault 6 = Reversed 7 = Warning 8 = Zero Frequency 9 = Control from I/O 14 = Run Bypass/Drive 15 = Ext Brake Control 16 = In Bypass Mode 17 = At Speed 18 = Remote Control 19 = Freq Limit 1 Superv 20 = Freq Limit 2 Superv 22 = PID1 Superv 23 = PID2 Superv 24 = OverHeat Fault 28 = 4mA Ref Fault/ Warning 29 = OverCurrent Regular 30 = OverVoltage Regular 31 = UnderVoltage Regular 32 = Torq Limit Superv 33 = Ref Limit Superv 34 = Un-Requested Rotation Direction 35 = Thermal Fault/ Warning 36 = Bypass Enable 37 = Jog Speed Select 38 = Motor Therm Protection 39 = FB Digital Input 1 40 = FB Digital Input 2 41 = FB Digital Input 3 42 = FB Digital Input 4 43 = Damper Control 44 = TC1 Status 45 = TC2 Status 46 = TC3 Status 47 = In E-Stop 48 = Power Limit Superv 49 = Temp Limit Superv 50 = Analog Input Superv 51 = Motor 1 Control 52 = Motor 2 Control 53 = Motor 3 Control 54 = Motor 4 Control 55 = Motor 5 Control 56 = Logic Fulfilled
P6.3 ②	Logic Operation Input B				0	753	See Par ID 752

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 161. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See Par ID 135
P7.2 ①②	Remote 2 Reference				7	139	See Par ID 136
P7.3 ②	Keypad Reference	See Par ID 101	See Par ID 102	Hz	0.00	141	
P7.4 ②	Keypad Direction				0	116	0 = Forward 1 = Reverse
P7.5 ②	Keypad Stop				1	114	0 = Enabled-Keypad Operation 1 = Always Enabled
P7.6 ②	Jog Reference	0.00	See Par ID 102	Hz	5.00	117	
P7.7 ②	Motor Pot Ramp Time	0.1	2000.0	Hz/s	10.0	156	
P7.8 ②	Motor Pot Ref Reset				0	169	0 = No Reset 1 = Reset: Stop + Power Down 2 = Reset: Power Down
P7.9 ②	Start Mode				0	252	0 = Ramp 1 = Flying Start From Stop Frequency 2 = Flying Start From Max Frequency
P7.10 ②	Stop Mode				1	253	0 = Coasting 1 = Ramp
P7.11 ②	Ramp 1 Shape	0.0	10.0	s	0.0	247	
P7.12 ②	Ramp 2 Shape	0.0	10.0	s	0.0	248	
P7.13 ②	Accel Time 2	0.1	3000.0	s	10.0	249	
P7.14 ②	Decel Time 2	0.1	3000.0	s	10.0	250	
P7.15 ②	Skip F1 Low Limit	0.00	See Par ID 257	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	See Par ID 256	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	See Par ID 259	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	See Par ID 258	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	See Par ID 261	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	See Par ID 260	400.00	Hz	0.00	261	
P7.21 ②	Skip Range Ramp Factor	0.1	10.0		1.0	264	
P7.22 ②	Power Loss Function				0	267	See Par ID 2462
P7.23 ②	Power Loss Time	0.3	5.0	s	2.0	268	
P7.24 ②	Currency				0	2122	0 = $ 1 = £ 2 = € 3 = ¥ 4 = Rs 5 = R$ 6 = Fr 7 = kr
P7.25 ②	Energy Cost			Varies	0.00	2123	
P7.26 ②	Data Type				0	2124	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P7.27	Energy Savings Reset					2125	0 = Not Reset 1 = Reset
P7.28 ①②	2th Stage Ramp Frequency	See Par ID 101	See Par ID 102	Hz	30.00	2444	
P7.29	Change PhaseSequence Motor				0	2515	0 = Change Disable 1 = Change Enable
P7.30 ②	Run Remove Stop Mode				0	2667	See Par ID 253

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 162. Motor Control—P8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.1 ①②	Motor Control Mode				0	287	0 = Freq Control 1 = Speed Control 5 = Open Loop Speed Control 6 = Open Loop Torque Control
P8.2 ①	Current Limit	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrVT	107	
P8.3 ①②	V/Hz Optimization				0	109	See Par ID 2462
P8.4 ①②	V/Hz Ratio				0	108	0 = Linear 1 = Squared 2 = Programmable 3 = Linear + Flux Optimization
P8.5 ①②	Field Weakening Point	8.00	400.00	Hz	FieldWeakPointMFG	289	
P8.6 ①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7 ①②	V/Hz Mid Frequency	0.00	See Par ID 289	Hz	VHzCurveMidFreqMFG	291	
P8.8 ①②	V/Hz Mid Voltage	0.00	100.00	%	100.00	292	
P8.9 ①②	Zero Frequency Voltage	0.00	40.00	%	0.00	293	
P8.10 ②	Switching Frequency	MinSwitchFreq	MaxSwitchFreq	kHz	DefaultSwitchFreqCT	2522	
P8.11 ②	Sine Filter Enable				0	1665	See Par ID 2462
P8.12 ①②	OverVoltage Control				3	294	0 = Disabled 1 = REF + 8Hz 2 = Max Freq 3 = Max Freq + 8Hz
P8.13 ②	Load Drooping	0.00	100.00	%	0.00	298	
P8.14	Identification				0	299	0 = No Action 1 = Identification Only Stator Resistor 2 = Identification with Run 3 = Identification No Run 4 = Identification Only Inertia
P8.15 ①②	Neg Frequency Limit	-400.00	See Par ID 1576	Hz	-400.00	1574	
P8.16 ①②	Pos Frequency Limit	See Par ID 1574	400.00	Hz	400.00	1576	
P8.17 ②	Frequency Ramp Out FilterTime Constant	0	3000	ms	0	1585	
P8.18 ②	Speed Error Filter Time Constant	0	3000	ms	0	1591	
P8.19 ②	Speed Error Band Stop Frequency	0.00	320.00	Hz	0.00	1592	
P8.20	Speed Control Kp0	0.0	1000.0	%		1593	
P8.21	Speed Control Ti0	0.0	3200.0	ms		1594	
P8.22 ②	Speed Control Kp At Field Weakening	0.0	1000.0	%	100.0	1595	
P8.23 ②	Speed Control Kp Below F0	0.0	1000.0	%	0.0	1596	
P8.24 ②	Speed Control F0	0.00	See Par ID 1598	Hz	5.00	1597	
P8.25 ②	Speed Control F1	See Par ID 1597	See Par ID 289	Hz	10.00	1598	
P8.26	Speed Control Kp1	0.0	1000.0	%		1599	
P8.27	Speed Control Ti1	0.0	3200.0	ms		1600	
P8.28 ②	Speed Control Kp Filter Time Constant	0	3000	ms	0	1601	
P8.29 ②	Motoring Torque Limit	0.0	300.0	%	300.0	1602	
P8.30 ②	Generator Torque Limit	0.0	300.0	%	300.0	1603	
P8.31 ②	Torque Limit Forward	0.0	300.0	%	300.0	1604	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 162. Motor Control—P8, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.32 ②	Torque Limit Reverse	0.0	300.0	%	300.0	1605	
P8.33 ②	Motoring Power Limit	0.0	300.0	%	300.0	1607	
P8.34 ②	Generator Power Limit	0.0	300.0	%	300.0	1608	
P8.35 ②	Acc Compensation Time Constant	0.0	1000.0	%	0.0	1611	
P8.36 ②	Acc Compensation Filter Time Constant	0	3000	ms	0	1612	
P8.37 ②	Flux Reference	0.0	500.0	%	100.0	1620	
P8.38 ②	Stop State Magnetisation	0.0	100.0	%	100.0	1621	
P8.39 ②	Start Boost Rise Time	0	32000	s	0	1622	
P8.40 ②	Flux Current Ramp Time	0	32000	ms	200	1623	
P8.41 ②	Zero Speed Start Time	0	32000	ms	100	1624	
P8.42 ②	Zero Speed Stop Time	0	32000	ms	100	1625	
P8.43 ②	Droop Control Filter Time Constant	0	3000	ms	0	1630	
P8.44 ②	Startup Torque Selection				0	1631	0 = Not Used 1 = TorqueMemory 2 = Reserve 3 = StartupTorque FWD/REV
P8.45 ②	Torque Memory Start	-300.0	300.0	%	0.0	1632	
P8.46 ②	Startup Torque Forward	-300.0	300.0	%	0.0	1633	
P8.47 ②	Startup Torque Reverse	-300.0	300.0	%	0.0	1634	
P8.48	Startup Torque Actual			%		1635	
P8.49 ②	Startup Torque Time	0	10000	ms	50	1667	
P8.50 ①	Stator Resistor	0.001	65.535	ohm	0.033	771	
P8.51 ①	Rotor Resistor	0.001	65.535	ohm	0.034	772	
P8.52 ①	Leak Inductance	0.01	655.35	mh	0.12	773	
P8.53 ①	Mutual Inductance	0.1	6553.5	mh	3.4	774	
P8.54 ①	Excitation Current	0.0	DriveNomCurrCT*2	A	0.0	775	
P8.55	VF Stable Kd	0	3000	%	100	1656	
P8.56	VF Stable Kq	0	3000	%	100	1657	
P8.57 ①②	Overmodulation Enable				0	2835	See Par ID 2462
P8.58 ①	Motor Inertia	0.001	65.535		0.100	2837	

Table 163. Protections—P9

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.1 ①②	4mA Input Fault				0	306	0 = No Action 1 = Warning 2 = Warning: Previous Freq 3 = Warning: Preset Freq 4 = Fault 5 = Fault, Coast
P9.2 ①②	4mA Fault Frequency	0.00	See Par ID 102	Hz	0.00	331	
P9.3 ①②	External Fault				2	307	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P9.4 ①②	Input Phase Fault				2	332	See Par ID 307
P9.5 ①②	Uvolt Fault Response				2	330	See Par ID 307
P9.6 ①②	Output Phase Fault				2	308	See Par ID 307
P9.7 ①②	Ground Fault				2	309	See Par ID 307

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 163. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.8 ①②	Motor Thermal Protection				2	310	See Par ID 307
P9.9 ②	Motor Thermal F0 Current	0.0	150.0	%	40.0	311	
P9.10 ②	Motor Thermal Time	1	200	min	45	312	
P9.11 ①②	Stall Protection				0	313	See Par ID 307
P9.12 ②	Stall Current Limit	0.1	ActiveMotor NomCurr*2	A	ActiveMotor NomCurr*13/10	314	
P9.13 ②	Stall Time Limit	1.0	120.0	s	15.0	315	
P9.14 ②	Stall Frequency Limit	1.00	See Par ID 102	Hz	25.00	316	
P9.15 ①②	Underload Protection				0	317	See Par ID 307
P9.16 ②	Underload Fnom Torque	10.0	150.0	%	50.0	318	
P9.17 ②	Underload F0 Torque	5.0	150.0	%	10.0	319	
P9.18 ②	Underload Time Limit	2.00	600.00	s	20.00	320	
P9.19 ①②	Thermistor Fault Response				2	333	See Par ID 307
P9.20 ②	Line Start Lockout				2	750	0 = Disabled, No Change 1 = Enable, No Change 2 = Disabled, Changed 3 = Enable, Changed
P9.21 ①②	Fieldbus Fault Response				2	334	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast 4 = Warning, Coast 5 = Warning, Auto Switch To Local 6 = Warning, Auto Switch To Preset Speed 1
P9.22 ①②	OPTCard Fault Response				2	335	See Par ID 307
P9.23 ①②	Unit Under Temp Prot				2	1564	See Par ID 307
P9.24 ②	AR Wait Time	1.00	300.00	s	1.00	321	
P9.25 ②	AR Trail Time	0.00	600.00	s	30.00	322	
P9.26 ②	AR Start Function				0	323	0 = Flying Start From Stop Frequency 1 = Ramp 2 = Flying Start From Max Frequency
P9.27 ②	Undervoltage Attempts	0	10		1	324	
P9.28 ②	OverVoltage Attempts	0	10		1	325	
P9.29 ②	OverCurrent Attempts	0	3		1	326	
P9.30 ②	4mA Fault Attempts	0	10		1	327	
P9.31 ②	Motor Temp Fault Attempts	0	10		1	329	
P9.32 ②	External Fault Attempts	0	10		1	328	
P9.33 ②	Underload Attempts	0	10		1	336	
P9.34 ①②	RTC Fault				1	955	See Par ID 307
P9.35 ①②	PT100 Fault Response				2	337	See Par ID 307
P9.36 ①②	Replace Battery Fault Response				1	1256	See Par ID 307
P9.37 ①②	Replace Fan Fault Response				1	1257	See Par ID 307
P9.38 ①②	IP Address Confliction Resp				1	1678	See Par ID 307
P9.39 ②	Cold Weather Mode				0	2126	See Par ID 2462
P9.40 ②	Cold Weather Volt. Level	0.0	20.0	%	2.0	2127	
P9.41 ②	Cold Weather Time Out	0	10	min	3	2128	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 163. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.42	Cold Weather Password					2129	
P9.43	Under Temp Fault Override					2130	See Par ID 2118
P9.44 ②	Ground Fault Limit	0	30	%	15	2158	
P9.45 ①②	Keypad Comm Fault Response				2	2157	See Par ID 307
P9.46 ②	Preheat Mode				0	2159	See Par ID 2462
P9.47 ②	Preheat Control Source				31	2160	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = SlotA PT100 Temp Channel 1 33 = SlotA PT100 Temp Channel 2 34 = SlotA PT100 Temp Channel 3 35 = SlotA Max PT100 Temp 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = SlotB Max PT100 Temp 40 = SlotA and SlotB Max PT100 Temp
P9.48 ②	Preheat Enter Temp	0.0	19.9	°C	10.0	2161	
P9.49 ②	Preheat Quit Temp	20.0	40.0	°C	20.0	2162	
P9.50 ②	Preheat Output Volt	0.0	20.0	%	2.0	2163	
P9.51 ①②	PID Feedback AI Loss Response				0	2401	0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Freq 4 = Warning: Analog->Net

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 163. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.52 ①②	PID Feedback AI Loss Pre Freq	0.00	400.00	Hz	0.00	2402	
P9.53 ②	PID Feedback AI Loss Pipe Fill Loss Level	0.0	1000.0	Varies	0.0	2403	
P9.54 ②	PID Feedback AI Loss PreFreq Timeout	0	6000	s	0	2404	
P9.55 ②	PID Feedback AI Loss Attempts	0	10		1	2405	
P9.56 ②	STO Fault Response				2	2427	0 = No Action 1 = Warning 2 = Fault
P9.57 ②	Fault Reset Start				0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset
P9.58	Warning Operation Mode				1	2657	0 = No Action 1 = Warning, No Store 2 = Warning, Store
P9.59 ②	Fan Protection				2	2664	See Par ID 307
P9.60	Under Voltage Trip Level	DCLinkUnderVolt StopLimit	DCLinkOverVolt StopLimit	V	DCLinkUnderVolt ProtectLimit	2666	
P9.61 ②	OP Cont Interlock Attempts	0	10		1	2803	
P9.62 ①②	OP Cont Interlock Protection				2	2831	See Par ID 307

Table 164. PID Controller 1—P10

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.1 ②	PID1 Control Gain	0.00	200.00	%	100.00	1294	
P10.2 ②	PID1 Control ITime	0.00	600.00	s	1.00	1295	
P10.3 ②	PID1 Control DTime	0.00	100.00	s	0.00	1296	
P10.4 ①②	PID1 Process Unit				0	1297	0 = % 1 = 1/min 2 = rpm 3 = ppm 4 = pps 5 = l/s 6 = l/min 7 = l/h 8 = kg/s 9 = kg/min 10 = kg/h 11 = m3/s 12 = m3/min 13 = m3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVS 20 = kW 21 = °C 22 = GPM 23 = gal/s 24 = gal/min 25 = gal/h 26 = lb/s 27 = lb/min 28 = lb/h

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 164. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.4 ①②, continued	PID1 Process Unit				0	1297	29 = CFM 30 = ft3/s 31 = ft3/min 32 = ft3/h 33 = ft/s 34 = in wg 35 = ft wg 36 = PSI 37 = lb/in2 38 = HP 39 = °F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m
P10.5 ②	PID1 Process Unit Min	-99999.99	See Par ID 1300	Varies	0.00	1298	
P10.6 ②	PID1 Process Unit Max	See Par ID 1298	99999.99	Varies	100.00	1300	
P10.7 ②	PID1 Process Unit Decimal	0	4		2	1302	
P10.8 ①②	PID1 Error Inversion				0	1303	See Par ID 181
P10.9 ②	PID1 Dead Band	0.00	99999.99	Varies	0.00	1304	
P10.10 ②	PID1 Dead Band Delay	0.00	320.00	s	0.00	1306	
P10.11 ②	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307	
P10.12 ②	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309	
P10.13 ②	PID1 Ramp Time	0.00	300.00	s	0.00	1311	
P10.14 ①②	PID1 Set Point 1 Source				1	1312	0 = Not Used 1 = PID1 Keypad Set Point 1 2 = PID1 Keypad Set Point 2 3 = AI1 4 = AI2 5 = Slot A: AI1 6 = Slot B: AI1 7 = FB Process Data Input 1 8 = FB Process Data Input 2 9 = FB Process Data Input 3 10 = FB Process Data Input 4 11 = FB Process Data Input 5 12 = FB Process Data Input 6 13 = FB Process Data Input 7 14 = FB Process Data Input 8 15 = PID2 Output 16 = Multi Drive Network 17 = FB PID1 Set Point 1 18 = FB PID1 Set Point 2
P10.15 ②	PID1 Set Point 1 Min	-200.00	200.00	%	0.00	1313	
P10.16 ②	PID1 Set Point 1 Max	-200.00	200.00	%	100.00	1314	
P10.17 ①②	PID1 Set Point 1 Sleep Enable				0	1315	See Par ID 2462
P10.18 ①②	PID1 Set Point 1 Sleep Unit Sel				0	2396	0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 164. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.19 ②	PID1 Set Point 1 Sleep Level			Varies	0.00	2450	
P10.20 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.21 ②	PID1 Set Point 1 Wake Up Level	-99999.99	99999.99	Varies	0.00	1318	
P10.22 ②	PID1 Set Point 1 Boost	-2.0	2.0		1.0	1320	
P10.23 ①②	PID1 Set Point 2 Source				2	1321	See Par ID 1312
P10.24 ②	PID1 Set Point 2 Min	-200.00	200.00	%	0.00	1322	
P10.25 ②	PID1 Set Point 2 Max	-200.00	200.00	%	100.00	1323	
P10.26 ①②	PID1 Set Point 2 Sleep Enable				0	1324	See Par ID 2462
P10.27 ①②	PID1 Set Point 2 Sleep Unit Sel				0	2397	See Par ID 2396
P10.28 ②	PID1 Set Point 2 Sleep Level			Varies	0.00	2452	
P10.29 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.30 ②	PID1 Set Point 2 Wake Up Level	-99999.99	99999.99	Varies	0.00	1327	
P10.31 ②	PID1 Set Point 2 Boost	-2.0	2.0		1.0	1329	
P10.32 ①②	PID1 Feedback Function				0	1330	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1 - Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1 - Source 2 6 = MIN(Source 1, Source 2) 7 = MAX(Source 1, Source 2) 8 = MEAN(Source1, Source2) 9 = Source1*Source2
P10.33 ②	PID1 Feedback Gain	-1000.0	1000.0	%	100.0	1331	
P10.34 ①②	PID1 Feedback 1 Source				2	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 14 = PID2 Output

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 164. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.34 ①②, continued	PID1 Feedback 1 Source				2	1332	15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID1 Feedback 1 22 = FB PID1 Feedback 2
P10.35 ②	PID1 Feedback 1 Min	-200.00	200.00	%	0.00	1333	
P10.36 ②	PID1 Feedback 1 Max	-200.00	200.00	%	100.00	1334	
P10.37 ①②	PID1 Feedback 2 Source				0	1335	See Par ID 1332
P10.38 ②	PID1 Feedback 2 Min	-200.00	200.00	%	0.00	1336	
P10.39 ②	PID1 Feedback 2 Max	-200.00	200.00	%	100.00	1337	
P10.40 ①②	PID1 Feedforward Func				0	1338	See Par ID 1330
P10.41 ②	PID1 Feedforward Gain	-1000.0	1000.0	%	100.0	1339	
P10.42 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 14 = PID2 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID1 Feedforward 1 22 = FB PID1 Feedforward 2
P10.43 ②	PID1 Feedforward 1 Min	-200.00	200.00	%	0.00	1341	
P10.44 ②	PID1 Feedforward 1 Max	-200.00	200.00	%	100.00	1342	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 164. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.45 ①②	PID1 Feedforward 2 Source				0	1343	See Par ID 1340
P10.46 ②	PID1 Feedforward 2 Min	-200.00	200.00	%	0.00	1344	
P10.47 ②	PID1 Feedforward 2 Max	-200.00	200.00	%	100.00	1345	
P10.48 ②	PID1 Set Point 1 Comp Enable				0	1352	See Par ID 2462
P10.49 ②	PID1 Set Point 1 Comp Max	-200.00	200.00	%	0.00	1353	
P10.50 ②	PID1 Set Point 2 Comp Enable				0	1354	See Par ID 2462
P10.51 ②	PID1 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1355	
P10.52 ②	PID1 Wake Up Action				0	2466	0 = Below Wake Up Level 1 = Above Wake Up Level 2 = Below Wake Up Level(PID ref.) 3 = Above Wake Up Level(PID ref.)
P10.53	FB PID1 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2542	
P10.54	FB PID1 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2544	
P10.55	FB PID1 Feedback 1			%		2550	
P10.56	FB PID1 Feedback 2			%		2551	
P10.57	FB PID1 Feedforward 1			%		2554	
P10.58	FB PID1 Feedforward 2			%		2555	
P10.59 ②	PID1 Sleep Boost level	-9999	9999	Varies	0	2660	
P10.60 ②	PID1 Sleep Boost Max Time	1	300	s	30	2661	
P10.61 ②	PID1 Low Feedback Level	0.0	6000.0	Varies	0.0	2811	
P10.62 ②	PID1 Low Feedback Time	0	3600	s	10	2812	
P10.63 ①②	PID1 Low Feedback Protection				0	2813	See Par ID 307
P10.64 ②	PID1 High Feedback Level	0.0	6000.0	Varies	150.0	2814	
P10.65 ②	PID1 High Feedback Time	0	3600	s	5	2815	
P10.66 ①②	PID1 High Feedback Protection				0	2816	See Par ID 307
P10.67 ①②	PID1 Hysteresis Level	0.0	100.0	Varies	0.0	2817	
P10.68 ②	PID1 Backup Feedback Source				0	2825	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 165. PID Controller 2—P11

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.1 ②	PID2 Control Gain	0.00	200.00	%	100.00	1356	
P11.2 ②	PID2 Control I Time	0.00	600.00	s	1.00	1357	
P11.3 ②	PID2 Control D Time	0.00	100.00	s	0.00	1358	
P11.4 ①②	PID2 Process Unit				0	1359	See Par ID 1297
P11.5 ②	PID2 Process Unit Min	-99999.99	See Par ID 1362	Varies	0.00	1360	
P11.6 ②	PID2 Process Unit Max	See Par ID 1360	99999.99	Varies	100.00	1362	
P11.7 ②	PID2 Process Unit Decimal	0	4		2	1364	
P11.8 ①②	PID2 Error Inversion				0	1365	See Par ID 181
P11.9 ②	PID2 Dead Band	0.00	99999.99	Varies	0.00	1366	
P11.10 ②	PID2 Dead Band Delay	0.00	320.00	s	0.00	1368	
P11.11 ②	PID2 Keypad Set Point 1	See Par ID 1360	See Par ID 1362	Varies	0.00	1369	
P11.12 ②	PID2 Keypad Set Point 2	See Par ID 1360	See Par ID 1362	Varies	0.00	1371	
P11.13 ②	PID2 Ramp Time	0.00	300.00	s	0.00	1373	
P11.14 ①②	PID2 Set Point 1 Source				1	1374	0 = Not Used 1 = PID2 Keypad Set Point 1 2 = PID2 Keypad Set Point 2 3 = AI1 4 = AI2 5 = Slot A: AI1 6 = Slot B: AI1 7 = FB Process Data Input 1 8 = FB Process Data Input 2 9 = FB Process Data Input 3 10 = FB Process Data Input 4 11 = FB Process Data Input 5 12 = FB Process Data Input 6 13 = FB Process Data Input 7 14 = FB Process Data Input 8 15 = PID1 Output 16 = Multi Drive Network 17 = FB PID2 Set Point 1 18 = FB PID2 Set Point 2
P11.15 ②	PID2 Set Point 1 Min	-200.00	200.00	%	0.00	1375	
P11.16 ②	PID2 Set Point 1 Max	-200.00	200.00	%	100.00	1376	
P11.17 ①②	PID2 Set Point 1 Sleep Enable				0	1377	See Par ID 2462
P11.18 ①②	PID2 Set Point 1 Sleep Unit Sel				0	2398	0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID2 Feedback
P11.19 ②	PID2 Set Point 1 Sleep Level			Varies	0.00	2454	
P11.20 ②	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379	
P11.21 ②	PID2 Set Point 1 WakeUp Level	-99999.99	99999.99	Varies	0.00	1380	
P11.22 ②	PID2 Set Point 1 Boost	-2.0	2.0		1.0	1382	
P11.23 ①②	PID2 Set Point 2 Source				2	1383	See Par ID 1374
P11.24 ②	PID2 Set Point 2 Min	-200.00	200.00	%	0.00	1384	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 165. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.25 ②	PID2 Set Point 2 Max	-200.00	200.00	%	100.00	1385	
P11.26 ①②	PID2 Set Point 2 Sleep Enable				0	1386	See Par ID 2462
P11.27 ①②	PID2 Set Point 2 Sleep Unit Sel				0	2399	See Par ID 2398
P11.28 ②	PID2 Set Point 2 Sleep Level			Varies	0.00	2456	
P11.29 ②	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388	
P11.30 ②	PID2 Set Point 2 WakeUp Level	-99999.99	99999.99	Varies	0.00	1389	
P11.31 ②	PID2 Set Point 2 Boost	-2.0	2.0		1.0	1391	
P11.32 ①②	PID2 Feedback Func				0	1392	See Par ID 1330
P11.33 ②	PID2 Feedback Gain	-1000.0	1000.0	%	100.0	1393	
P11.34 ①②	PID2 Feedback 1 Source				2	1394	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 14 = PID1 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID2 Feedback 1 22 = FB PID2 Feedback 2
P11.35 ②	PID2 Feedback 1 Min	-200.00	200.00	%	0.00	1395	
P11.36 ②	PID2 Feedback 1 Max	-200.00	200.00	%	100.00	1396	
P11.37 ①②	PID2 Feedback 2 Source				0	1397	See Par ID 1394
P11.38 ②	PID2 Feedback 2 Min	-200.00	200.00	%	0.00	1398	
P11.39 ②	PID2 Feedback 2 Max	-200.00	200.00	%	100.00	1399	
P11.40 ①②	PID2 Feedforward Func				0	1400	See Par ID 1330
P11.41 ②	PID2 Feedforward Gain	-1000.0	1000.0	%	100.0	1401	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 165. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.42 ①②	PID2 Feedforward 1 Source				0	1402	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 14 = PID1 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID2 Feedforward 1 22 = FB PID2 Feedforward 2
P11.43 ②	PID2 Feedforward 1 Min	-200.00	200.00	%	0.00	1403	
P11.44 ②	PID2 Feedforward 1 Max	-200.00	200.00	%	100.00	1404	
P11.45 ①②	PID2 Feedforward 2 Source				0	1405	See Par ID 1402
P11.46 ②	PID2 Feedforward 2 Min	-200.00	200.00	%	0.00	1406	
P11.47 ②	PID2 Feedforward 2 Max	-200.00	200.00	%	100.00	1407	
P11.48 ②	PID2 Set Point1 Comp Enable				0	1414	See Par ID 2462
P11.49 ②	PID2 Set Point1 Comp Max	-200.00	200.00	%	0.00	1415	
P11.50 ②	PID2 Set Point 2 Comp Enable				0	1416	See Par ID 2462
P11.51 ②	PID2 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1417	
P11.52 ②	PID2 Wake Up Action				0	2467	See Par ID 2466
P11.53	FB PID2 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2546	
P11.54	FB PID2 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2548	
P11.55	FB PID2 Feedback 1			%		2552	
P11.56	FB PID2 Feedback 2			%		2553	
P11.57	FB PID2 Feedforward 1			%		2556	
P11.58	FB PID2 Feedforward 2			%		2557	
P11.59 ②	PID2 Sleep Boost level	-9999	9999	Varies	0	2662	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 165. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.60 ②	PID2 Sleep Boost Max Time	1	300	s	30	2663	
P11.61 ②	PID2 Low Feedback Level	0.0	6000.0	Varies	0.0	2818	
P11.62 ②	PID2 Low Feedback Time	0	3600	s	10	2819	
P11.63 ①②	PID2 Low Feedback Protection				0	2820	See Par ID 307
P11.64 ②	PID2 High Feedback Level	0.0	6000.0	Varies	150.0	2821	
P11.65 ②	PID2 High Feedback Time	0	3600	s	5	2822	
P11.66 ①②	PID2 High Feedback Protection				0	2823	See Par ID 307
P11.67 ①②	PID2 Hysteresis Level	0.0	100.0	Varies	0.0	2824	
P11.68 ②	PID2 Backup Feedback Source				0	2826	See Par ID 2825

Table 166. Preset Speed—P12

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1 ②	Preset Speed 1	0.00	See Par ID 102	Hz	5.00	105	
P12.2 ②	Preset Speed 2	0.00	See Par ID 102	Hz	10.00	106	
P12.3 ②	Preset Speed 3	0.00	See Par ID 102	Hz	15.00	118	
P12.4 ②	Preset Speed 4	0.00	See Par ID 102	Hz	20.00	119	
P12.5 ②	Preset Speed 5	0.00	See Par ID 102	Hz	25.00	120	
P12.6 ②	Preset Speed 6	0.00	See Par ID 102	Hz	30.00	121	
P12.7 ②	Preset Speed 7	0.00	See Par ID 102	Hz	35.00	122	

Table 167. Torque Control—P13

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.1 ②	Torque Limit	0.0	400.0	%	400.0	295	
P13.2 ②	Torque Ref Select				0	303	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = AI1 Joystick 6 = AI2 Joystick 7 = Keypad Torque Ref 8 = FB Process Data Input 1 9 = PID1 Control Output 10 = PID2 Control Output 11 = FB Torque Ref
P13.3	Keypad Torque Ref	-300.0	300.0	%	0.0	782	
P13.4 ②	Torque Ref Max	-300.0	300.0	%	100.0	304	
P13.5 ②	Torque Ref Min	-300.0	300.0	%	0.0	305	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 167. Torque Control—P13, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.6 ②	Speed Limiter Mode				0	1666	0 = NegFreqMax ... PosFreqMax 1 = -|FreqRampOut| ... +|FreqRampOut| 2 = NegFreqMax ... FreqRampout(MIN) 3 = FreqRampOut ... PosFreqMax(MAX) 4 = FreqRampOut ± WindowPos/NegWidth 5 = 0 ... FreqRampOut(pos or neg direction) 6 = FreqRamp ± WindowPos/Neg/PosOff/NegOff
P13.7 ②	Window Pos Width	0.00	50.00	Hz	2.00	1636	
P13.8 ②	Window Neg Width	0.00	50.00	Hz	2.00	1637	
P13.9 ②	Window Pos Off Limit	0.00	See Par ID 1636	Hz	0.00	1638	
P13.10 ②	Window Neg Off Limit	0.00	See Par ID 1637	Hz	0.00	1639	
P13.11 ②	Torque Reference Filter TC	0	32000	ms	0	1640	
P13.12 ②	Pull Out Torque	0.0	1000.0	%	250.0	1606	
P13.13 ①	Stop State Magnetisation Time	0	32000	s	0	1684	
P13.14	FB Torque Ref	-300.0	300.0	%		2541	

Table 168. Brake—P14

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P14.1 ①②	DC-Brake Current	Drive NomCurrCT*15/100	Drive NomCurrCT*15/10	A	DriveNomCurrCT*1/2	254	
P14.2 ①②	Start DC-Brake Time	0.00	600.00	s	0.00	263	
P14.3 ①②	Stop DC-Brake Frequency	0.10	10.00	Hz	1.50	262	
P14.4 ①②	Stop DC-Brake Time	0.00	600.00	s	0.00	255	
P14.5 ①②	Brake Chopper Mode				0	251	0 = Disabled 1 = B(Run) T(Rdy) 2 = External 3 = B(Rdy) T(Rdy) 4 = B(Run) T(No)
P14.6 ①②	Flux Brake				0	266	0 = Off 1 = On
P14.7 ①②	Flux Brake Current	ActiveMotor NomCurr*1/10	See Par ID 107	A	ActiveMotorNomCurr*1/2	265	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 169. Fire Mode—P15

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P15.1 ①②	Fire Mode Function				0	535	0 = Closing Contact 1 = Opening Contact
P15.2 ①②	Fire Mode Ref Select Function				0	536	0 = Fire Mode Min Frequency 1 = Fire Mode Ref 2 = Fieldbus Ref 3 = AI1 4 = AI2 5 = AI1 + AI2 6 = PID1 Control Output 7 = PID2 Control Output
P15.3 ②	Fire Mode Frequency	See Par ID 101	See Par ID 102	Hz	60.00	537	
P15.4 ②	Fire Mode % Speed Ref 1	0.0	100.0	%	75.0	565	
P15.5 ②	Fire Mode % Speed Ref 2	0.0	100.0	%	100.0	564	
P15.6 ①②	Smoke Purge Frequency	0.0	100.0	%	50.0	554	
P15.7	Fire Mode Test Enable					2443	See Par ID 2462

Table 170. Second Motor Parameter—P16

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P16.1 ①	Motor Nom Current 2	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT	577	
P16.2 ①	Motor Nom Speed 2	300	20000	rpm	SecdMotorNomSpeedMFG	578	
P16.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P16.4 ①	Motor Nom Volt 2	180	690	V	SecdMotorNomVoltMFG	580	
P16.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	SecdMotorNomFreqMFG	581	
P16.6 ①	Stator Resistor 2	0.001	65.535	ohm	0.033	1419	
P16.7 ①	Rotor Resistor 2	0.001	65.535	ohm	0.034	1420	
P16.8 ①	Leak Inductance 2	0.01	655.35	mh	0.12	1421	
P16.9 ①	Mutual Inductance 2	0.1	6553.5	mh	3.4	1422	
P16.10 ①	Excitation Current 2	0.0	DriveNomCurrCT*2	A	0.0	1423	
P16.11 ①	Motor Inertia2	0.001	65.535		0.100	2838	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Bypass

Table 171. Basic Setting—P17.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1.1 ①②	Bypass Enable				0	1418	See Par ID 2462
P17.1.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.1.3 ①②	Auto Bypass				0	542	See Par ID 2462
P17.1.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.1.5 ①②	OverCurrent Bypass Enable				0	547	See Par ID 2462
P17.1.6 ①②	IGBT Fault Bypas Enable				0	546	See Par ID 2462
P17.1.7 ①②	4mA Fault Bypass Enable				0	548	See Par ID 2462
P17.1.8 ①②	UnderVoltage Bypass Enable				0	545	See Par ID 2462
P17.1.9 ①②	OverVoltage Bypass Enable				0	549	See Par ID 2462
P17.1.10 ①②	Motor OverTemp Bypass Enable				0	1698	See Par ID 2462
P17.1.11 ①②	UnderLoad Bypass Enable				0	1699	See Par ID 2462
P17.1.12 ①②	External Bypass Enable				0	1700	See Par ID 2462
P17.1.13 ①②	Charge Switch Fault Bypass Enable				0	1701	See Par ID 2462
P17.1.14 ①②	Saturation Trip Fault Bypass Enable				0	1702	See Par ID 2462
P17.1.15 ①②	Under Temp Fault Bypass Enable				0	1703	See Par ID 2462
P17.1.16 ①②	EEPROM Fault Bypass Enable				0	1704	See Par ID 2462
P17.1.17 ①②	FRAM Fault Bypass Enable				0	1705	See Par ID 2462
P17.1.18 ①②	Watchdog Fault Bypass Enable				0	1706	See Par ID 2462
P17.1.19 ①②	Fan Cooling Fault Bypass Enable				0	1707	See Par ID 2462
P17.1.20 ①②	Keypad Com Fault Bypass Enable				0	1708	See Par ID 2462
P17.1.21 ①②	Option Card Fault Bypass Enable				0	1709	See Par ID 2462
P17.1.22 ①②	RTC Clock Fault Bypass Enable				0	1710	See Par ID 2462
P17.1.23 ①②	Ctrl Board OverTemp Fault Bypass Enable				0	1711	See Par ID 2462
P17.1.24 ①②	Fieldbus Fault Bypass Enable				0	1713	See Par ID 2462
P17.1.25 ①②	Op Cont Interlock Fault Bypass Enable				0	2832	See Par ID 2462

Table 172. Redundant Drive—P17.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.2.1 ①②	Redundant Drive Enable				0	2476	See Par ID 2462
P17.2.2 ①②	Drive ID	0	5		0	2278	
P17.2.3 ②	Redundant Run Time Enable				0	2477	See Par ID 2462
P17.2.4	Redundant Run Time Reset					2478	See Par ID 2125
P17.2.5 ②	Redundant RunTime Limit	0.0	300000.0	h	0.0	2479	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Pump parameters

Table 173. Basic Setting—P18.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.1 ①②	Multi-pump Mode				0	2279	0 = Disabled 1 = Single Drive Control 2 = Multi Drive Network
P18.1.2 ①②	Drive ID	0	5		0	2278	
P18.1.3 ②	PID Bandwidth	0.00	6000.00	Varies	10.00	2458	
P18.1.4 ①②	Staging Frequency	See Par ID 101	400.00		50.00	2315	
P18.1.5 ①②	De-Staging Frequency	0.00	See Par ID 102		0.00	2316	
P18.1.6 ②	Add/Remove Delay	0	3600	s	10	344	
P18.1.7 ②	Interlock Enable				0	350	See Par ID 2462
P18.1.8 ①②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.1.9 ①②	Damper Time Out	1	32500	s	5	484	
P18.1.10 ①②	Damper Delay	1	32500	s	5	485	
P18.1.11 ②	Derag Cycles	0	10		3	2468	
P18.1.12 ②	Derag at Start/Stop				0	2469	0 = Off 1 = Start 2 = Stop 3 = Start and Stop 4 = Digital Input
P18.1.13 ②	Deragging Run Time	0	3600	s	0	2470	
P18.1.14 ②	Derag Speed	See Par ID 101	See Par ID 102	Hz	5.00	2471	
P18.1.15 ②	Derag Off Delay	1	600	s	10	2472	
P18.1.16 ①②	Multi-pump Mode 2				0	2659	See Par ID 2279

Multi-pump status

Table 174. Operation Mode—P18.2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.1.1	Drive 1					2218	0 = Offline 1 = Slave Drive 2 = Master Drive 3 = Redundant Drive
P18.2.1.2	Drive 2					2230	See Par ID 2218
P18.2.1.3	Drive 3					2242	See Par ID 2218
P18.2.1.4	Drive 4					2254	See Par ID 2218
P18.2.1.5	Drive 5					2266	See Par ID 2218

Table 175. Multi-Pump Status—P18.2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.2.1	Drive 1				5	2219	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.2	Drive 2				5	2231	See Par ID 2219
P18.2.2.3	Drive 3				5	2243	See Par ID 2219
P18.2.2.4	Drive 4				5	2255	See Par ID 2219
P18.2.2.5	Drive 5				5	2267	See Par ID 2219

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 176. Network Status—P18.2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.3.1	Drive 1					2220	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.2	Drive 2					2232	See Par ID 2220
P18.2.3.3	Drive 3					2244	See Par ID 2220
P18.2.3.4	Drive 4					2256	See Par ID 2220
P18.2.3.5	Drive 5					2268	See Par ID 2220

Multi-pump measurement

Table 177. Latest Fault Code—P18.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.1.1	Drive 1					2221	
P18.3.1.2	Drive 2					2233	
P18.3.1.3	Drive 3					2245	
P18.3.1.4	Drive 4					2257	
P18.3.1.5	Drive 5					2269	

Table 178. Output Frequency—P18.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.2.1	Drive 1			Hz		2222	
P18.3.2.2	Drive 2			Hz		2234	
P18.3.2.3	Drive 3			Hz		2246	
P18.3.2.4	Drive 4			Hz		2258	
P18.3.2.5	Drive 5			Hz		2270	

Table 179. Motor Voltage—P18.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.3.1	Drive 1			V		2223	
P18.3.3.2	Drive 2			V		2235	
P18.3.3.3	Drive 3			V		2247	
P18.3.3.4	Drive 4			V		2259	
P18.3.3.5	Drive 5			V		2271	

Table 180. Motor Current—P18.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.4.1	Drive 1			A		2224	
P18.3.4.2	Drive 2			A		2236	
P18.3.4.3	Drive 3			A		2248	
P18.3.4.4	Drive 4			A		2260	
P18.3.4.5	Drive 5			A		2272	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 181. Motor Torque—P18.3.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.5.1	Drive 1			%		2225	
P18.3.5.2	Drive 2			%		2237	
P18.3.5.3	Drive 3			%		2249	
P18.3.5.4	Drive 4			%		2261	
P18.3.5.5	Drive 5			%		2273	

Table 182. Motor Power—P18.3.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.6.1	Drive 1			%		2226	
P18.3.6.2	Drive 2			%		2238	
P18.3.6.3	Drive 3			%		2250	
P18.3.6.4	Drive 4			%		2262	
P18.3.6.5	Drive 5			%		2274	

Table 183. Motor Speed—P18.3.7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.7.1	Drive 1			rpm		2227	
P18.3.7.2	Drive 2			rpm		2239	
P18.3.7.3	Drive 3			rpm		2251	
P18.3.7.4	Drive 4			rpm		2263	
P18.3.7.5	Drive 5			rpm		2275	

Table 184. Run Time—P18.3.8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.8.1	Drive 1			h		2228	
P18.3.8.2	Drive 2			h		2240	
P18.3.8.3	Drive 3			h		2252	
P18.3.8.4	Drive 4			h		2264	
P18.3.8.5	Drive 5			h		2276	

Table 185. Multi-Pump Single Drive—P18.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.4.1 ①②	Number of Pumps	1	5		1	342	
P18.4.2 ②	Include Freq Converter				1	346	See Par ID 2462
P18.4.3 ②	Auto-Change Enable				0	345	See Par ID 2462
P18.4.4 ②	Auto-Change Interval	0.0	3000.0	h	48.0	347	
P18.4.5 ②	Auto-Change Freq Limit	See Par ID 101	See Par ID 102	Hz	25.00	349	
P18.4.6 ②	Auto-Change Pump Limit	0	5		1	348	
P18.4.7 ①②	Pipe Fill Aux Pump Select				0	2439	0 = Disabled 1 = Aux Motor 1 2 = Aux Motor 2 3 = Aux Motor 3 4 = Aux Motor 4
P18.4.8 ①②	Pipe Fill Aux Pump Run Time	0.0	3600.0	min	0.0	2440	
P18.4.9 ①②	Pipe Fill Aux Pump Operation				0	2441	0 = Automatic 1 = Stop
P18.4.10 ①②	Pipe Fill Aux Pump Delay	0.0	600.0	min	2.0	2442	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 186. Multi-Pump Multi Drive—P18.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.5.1 ①②	Number of Drives	1	5		1	2449	
P18.5.2 ①②	Regulation Source				0	2284	0 = Network Only 1 = PID Controller 1
P18.5.3 ①②	Recovery Method				0	2285	See Par ID 2441
P18.5.4 ①②	Callback Source				0	2286	0 = No Action 1 = Safety Torque Off
P18.5.5 ②	Add/Remove Drive Selection				0	2311	0 = Drive ID 1 = Run Time
P18.5.6 ②	Run Time Enable				0	2280	See Par ID 2462
P18.5.7 ②	Run Time Limit	0.0	300000.0	h	0.0	2281	
P18.5.8	Run Time Reset					2283	0 = No Action 1 = Reset
P18.5.9 ②	Master Drive Mode				0	2473	0 = Follow PID 1 = Fixed Speed 2 = Turn Off
P18.5.10 ②	Master Fixed Speed	See Par ID 101	See Par ID 102	Hz	50.00	2474	
P18.5.11 ②	Master Fixed Speed Delay	0	1000	s	5	2475	

Table 187. Protections—P18.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.6.1 ①②	Pipe Fill Loss Detection Method				0	2406	0 = Motor Current 1 = Motor Power 2 = Motor Torque
P18.6.2 ②	Pipe Fill Loss Level	0.0	1000.0	Varies	0.0	2407	
P18.6.3 ②	Pipe Fill Loss Time	0	600	s	0	2408	
P18.6.4 ①②	Pipe Fill Loss Frequency	0.00	See Par ID 102	Hz	0.00	2409	
P18.6.5 ①②	Pipe Fill Loss Response				0	2410	See Par ID 2427
P18.6.6 ②	Pipe Fill Loss Attempts	0	10		1	2411	
P18.6.7 ②	Prime Pump Enable				0	2428	See Par ID 190
P18.6.8 ②	Prime Pump Level	0.00	6000.00	Varies	0.00	2429	
P18.6.9 ②	Prime Pump Frequency	See Par ID 101	See Par ID 102	Hz	0.00	2431	
P18.6.10 ②	Prime Pump Delay Time	0.0	3600.0	min	0.0	2432	
P18.6.11 ②	Prime Pump Loss of Prime Level	0.0	1000.0	Varies	0.0	2433	
P18.6.12 ②	Prime Pump Level 2	0.00	6000.00	Varies	0.00	2434	
P18.6.13 ②	Prime Pump Frequency 2	See Par ID 101	See Par ID 102	Hz	0.00	2436	
P18.6.14 ②	Prime Pump Delay Time 2	0.0	3600.0	min	0.0	2437	
P18.6.15 ②	Prime Pump Loss of Prime Level 2	0.0	1000.0	Varies	0.0	2438	
P18.6.16 ①②	Broken Pipe Fault Response				0	1853	See Par ID 307
P18.6.17 ②	Broken Pipe Level	0.0	6000.0	Varies	15.0	1854	
P18.6.18 ②	Broken Pipe Delay	1.0	120.0	s	15.0	1855	
P18.6.19 ②	Broken Pipe Frequency	1.00	See Par ID 102	Hz	25.00	1856	
P18.6.20 ②	Jockey Pump Enable				0	2804	0 = Not Used 1 = PID Sleep 2 = PID Sleep(Level)
P18.6.21 ②	Jockey Start Level	-99999.99	See Par ID 2807	Varies	0.00	2805	
P18.6.22 ②	Jockey Stop Level	See Par ID 2805	99999.99	Varies	0.00	2807	
P18.6.23 ②	Lube Pump Enable				0	2809	See Par ID 2462
P18.6.24 ②	Lube Pump Time	0.0	300.0	s	0.0	2810	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 188. Real Time Clock—P19

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P19.1 ②	Interval 1 On Time				0,0,0	491	
P19.2 ②	Interval 1 Off Time				0,0,0	493	
P19.3 ②	Interval 1 From Day				0	517	0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday
P19.4 ②	Interval 1 To Day				0	518	See Par ID 517
P19.5 ②	Interval 1 Channel				0	519	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.6 ②	Interval 2 On Time				0,0,0	495	
P19.7 ②	Interval 2 Off Time				0,0,0	497	
P19.8 ②	Interval 2 From Day				0	520	See Par ID 517
P19.9 ②	Interval 2 To Day				0	521	See Par ID 517
P19.10 ②	Interval 2 Channel				0	522	See Par ID 519
P19.11 ②	Interval 3 On Time				0,0,0	499	
P19.12 ②	Interval 3 Off Time				0,0,0	501	
P19.13 ②	Interval 3 From Day				0	523	See Par ID 517
P19.14 ②	Interval 3 To Day				0	524	See Par ID 517
P19.15 ②	Interval 3 Channel				0	525	See Par ID 519
P19.16 ②	Interval 4 On Time				0,0,0	503	
P19.17 ②	Interval 4 Off Time				0,0,0	505	
P19.18 ②	Interval 4 From Day				0	526	See Par ID 517
P19.19 ②	Interval 4 To Day				0	527	See Par ID 517
P19.20 ②	Interval 4 Channel				0	528	See Par ID 519
P19.21 ②	Interval 5 On Time				0,0,0	507	
P19.22 ②	Interval 5 Off Time				0,0,0	509	
P19.23 ②	Interval 5 From Day				0	529	See Par ID 517
P19.24 ②	Interval 5 To Day				0	530	See Par ID 517
P19.25 ②	Interval 5 Channel				0	531	See Par ID 519
P19.26 ②	Timer 1 Duration	0	72000	s	0	511	
P19.27 ②	Timer 1 Channel				0	532	See Par ID 519
P19.28 ②	Timer 2 Duration	0	72000	s	0	513	
P19.29 ②	Timer 2 Channel				0	533	See Par ID 519
P19.30 ②	Timer 3 Duration	0	72000	s	0	515	
P19.31 ②	Timer 3 Channel				0	534	See Par ID 519
P19.32 ②	Interval 1 Setting				0	2487	0 = Weekly 1 = Daily
P19.33 ②	Interval 2 Setting				0	2488	See Par ID 2487
P19.34 ②	Interval 3 Setting				0	2489	See Par ID 2487
P19.35 ②	Interval 4 Setting				0	2490	See Par ID 2487
P19.36 ②	Interval 5 Setting				0	2491	See Par ID 2487

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Communication

Table 189. FB Process Data Input Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1 ②	FB Process Data Input 1 Sel	0	2663		2541	2533	
P20.1.2 ②	FB Process Data Input 2 Sel	0	See Par ID 2533		2542	2534	
P20.1.3 ②	FB Process Data Input 3 Sel	0	See Par ID 2533		2550	2535	
P20.1.4 ②	FB Process Data Input 4 Sel	0	See Par ID 2533		0	2536	
P20.1.5 ②	FB Process Data Input 5 Sel	0	See Par ID 2533		0	2537	
P20.1.6 ②	FB Process Data Input 6 Sel	0	See Par ID 2533		0	2538	
P20.1.7 ②	FB Process Data Input 7 Sel	0	See Par ID 2533		0	2539	
P20.1.8 ②	FB Process Data Input 8 Sel	0	See Par ID 2533		0	2540	

Table 190. FB Process Data Output Sel—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1 ②	FB Process Data Output 1 Sel				1	1556	
P20.2.2 ②	FB Process Data Output 2 Sel				2	1557	
P20.2.3 ②	FB Process Data Output 3 Sel				3	1558	
P20.2.4 ②	FB Process Data Output 4 Sel				4	1559	
P20.2.5 ②	FB Process Data Output 5 Sel				5	1560	
P20.2.6 ②	FB Process Data Output 6 Sel				6	1561	
P20.2.7 ②	FB Process Data Output 7 Sel				7	1562	
P20.2.8 ②	FB Process Data Output 8 Sel				28	1563	
P20.2.9 ②	Standard Status Word Bit0 Function Select				1	2415	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 11 = PID1 Superv 12 = PID2 Superv 13 = OverHeat Fault 14 = OverCurrent Regular 15 = OverVoltage Regular 16 = UnderVoltage Regular 17 = 4mA Ref Fault/ Warning 18 = Ext Brake Control 19 = Ext Brake Inverted 20 = Torq Limit Superv

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 190. FB Process Data Output Sel—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.9 ②, continued	Standard Status Word Bit0 Function Select				1	2415	21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Therm Protection 31 = FB Digital Input 1 32 = FB Digital Input 2 33 = FB Digital Input 3 34 = FB Digital Input 4 35 = Damper Control 36 = TC1 Status 37 = TC2 Status 38 = TC3 Status 39 = In E-Stop 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 43 = Motor 1 Control 44 = Motor 2 Control 45 = Motor 3 Control 46 = Motor 4 Control 47 = Motor 5 Control 48 = Logic Fulfilled 49 = PID1 Sleep 50 = PID2 Sleep 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 57 = Prime Pump Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = FieldBus_RTU_Fault,FieldBus RTU Fault 65 = FieldBus_TCP_Fault,FieldBus TCP Fault 66 = FieldBus_MSTP_Fault,FieldBus MSTP Fault 67 = FieldBus_EIP_Fault,FieldBus EIP Fault 68 = FieldBus_SlotA_Fault,FieldBus SlotA Fault 69 = FieldBus_SlotB_Fault,FieldBus SlotB Fault 70 = FieldBus SMDT Fault 71 = Jockey Pump Active 72 = Lube Pump Active 73 = PID1 Low Feedback 74 = PID1 High Feedback 75 = PID2 Low Feedback 76 = PID2 High Feedback

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 190. FB Process Data Output Sel—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.10 ②	Standard Status Word Bit1 Function Select				2	2416	See Par ID 2415
P20.2.11 ②	Standard Status Word Bit2 Function Select				3	2417	See Par ID 2415
P20.2.12 ②	Standard Status Word Bit3 Function Select				4	2418	See Par ID 2415
P20.2.13 ②	Standard Status Word Bit4 Function Select				5	2419	See Par ID 2415
P20.2.14 ②	Standard Status Word Bit5 Function Select				6	2420	See Par ID 2415
P20.2.15 ②	Standard Status Word Bit6 Function Select				7	2421	See Par ID 2415
P20.2.16 ②	Standard Status Word Bit7 Function Select				8	2422	See Par ID 2415

RS-485 bus

Table 191. Basic Setting—P20.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.1.1 ①	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP 2 = SWD

Table 192. Modbus RTU—P20.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.2.1 ①	Slave Address	1	247		1	587	
P20.3.2.2 ①	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.2.3 ①	Parity Type				2	585	0 = None 1 = Odd 2 = Even
P20.3.2.4	Modbus RTU Protocol Status					588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.3.2.5	Comm Timeout Modbus RTU	0	60000	ms	10000	593	
P20.3.2.6	Modbus RTU Fault Response				0	2516	0 = in Fieldbus Control 1 = in all Control

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 193. BACnet MS/TP—P20.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.1	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P20.3.3.2	MSTP MS/TP Device Address	0	127		1	595	
P20.3.3.3	MSTP Instance Number	0	4194302		0	596	
P20.3.3.4	MSTP Comm Timeout MSTP	0	60000	ms	10000	598	
P20.3.3.5	MSTP Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.3.3.6	MSTP Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud rate fault
P20.3.3.7	MSTP Fault Response				0	2526	See Par ID 2516
P20.3.3.8 ①	MSTP Max Master	1	127		127	1537	

Table 194. Terminal: SWD—P20.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.4.1 ②	Parameter Access				1	2630	0 = Local Control 1 = Fieldbus
P20.3.4.2 ①②	Process Data Access				4	2631	0 = Local Control 1 = Fieldbus 2 = Mixed Interface 4 = NET, Local on Fault 5 = Dual Mode
P20.3.4.3	Fault Situation Counter					2632	
P20.3.4.4	Board Status					2609	
P20.3.4.5	Firmware Version					2610	
P20.3.4.6	Protocol Status					2612	
P20.3.4.7	Operation Mode					2613	
P20.3.4.8 ②	PDP-Telegram Selection				1	2614	
P20.3.4.9	Fault Counter PDP				0	2615	
P20.3.4.10 ②	Fault Situations Max				8,8	2616	
P20.3.4.11 ②	PDP-Profil Number				809	2618	
P20.3.4.12	PDP-Control Word					2619	
P20.3.4.13 ②	PDP-Status Word				64	2620	
P20.3.4.14	PDP-MaxBlockLength				30	2621	
P20.3.4.15	PDP-NoOfMultiparameter				1	2622	
P20.3.4.16	PDP-MaxLatency				2	2623	
P20.3.4.17	PDP-DO Manufacturer				413	2624	
P20.3.4.18	PDP-DO Device Type				CONST_PROD_CODE	1451	
P20.3.4.19	PDP-DO FW-Interface				FIRMWARE_MAJOR_ NUM * 100 + FIRMWARE_ MINOR_NUM	2625	
P20.3.4.20	PDP-DO FW-Year					2626	
P20.3.4.21	PDP-DO FW-DayMonth					2627	
P20.3.4.22	PDP-DO NoOfDOs				1	2628	
P20.3.4.23	PDP-DO Subclass				1	2629	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 195. EtherNet/IP—P20.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.4.1 ①	IP Address Mode				0	1500	
P20.4.2	Active IP Address					1507	
P20.4.3	Active Subnet Mask					1509	
P20.4.4	Active Default Gateway					1511	
P20.4.5	MAC Address					1513	
P20.4.6 ①	Static IP Address				192.168.1.254	1501	
P20.4.7 ①	Static Subnet Mask				255.255.255.0	1503	
P20.4.8 ①	Static Default Gateway				192.168.1.1	1505	
P20.4.9	Ethernet IP Protocol Status					608	
P20.4.10	EIP Fault Response				0	2518	See Par ID 2516

Table 196. Modbus TCP—P20.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.5.1	Connection Limit				5	609	
P20.5.2	Modbus TCP Unit ID				1	610	
P20.5.3	Comm Timeout Modbus TCP	0	60000	ms	10000	611	
P20.5.4	Modbus TCP Protocol Status					612	See Par ID 599
P20.5.5	Modbus TCP Fault Response				0	2517	See Par ID 2516
P20.5.6	Modbus TCP Trusted IP Enable				1	74	See Par ID 2462
P20.5.7	Trusted IP White List				0xC0.0xA8.0x01.0xFF. 0x00.0x00.0x00.0x00. 0x00.0x00.0x00.0x00	68	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

System

Table 197. Basic Setting—P21.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.1	Language				0	340	
P21.1.2 ①	Application					142	
P21.1.3 ①	Parameter Sets					619	
P21.1.4	Up To Keypad					620	See Par ID 2118
P21.1.5 ①	Down From Keypad					621	
P21.1.6	Parameter Comparison					623	
P21.1.7	Password	0	9999		0	624	
P21.1.8	Parameter Lock				0	625	
P21.1.9	Multimonitor Set				0	627	
P21.1.10	Default Page				2	628	
P21.1.11	Timeout Time	0	65535	s	30	629	
P21.1.12	Contrast Adjust	5	18		12	630	
P21.1.13	Backlight Time	1	65535	min	10	631	
P21.1.14	Fan Control				1	632	
P21.1.15	Keypad ACK Timeout	200	5000	ms	200	633	
P21.1.16	Keypad Retry Number	1	10		5	634	
P21.1.17	Startup Wizard				0	626	
P21.1.18 ②	Jog Softkey Hidden				0	2412	See Par ID 2462
P21.1.19 ②	Reverse Softkey Hidden				0	2413	See Par ID 2462
P21.1.20 ②	Output Display Unit				45	2424	
P21.1.21 ②	Output Display Unit Min	-60000.00	See Par ID 2425	Varies	0.00	2460	
P21.1.22 ②	Output Display Unit Max	See Par ID 2460	60000.00	Varies	MotorNomFreqMFG	2425	
P21.1.23	Keypad Lock Password	0	9999		0	75	

Table 198. Version Info—P21.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.2.1	Keypad Software Version					640	
P21.2.2	Motor Control Software Version					642	
P21.2.3	Application Software Version					644	
P21.2.4	Software Bundle Version					1714	

Table 199. Application Info—P21.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.3.1	Brake Chopper Status					646	See Par ID 2118
P21.3.2	Brake Resistor Status					647	See Par ID 2118
P21.3.3	Serial Number					648	
P21.3.4	Power Unit Serail Number					1270	
P21.3.5	Control Unit Serial Number					1276	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 200. User Info—P21.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.4.1	Real Time Clock				0.0.0.1:1:13	566	
P21.4.2	Daylight Saving				0	582	
P21.4.3	Total MWh Count			Mwh		601	
P21.4.4	Total Power Day Count					603	
P21.4.5	Total Power Hr Count					606	
P21.4.6	Trip MWh Count			Mwh		604	
P21.4.7	Clear Trip MWh Count					635	See Par ID 2125
P21.4.8	Trip Power Day Count					636	
P21.4.9	Trip Power Hr Count					637	
P21.4.10	Clear Trip Power Count					639	See Par ID 2125

Table 201. Operate Mode—O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz		1	
O2	Freq Reference			Hz		24	
O3	Motor Speed			rpm		2	
O4	Motor Current			A		3	
O5	Motor Torque			%		4	
O6	Motor Power			%		5	
O7	Motor Voltage			V		6	
O8	DC-link Voltage			V		7	
O9	Unit Temperature			°C		8	
O10	Motor Temperature			%		9	
R11	Keypad Torque Ref	-300.0	300.0	%	0.0	782	
R12 ②	Keypad Reference	See Par ID 101	See Par ID 102	Hz	0.00	141	
R13 ②	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307	
R14 ②	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Appendix A—Description of parameters

On the following pages you will find the parameter descriptions arranged according to the parameter number.

Some parameter names are followed by a number code indicating the applications in which the parameter is included. See the list of applications below. The parameter numbers under which the parameter appears in different applications are also given.

Application level

1 Standard Application
2 Multi-Pump and Fan Application
3 Multi-PID Application
4 Multi-Purpose Application

Modbus ID	Code	Parameters	Application	RO/RW
1	**M1**	**Output Frequency** Drive Output frequency going to the motor. This value should match reference frequency when in frequency control mode.	**1, 2, 3, 4**	RO
24	**M2**	**Freq Reference** Drive frequency reference value, motor output frequency should match this value in frequency control mode.	**1, 2, 3, 4**	RO
2	**M3**	**Motor Speed** Motor speed calculated based off the V/Hz curve setup when entered motor parameters	**1, 2, 3, 4**	RO
3	**M4**	**Motor Current** Measured output motor current.	**1, 2, 3, 4**	RO
4	**M5**	**Motor Torque** Percent calculated motor torque based off the current draw of the motor and its nameplate values.	**1, 2, 3, 4**	RO
5	**M6**	**Motor Power** Percent calculated motor power based off the current and voltage draw of the motor and its nameplate values.	**1, 2, 3, 4**	RO
6	**M7**	**Motor Voltage** Measured output ac motor voltage.	**1, 2, 3, 4**	RO
7	**M8**	**DC-link Voltage** Measured DC bus voltage.	**1, 2, 3, 4**	RO
8	**M9**	**Unit Temperature** Measured drive heat sink temperature in deg C.	**1, 2, 3, 4**	RO
9	**M10**	**Motor Temperature** Calculated motor temperature value in Percentage. Value is based off motor name plate data and the motor status information take when power up.	**1, 2, 3, 4**	RO
15	**M11**	**Torque Reference** Torque reference percentage used when in torque control mode.	**4**	RO
10	**M12**	**Analog Input 1** Analog input 1 measured value, can be a current or voltage input signal.	**1, 2, 3, 4**	RO
11	**M13**	**Analog Input 2** Analog input 2 measured value, can be a current or voltage input signal.	**1, 2, 3, 4**	RO
25	**M14**	**Analog Output 1** Analog Output 1 measured value supplied from the drive, can be a current or voltage output signal.	**1, 2, 3, 4**	RO
575	**M15**	**Analog Output 2** Analog Output 2 measured value supplied from the drive, can be a current or voltage output signal.	**1, 2, 3, 4**	RO
12	**M16**	**DI1, DI2, DI3** Digital Input status.	**1, 2, 3, 4**	RO
13	**M17**	**DI4, DI5, DI6** Digital Input status.	**1, 2, 3, 4**	RO
576	**M18**	**DI7, DI8** Digital Input status.	**1, 2, 3, 4**	RO
14	**M19**	**DO1,Virtual RO1,Virtual RO2** Digital Output status. The Virtual RO1 and Virtual RO2 status are of internal relays in the control board not for external use.	**1, 2, 3, 4**	RO

Modbus ID	Code	Parameters	Application	RO/RW
557	M20	**RO1, RO2, RO3** Relay output status.	1, 2, 3, 4	RO
558	M21	**TC1, TC2, TC3** Timer channel status.	2, 3, 4	RO
559	M22	**Interval 1** Time interval 1 status.	2, 3, 4	RO
560	M23	**Interval 2** Time interval 2 status.	2, 3, 4	RO
561	M24	**Interval 3** Time interval 3 status.	2, 3, 4	RO
562	M25	**Interval 4** Time interval 4 status.	2, 3, 4	RO
563	M26	**Interval 5** Time interval 5 status.	2, 3, 4	RO
569	M27	**Timer 1** Timer 1 value in seconds.	2, 3, 4	RO
571	M28	**Timer 2** Timer 2 value in seconds.	2, 3, 4	RO
573	M29	**Timer 3** Timer 3 value in seconds.	2, 3, 4	RO
16	M30	**PID1 Set Point** PID1 reference value level.	2, 3, 4	RO
18	M31	**PID1 Feedback** PID1 actual value feedback level.	2, 3, 4	RO
20	M32	**PID1 Error Value** PID1 difference between set point and feedback value levels.	2, 3, 4	RO
22	M33	**PID1 Output** PID1 output percentage to the motor.	2, 3, 4	RO
23	M34	**PID1 Status** PID1 status indication, indicates if drive is stopped, running in PID mode, or in PID sleep mode.	2, 3, 4	RO
32	M35	**PID2 Set Point** PID2 reference value level.	3, 4	RO
34	M36	**PID2 Feedback** PID2 actual value feedback level.	3, 4	RO
36	M37	**PID2 Error Value** PID2 difference between set point and feedback value levels.	3, 4	RO
38	M38	**PID2 Output** PID2 output percentage to the motor.	3, 4	RO
39	M39	**PID2 Status** PID2 status indication, indicates if drive is stopped, running in PID mode, or in PID sleep mode.	3, 4	RO
26	M40	**Running Motors** Number of auxiliary motors currently running.	2, 3, 4	RO
27	M41	**PT100 Temperature** PT100 thermistor temperature value in deg C.	1, 2, 3, 4	RO
28	M42	**Latest Fault Code** Last Active Fault value. See fault codes for the value shown here.	1, 2, 3, 4	RO
583	M43	**RTC Battery Status** Real time clock battery status.	1, 2, 3, 4	RO
1686	M44	**Instant Motor Power** Measured Instantaneous motor power draw in kW.	1, 2, 3, 4	RO
2120	M45	**Energy Savings** Displays the Energy savings of the drive comparted to an across the line starter based off the standard motor name plate values.	1, 2, 3, 4	RO

Modbus ID	Code	Parameters	Application	RO/RW
2209	**M46**	**Control Board DIDO Status** Control Board DIDO Status provides the status of inputs and outputs on the control board. It is looking at DIN1 - Terminal 20, DIN2 - Terminal 21, DIN3 - Terminal 22, DIN4 - Terminal 23, DIN5 - Terminal 7, DIN6 - Terminal 8, DIN7 - Terminal 9, DIN8 - Terminal 10, DO1 - Terminal 14, RO1 - Terminal 28-29, RO2 - Terminal 32-34, RO3 - Terminal 27 and 31. Along with the onboard I/O being monitored it also provides status info on if there are boards in the A or B expander Board slots. Bit 0 = DIN1 Status Bit 1 = DIN2 Status Bit 2 = DIN3 Status Bit 3 = DIN4 Status Bit 4 = DIN5 Status Bit 5 = DIN6 Status Bit 6 = DIN7 Status Bit 7 = DIN8 Status Bit 8 = DO1 Status Bit 9 = RO1 Status Bit 10 = RO2 Status Bit 11 = RO3 Status Bit 12 = Slot A with Board Bit 13 = Slot B with Board Bit 14 -15 = Not used	**1, 2, 3, 4**	RO
2210	**M47**	**SlotA DIDO Status** SlotA DIDO Status will give the input and output status of a board inserted in the A expander board slot. Depending on the board inserted different bits will become active if the I/O is enabled. Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used	**1, 2, 3, 4**	RO

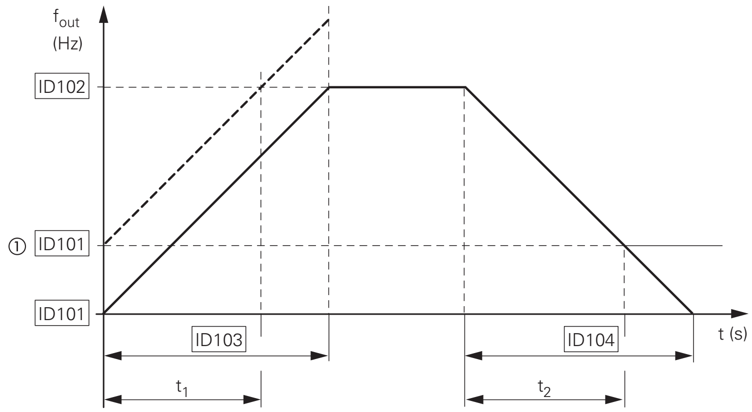
Modbus ID	Code	Parameters	Application	RO/RW
2211	M48	**SlotB DIDO Status** SlotB DIDO Status will give the input and output status of a board inserted in the B expander board slot. Depending on the board inserted different bits will become active if the I/O is enabled. Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used	1, 2, 3, 4	RO
29	M49	**Application Status Word** Application Status word will provide additional status indication of the health of the drive. Bit 0 = MC Ready Bit 1 = MC_Run Bit 2 = MC_Fault Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning/AR-Fault Bit 7 = MC_ZeroSpeed Bit 8 = I/O Control Indicate Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Indicator Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 Motor Regulator Status not Zero Bit 14 = Ext Brake Control Bit 15 = Bypass Mode	1, 2, 3, 4	RO
2414	M50	**Standard Status Word** Standard Status Word is defined based of the parameter setting in the Fieldbus Process Data Ouput(P20.1) group, P20.1.9 through P20.1.16 define the first 8 bits of this status word. The options for these bits are based off the standard Relay functions. Bit 0 = P20.1.9 (default = Ready) Bit 1 = P20.1.10 (default = Run) Bit 2 = P20.1.11 (default = Fault) Bit 3 = P20.1.12 (default = Fault Invert) Bit 4 = P20.1.13 (default = Warning) Bit 5 = P20.1.14 (default = Reversed) Bit 6 = P20.1.15 (default = At Speed) Bit 7 = P20.1.16 (default = Zero Frequency) Bit 8 - 15 = Not Used	1, 2, 3, 4	RO
2445	M51	**Output** User defined output value that can be seen in the desired unit and scale, this value will be displayed in the formate selected by P21.1.20 with a scale value from P21.1.21.	1, 2, 3, 4	RO

Modbus ID	Code	Parameters	Application	RO/RW
2447	**M52**	**Reference** User defined reference value that can be seen in the desired unit and scale, this value will be displayed in the formate selected by P21.1.20 with a scale value from P21.1.21.	**1, 2, 3, 4**	RO
601	**M53**	**Total MWh Count** Megawatt hours total operation time counter of the drive output active.	**1, 2, 3, 4**	RO
603	**M54**	**Total Power Day Count** Number of days the drive has been supplied with power.	**1, 2, 3, 4**	RO
606	**M55**	**Total Power Hr Count** Number of hours the drive has been supplied with power.	**1, 2, 3, 4**	RO
604	**M56**	**Trip MWh Count** Megawatts hours of the drive output active since last reset.	**1, 2, 3, 4**	RO
636	**M57**	**Trip Power Day Count** Number of days since the last reset.	**1, 2, 3, 4**	RO
637	**M58**	**Trip Power Hr Count** Number of hours the DG1 has been running a motor since the last reset.	**1, 2, 3, 4**	RO
2827	**M59**	**Total Run time Count** The total time when drive is running.	**1, 2, 3, 4**	RO
2830	**M60**	**Numbers Of Start** The numbers of drives starts	**1, 2, 3, 4**	RO
2829	**M61**	**Trip Run Time Count** The run time from last start signal.	**1, 2, 3, 4**	RO
30	**M62**	**Multi-Monitoring** Displays any 3 monitoring values in a single screen. The values are selectable via the keypad menu. by going to the Multi-Monitor page and seeing 3 lines of Monitoring values, Up and Down keys can be used to select the row and then hitting the left arrow key will allow for editing the value then by going up and down. See Figure 16 for walking through keypad to set screen up.	**1, 2, 3, 4**	RW
2101	**M63**	**FB Status Word** fieldbus status word	**1, 2, 3, 4**	RO
2001	**M64**	**FB Ctrol Word** fieldbus control word	**1, 2, 3, 4**	RW
2003	**M65**	**FB Speed Reference** Speed reference from fieldbus	**1, 2, 3, 4**	RW
101	**P1.1**	**Min Frequency** These define the frequency limits of the frequency converter. The maximum value for these parameters is 400 Hz. The minimum frequency has to be below the maximum frequency level. These will limit other frequency parameter settings; Preset Speeds, Jog Speed, 4 mA Fault preset speed, Fire Mode speed, and brake speed settings.	**1, 2, 3, 4**	RW
102	**P1.2**	**Max Frequency** These define the frequency limits of the frequency converter. The maximum value for these parameters is 400 Hz. The minimum frequency has to be below the maximum frequency level. These will limit other frequency parameter settings; Preset Speeds, Jog Speed, 4 mA Fault preset speed, Fire Mode speed, and brake speed settings.	**1, 2, 3, 4**	RW
103	**P1.3**	**Accel Time 1** The time required for the output frequency to accelerate from zero frequency to Max frequency (P1.2). When accelerating from different frequency levels the accel time will be a fraction of the total ramp time.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
104	P1.4	**Decel Time 1**	1, 2, 3, 4	RW

The time required for the output frequency to decelerate from Max frequency (P1.2) to zero frequency. When decelerating from different frequency levels the decel time will be a fraction of the total decel time.

Figure 39. Acceleration and deceleration time



The values for the acceleration time t_1 and the deceleration time t_2 are calculated as follows:

$$t_1 = \frac{(ID102 - ID101) \times ID103}{ID102} \qquad t_2 = \frac{(ID102 - ID101) \times ID104}{ID102}$$

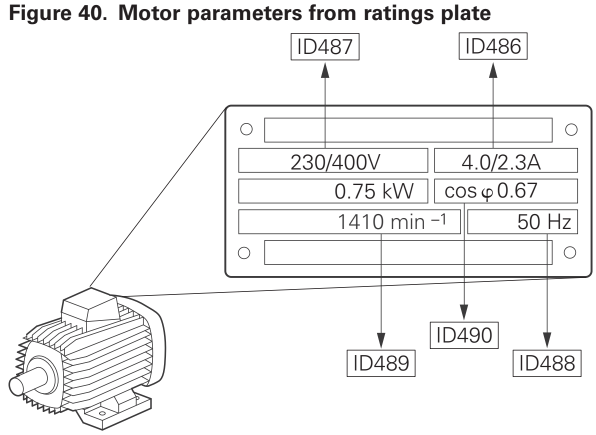
The defined acceleration (ID103) and deceleration times ID104 apply for all changes to the frequency setpoint value.
If the start-release (FWD, REV) is switched off, the output frequency (f_{Out}) is immediately set to zero. The motor runs down uncontrolled.
If a controlled run-down is requested (with value from ID104), stop mode should be set to ramp.

① When setting a minimum output frequency (ID104 greater than 0 Hz), the acceleration and deceleration time of the drive is reduced to t_1 or t_2.

Modbus ID	Code	Parameters	Application	RO/RW
486	P1.5	**Motor Nom Current**	1, 2, 3, 4	RW

Motor nominal nameplate full load current. Find this value on the rating plate of the motor.

Figure 40. Motor parameters from ratings plate



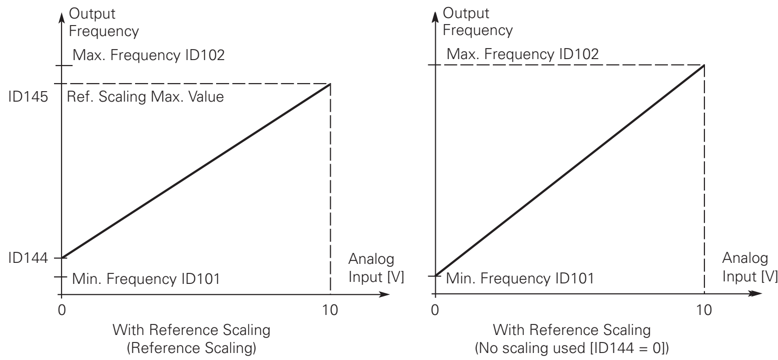
Modbus ID	Code	Parameters	Application	RO/RW
489	P1.6	**Motor Nom Speed** Motor nominal nameplate base speed. Find this value on the rating plate of the motor.	1, 2, 3, 4	RW
490	P1.7	**Motor PF** Motor nominal nameplate full load power factor. Find this value on the rating plate of the motor.	1, 2, 3, 4	RW
487	P1.8	**Motor Nom Voltage** Motor nominal nameplate base voltage. Find this value on the rating plate of the motor.	1, 2, 3, 4	RW
488	P1.9	**Motor Nom Frequency** Motor nominal nameplate base frequency. Find this value on the rating plate of the motor. This parameter sets the Field Weakening Point (P8.4) to the same value.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
1685	**P1.10**	**Power Up Local Remote Select** Selects on power up what control place the drive goes into. By default it will hold the last state that the drive was in when powered down or selecting Local or Remote it will power up in that mode no matter the position it was powered down in.	**1, 2, 3, 4**	RW
135	**P1.11**	**Remote 1 Control Place** Selects where the drive will look for the start command in the remote location, I/O terminals would be from the Digital hardwired inputs, Fieldbus would be a communication bus. Keypad display will indicate what mode is selected.	**1, 2, 3, 4**	RW
1695	**P1.12**	**Local Control Place** Selects where the drive will look for the start command in the local location, I/O terminals would be from the Digital hardwired inputs or keypad Start/Stop buttons. Keypad display will indicate what mode is selected.	**1, 2, 3, 4**	RW
2462	**P1.13**	**Bumpless Enable** When switching between Local or Remote control places when enabled the output of the drive will not change to the new reference place until that reference value is adjusted when in the new control place.	**1, 2, 3, 4**	RW
136	**P1.14**	**Local Reference** This parameter determines the reference for Local control location, this value can be fed from a analog input, keypad, or fieldbus reference signal.	**1, 2, 3, 4**	RW
137	**P1.15**	**Remote 1 Reference** This parameter determines the reference for Remote 1 control mode this value can be fed from a analog input, keypad, or fieldbus reference signal.	**1, 2, 3, 4**	RW
1679	**P1.16**	**Reverse Enable** Enables or disables the reverse motor direction.	**1, 2, 3, 4**	RW
2423	**P1.17**	**Run Delay Time** Run Delay time parameter sets the time required for the drive to wait before another run command can be received. During this time the run signal is given it is ignored until the time has expired upon which it will then start, this is true for keypad, I/O, or Fieldbus Control places.	**1, 2, 3, 4**	RW
2465	**P1.18**	**HOA Source** Enables the HOA control function. If enabled it selected the desired location for switching between Hand, Off, and Auto control locations. 0 = Disabled - Off is disable and the standard Loc/Rem is used. 1 = HOA Source: I/O Terminal - Drive is looking for control source selection via I/O terminals. Have to use the HOA On/Off digital input along with Force Hand or Remote to function. 2 = HOA Source: Keypad - Keypad Loc/Rem button will function as the switch between Hand/Off/Auto.	**1, 2, 3, 4**	RW
1813	**P1.19**	**Minimum Run Time** This parameter specifies drive minimum run time. When the drive is running, during the minimum run time, the drive keep running even give a stop command.	**2, 3, 4**	RW
144	**P2.1.1**	**AI Ref Scale Min Value** 0.00 <= P2.21 <= P2.22 <= 400.00. With values set at 0 scaling will follow the minimum and maximum frequency values	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
145	**P2.1.2**	**AI Ref Scale Max Value**	**1, 2, 3, 4**	RW

0.00 <= P2.21 <= P2.22 <= 400.00. With values set at 0 scaling will follow the minimum and maximum frequency values

Figure 41. With and without reference scaling



Modbus ID	Code	Parameters	Application	RO/RW
222	**P2.2.1**	**AI1 Mode**	**1, 2, 3, 4**	RW

Selects the analog input mode for AI1 terminals 2 and 3 for current or voltage, also need to set DIP switches on control board, left of the keypad. If using the 10V supply on Terminal 1 of the DG1, it will require a ground jumper from Terminal 6 to the AI- input terminal 3 to complete the loop. When doing a current loop with an external supply the ground jumper is not required.

Figure 42. AI1 2wire-current

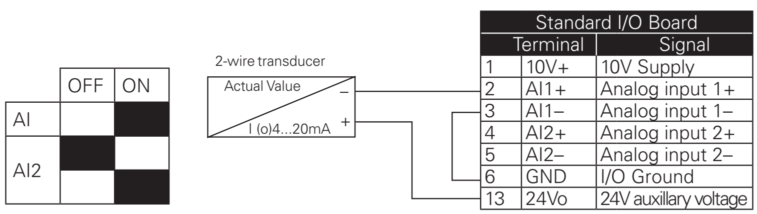
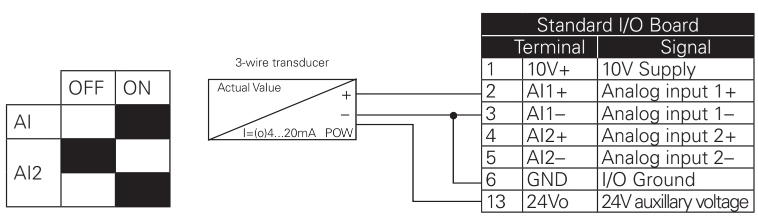


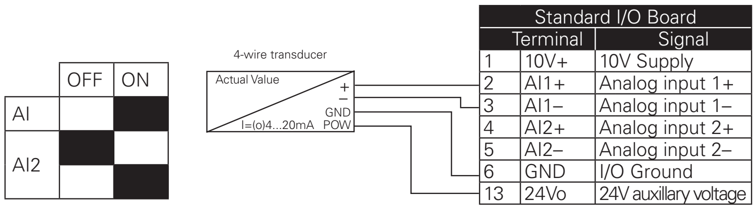
Figure 43. AI1 3wire-current



Modbus ID	Code	Parameters	Application	RO/RW
222	P2.2.1	**AI1 Mode, continued**	1, 2, 3, 4	RW

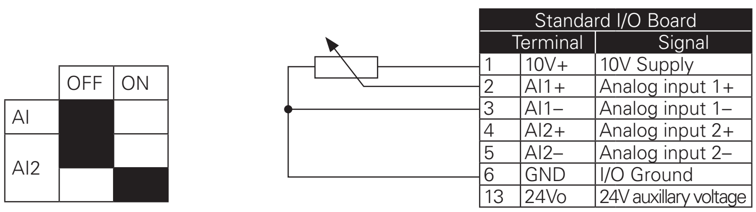
Selects the analog input mode for AI1 terminals 2 and 3 for current or voltage, also need to set DIP switches on control board, left of the keypad. If using the 10V supply on Terminal 1 of the DG1, it will require a ground jumper from Terminal 6 to the AI- input terminal 3 to complete the loop. When doing a current loop with an external supply the ground jumper is not required.

Figure 44. AI1 4wire-current



1 = 0-10V - If using the 10V supply on Terminal 1 of the drive, it will require a ground jumper from Terminal 6 to the AI- input terminal 3.

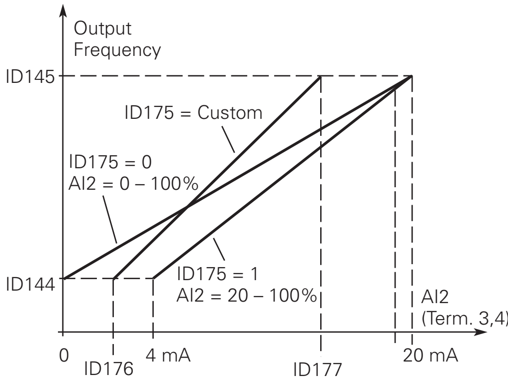
Figure 45. AI1 reference potentiometer 10V



Modbus ID	Code	Parameters	Application	RO/RW
175	P2.2.2	**AI1 Signal Range**	1, 2, 3, 4	RW

With this parameter you can select the analog input 1 signal range. 0–100% is equal to 0 to 10 V, 0–20 mA, or –10 V to 10 V depending on the selection of AI1 Mode, 20–100% is equal to 2 to 10 V, 4–20 mA, or –6 V to 10 V. For selection "Customized," see P2.3 and P2.4, this enables a customized signal range.

Figure 46. Analog input AI scaling



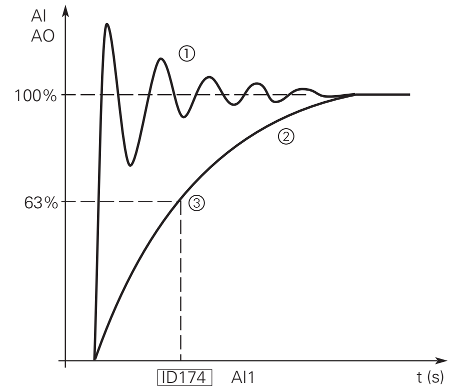
Modbus ID	Code	Parameters	Application	RO/RW
176	P2.2.3	**AI1 Custom Min** These parameters set the analog input signal range when custom Range is selected for AI1 signal. AI1 Custom Min <= AI1 Custom Max.	1, 2, 3, 4	RW
177	P2.2.4	**AI1 Custom Max** These parameters set the analog input signal range when custom Range is selected for AI1 signal. AI1 Custom Min <= AI1 Custom Max.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
174	P2.2.5	**AI1 Filter Time**	1, 2, 3, 4	RW

When this parameter is given a value greater than 0, the function that filters out disturbances from the incoming analog signal is activated.

A long filtering time makes the regulation response slower.

Figure 47. AI1 signal filtering



Notes: ① Analog signal with faults (unfiltered).
② Filtered analog signal.
③ Filter time constant at 63% of the set value.

Modbus ID	Code	Parameters	Application	RO/RW
181	P2.2.6	**AI1 Signal Invert**	1, 2, 3, 4	RW

Inverts the reference signal maximum reference becomes minimum frequency and minimum reference becomes maximum frequency.

If this parameter = 0, no inversion of analog Vin signal takes place.

If this parameter = 1, inversion of analog signal takes place.

Figure 48. AI1 No signal inversion

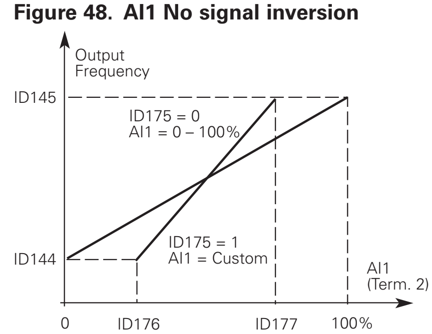
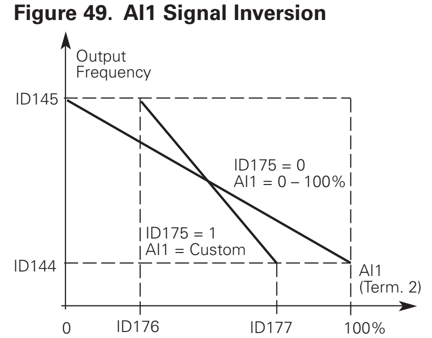


Figure 49. AI1 Signal Inversion



Maximum AI1 signal = minimum set speed.

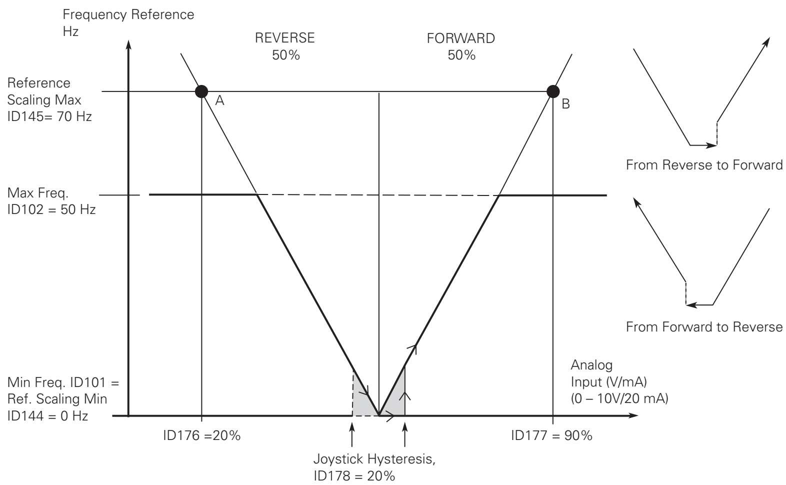
Minimum AI1 signal = maximum set speed.

Modbus ID	Code	Parameters	Application	RO/RW
178	**P2.2.7**	**AI1 Joystick Hyst**	**1, 2, 3, 4**	RW

This parameter defines the joystick hysteresis between 0 and 20%. When the joystick is turned from reverse to forward, the output frequency falls linearly to the selected minimum frequency (joystick in middle position) and stays there until the joystick is turned toward the forward command. How much the joystick must be turned to start the increase of the frequency toward the selected maximum frequency is dependent on the amount of joystick hysteresis defined with this parameter.

If the value of this parameter is 0, the frequency starts to increase linearly immediately when the joystick is turned toward the forward command from the middle position. When the control is changed from forward to reverse, the frequency follows the same pattern the other way around.

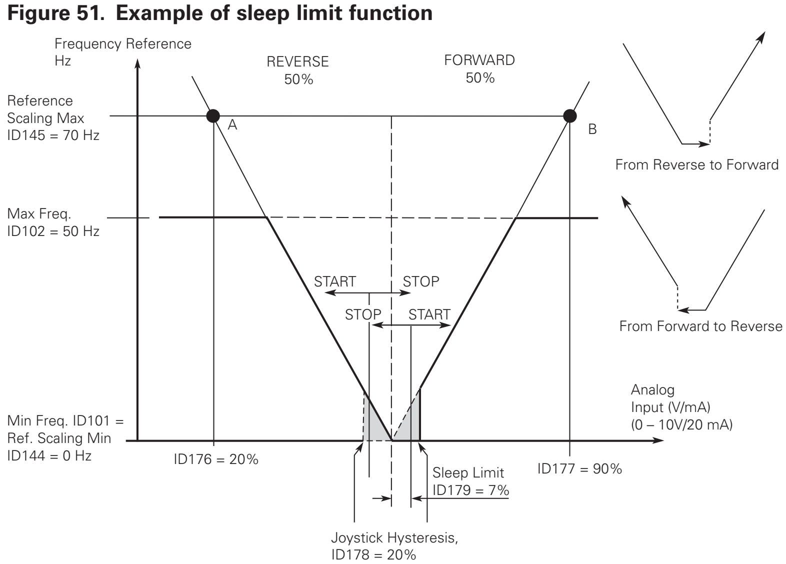
Figure 50. Example of joystick hysteresis



Modbus ID	Code	Parameters	Application	RO/RW
179	**P2.2.8**	**AI1 Sleep Limit**	**1, 2, 3, 4**	RW

The frequency converter keeps on output min frequency if the AI signal level falls below the Sleep limit defined with this parameter. This will allow the output to be shut off after the sleep delay until converter AI signal level rises again when using the Joystick control.

Figure 51. Example of sleep limit function



Modbus ID	Code	Parameters	Application	RO/RW
180	**P2.2.9**	**AI1 Sleep Delay**	**1, 2, 3, 4**	RW

This parameter defines the time the analog input signal has to stay under the Sleep limit determined with parameter P2.9 in order to make the frequency converter output min frequency.

Modbus ID	Code	Parameters	Application	RO/RW
133	**P2.2.10**	**AI1 Joystick Offset** The frequency zero point is the middle of AI range. Joystick offset means how much the zero point is moved in the forward or reverse direction.	**1, 2, 3, 4**	RW
223	**P2.3.1**	**AI2 Mode** Selects the analog input mode for AI2 terminal 4 and 5 for current or voltage, also need to set DIP switches on control board. If using the 24V supply from Terminal 13 of the DG1, it will require a ground jumper from Terminal 6 to the AI- input terminal 5 to complete the loop. When doing a current loop with an external supply the ground jumper is not required.	**1, 2, 3, 4**	RW

Figure 52. AI2 2wire-current

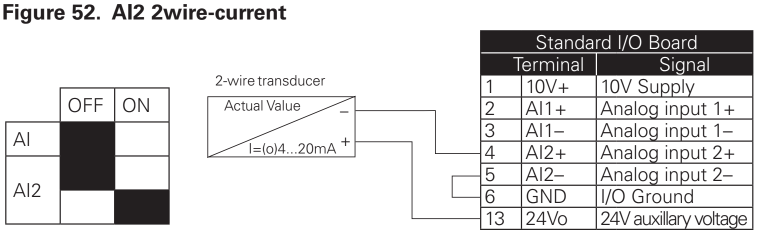


Figure 53. AI2 3wire-current

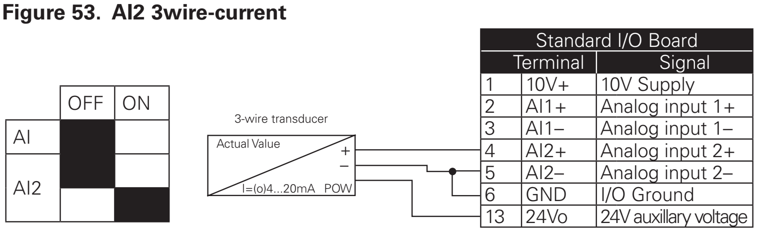
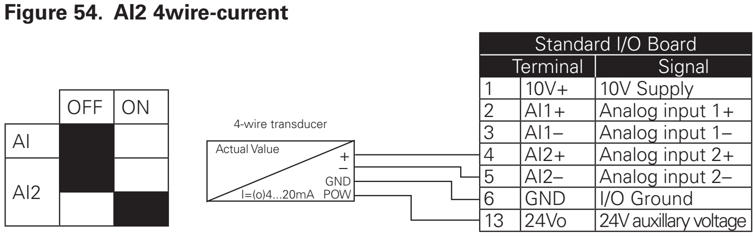
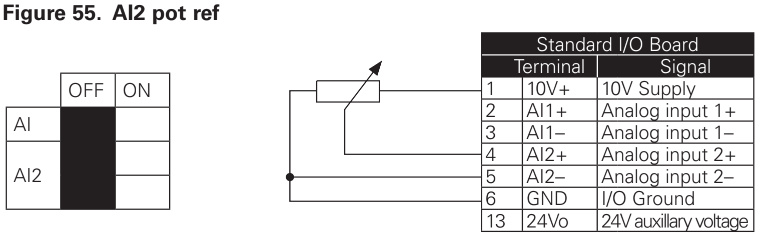


Figure 54. AI2 4wire-current



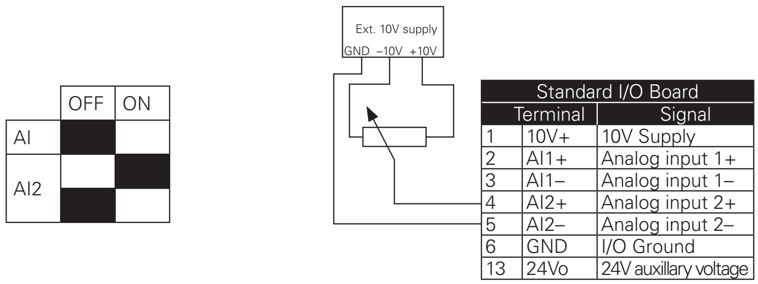
1 = 0-10V - If using the 10V supply on Terminal 1 of the drive, it will require a ground jumper from Terminal 6 to the AI- input terminal 3.

Figure 55. AI2 pot ref



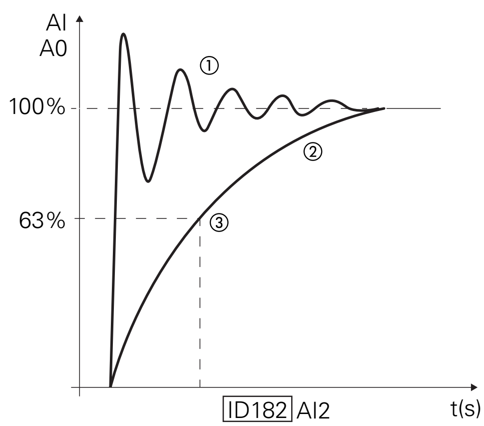
Modbus ID	Code	Parameters	Application	RO/RW
223	**P2.3.1**	**AI2 Mode, continued** 2 = -10V to +10Vdc - Voltage loop with a +10 and a -10 volt differential supply.	**1, 2, 3, 4**	RW

Figure 56. AI2 differential voltage



Modbus ID	Code	Parameters	Application	RO/RW
183	**P2.3.2**	**AI2 Signal Range** With this parameter you can select the analog input 2 signal range. 0–100% is equal to 0 to 10 V, 0–20 mA, or –10 V to 10 V depending on the selection of AI2 Mode, 20–100% is equal to 2 to 10 V, 4–20 mA, or –6 V to 10 V. For selection “Customized,” see P2.3 and P2.4, this enables a customized signal range.	**1, 2, 3, 4**	RW
184	**P2.3.3**	**AI2 Custom Min** These parameters set the analog input signal range when custom Range is selected for AI1 signal. AI2 Custom Min <= AI2 Custom Max.	**1, 2, 3, 4**	RW
185	**P2.3.4**	**AI2 Custom Max** These parameters set the analog input signal range when custom Range is selected for AI1 signal. AI2 Custom Min <= AI2 Custom Max.	**1, 2, 3, 4**	RW
182	**P2.3.5**	**AI2 Filter Time** When this parameter is given a value greater than 0, the function that filters out disturbances from the incoming analog signal is activated. A long filtering time makes the regulation response slower.	**1, 2, 3, 4**	RW

Figure 57. AI2 Filter time



Notes: ① Analog signal with faults (unfiltered) ①
② Filtered analog signal.
③ Filter time constant at 63% of the set value.

Modbus ID	Code	Parameters	Application	RO/RW
189	**P2.3.6**	**AI2 Signal Invert**	**1, 2, 3, 4**	RW

Inverts the reference signal maximum reference becomes minimum frequency and minimum reference becomes maximum frequency.

If this parameter = 0, no inversion of analog Vin signal takes place.

If this parameter = 1, inversion of analog signal takes place.

Figure 58. AI2 No signal inversion

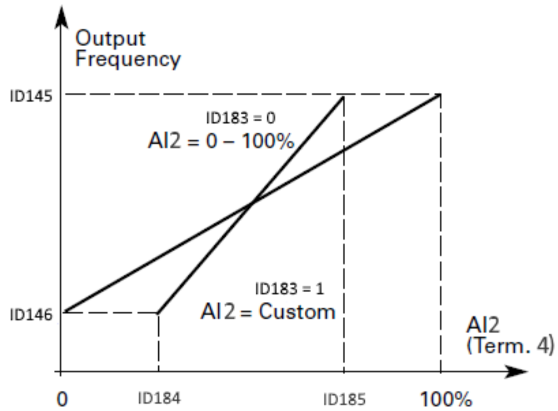
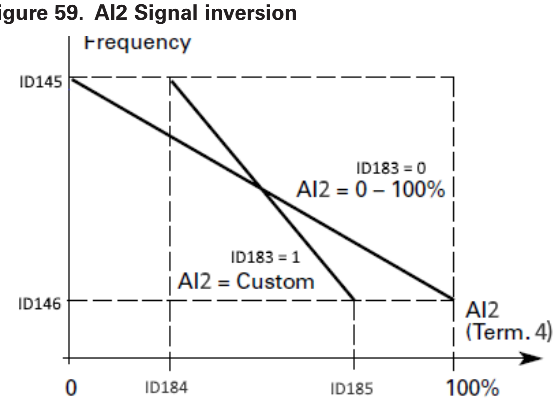


Figure 59. AI2 Signal inversion



Maximum AI2 signal = minimum set speed..

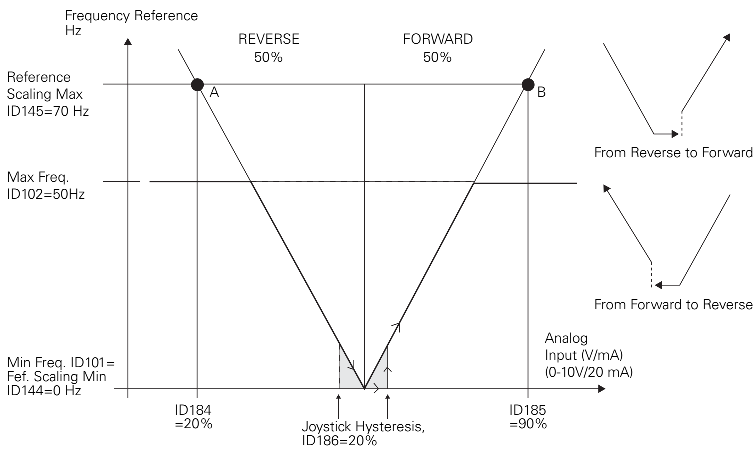
Minimum AI2 signal = maximum set speed.

Modbus ID	Code	Parameters	Application	RO/RW
186	**P2.3.7**	**AI2 Joystick Hyst**	**1, 2, 3, 4**	RW

This parameter defines the joystick hysteresis between 0 and 20%. When the joystick is turned from reverse to forward, the output frequency falls linearly to the selected minimum frequency (joystick in middle position) and stays there until the joystick is turned toward the forward command. How much the joystick must be turned to start the increase of the frequency toward the selected maximum frequency is dependent on the amount of joystick hysteresis defined with this parameter.

If the value of this parameter is 0, the frequency starts to increase linearly immediately when the joystick is turned toward the forward command from the middle position. When the control is changed from forward to reverse, the frequency follows the same pattern the other way around.

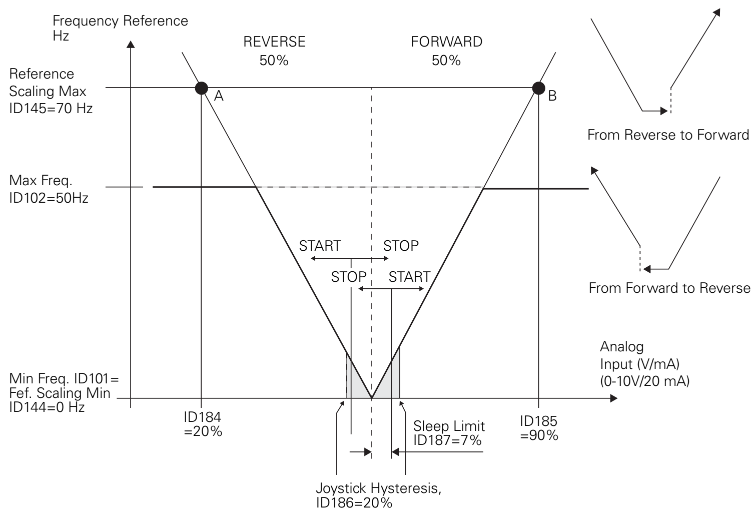
Figure 60. Example of joystick hysteresis



Modbus ID	Code	Parameters	Application	RO/RW
187	**P2.3.8**	**AI2 Sleep Limit**	**1, 2, 3, 4**	RW

The frequency converter keeps on output min frequency if the AI signal level falls below the Sleep limit defined with this parameter. This will allow the output to be shut off after the sleep delay until converter AI signal level rises again when using the Joystick control.

Figure 61. Example of sleep limit function



Modbus ID	Code	Parameters	Application	RO/RW
188	**P2.3.9**	**AI2 Sleep Delay**	**1, 2, 3, 4**	RW

This parameter defines the time the analog input signal has to stay under the Sleep limit determined with parameter P2.19 in order to make the frequency converter output min frequency.

Modbus ID	Code	Parameters	Application	RO/RW
134	**P2.3.10**	**AI2 Joystick Offset** The frequency zero point is the middle of AI range. Joystick offset means how much the zero point is moved in the forward or reverse direction.	**1, 2, 3, 4**	RW
2484	**P2.4.1**	**Fine Tuning Input** Selects the Analog input used for Fine adjustment tuning of a reference signal. 0 = Not Used 1 = Analog Input 1 2 = Analog Input 2	**1, 2, 3, 4**	RW
2485	**P2.4.2**	**Fine Tuning Min** Percentage that is subtracted from the main reference when adjust input is at minimum.	**1, 2, 3, 4**	RW
2486	**P2.4.3**	**Fine Tuning Max** Percentage that is added from the main reference when adjust input is at maximum.	**1, 2, 3, 4**	RW
143	**P3.1**	**IO Terminal 1 Start Stop Logic** For the DI function, we use Terminal programming method to function (TTF), you have a fixed input or output that you define a certain function for. 0 = P3.2: DI closed contact = start forward P3.3: DI closed contact = start reverse - This would be considered 2 wire control with either a contact used on the Start FWD or Start REV commands. Contacts Open the motor stops.	**1, 2, 3, 4**	RW

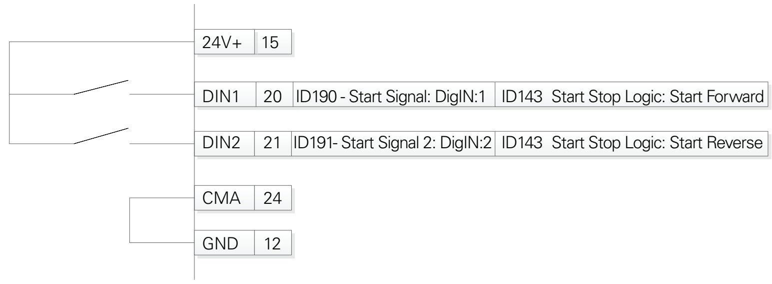
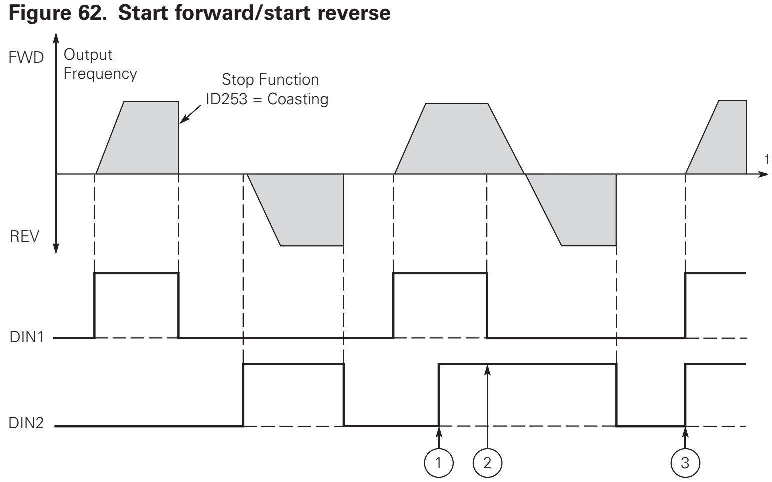


Figure 62. Start forward/start reverse



Notes: ① The first selected direction has the highest priority. ①
② When the DIN1 contact opens the direction of rotation starts to change.
③ If Start forward (DIN1) and Start reverse (DIN2) signals are active simultaneously the Start forward signal (DIN1) has priority.

Modbus ID	Code	Parameters	Application	RO/RW
143	**P3.1**	**IO Terminal 1 Start Stop Logic, continued**	**1, 2, 3, 4**	RW

1 = P3.2: DI closed contact = start /open contact = stop P3.3: DI closed contact = reverse / open contact = forward - This would be considered 2 wire control with a contact on start/stop, contact open it stops and direction on 2nd start signal.

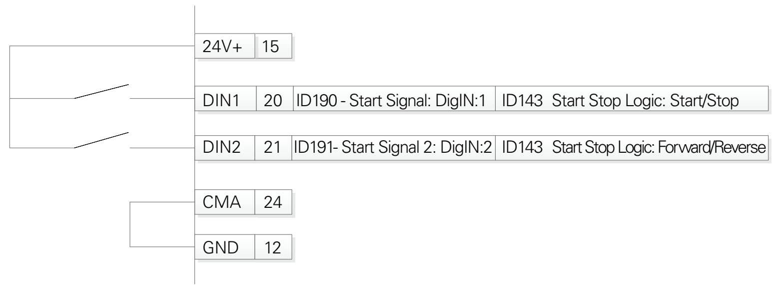
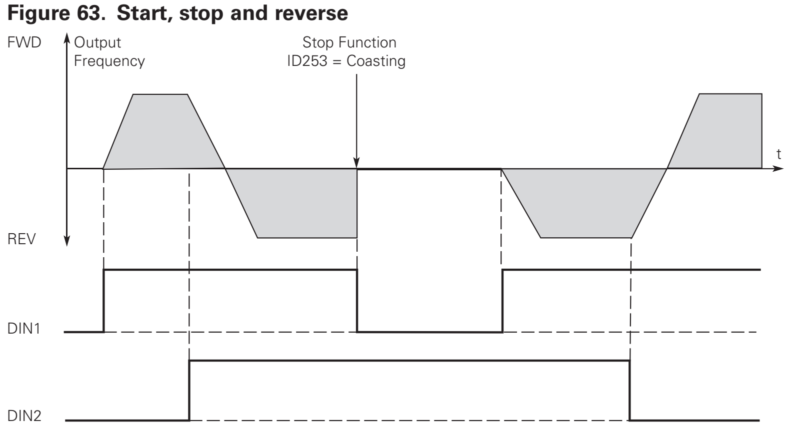
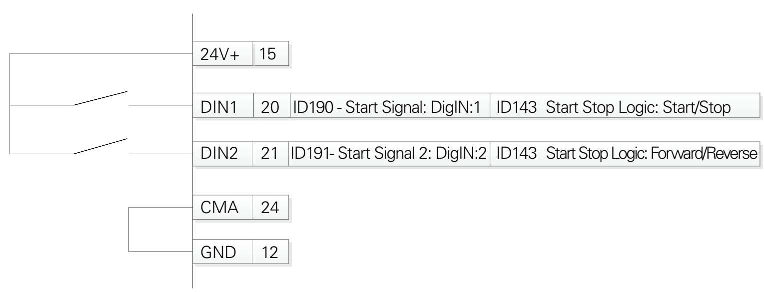


Figure 63. Start, stop and reverse



2 = P3.2: DI closed contact = start / open contact = stop P3.3: DI closed contact = start enabled / open contact = start disabled and drive stopped if running Motor direction keeps forward - This would be considered 3 wire control with Start signal 2 required to be closed to enable Start on Start signal 1.



Modbus ID	Code	Parameters	Application	RO/RW
143	P3.1	**IO Terminal 1 Start Stop Logic, continued**	1, 2, 3, 4	RW

3 = Three-wire connection (pulse control): P3.2: DI changes from open to closed = start pulse P3.3: DI changes from closed to open = stop pulse P3.5: DI closed contact = reverse/ open contact = forward - This would be considered 3 wire control with Start Signal 1 being the Start Pulse and Start Signal 2 being the NC Stop.

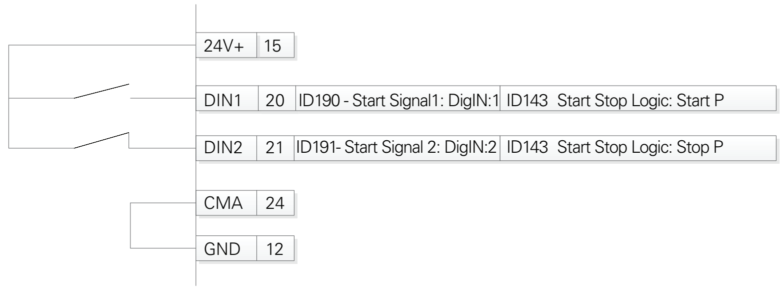
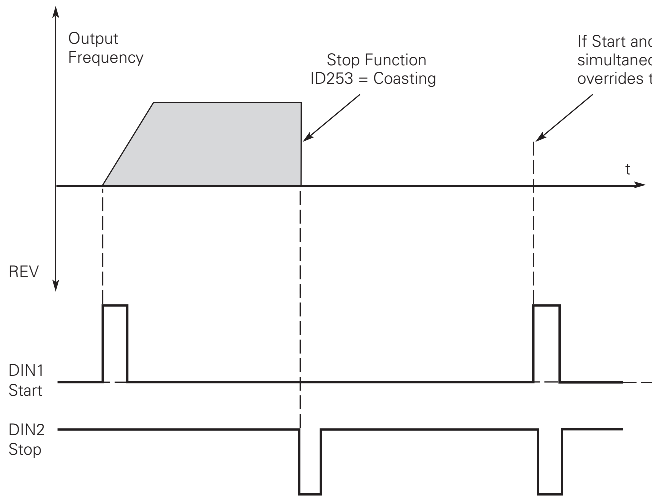


Figure 64. Start pulse/stop pulse



Modbus ID	Code	Parameters	Application	RO/RW
190	P3.2	**IO Terminal 1 Start Signal 1** Signal selection 1 for the start/stop logic listed in P3.1. This parameter would correspond to the function listed for DIN1. When the parameter is set to DigIN: 1 it references DIN1 on the control board, selecting different DIGIN values will assign it to a different input on the control board or option card. When set to Normally Open this function would be always tied low or 0 when using I/O terminal 1 as the control place. When value is set to Normally Closed this will cause the function to be always on and activate the output if I/O Terminal 1 is the current control place. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X	1, 2, 3, 4	RW
191	P3.3	**IO Terminal 1 Start Signal 2** Signal selection 2 for the start/stop logic listed in P3.1. This parameter would correspond to the function listed for DIN2. When the parameter is set to DigIN: 2 it references DIN2 on the control board, selecting different DIGIN values will assign it to a different input on the control board or option card. When set to Normally Open this function would be always tied low or 0 when using I/O terminal 1 as the control place. When value is set to Normally Closed this will cause the function to be always on and activate the output if I/O Terminal 1 is the current control place. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X	1, 2, 3, 4	RW
881	P3.4	**Thermistor Input Select** This parameter defines DIN7, and DIN8 is digital input or thermistor input. When this parameter is enabled it switches DIN7 and DIN8 to a thermistor input that triggers at 4.7k ohm.	1, 2, 3, 4	RW

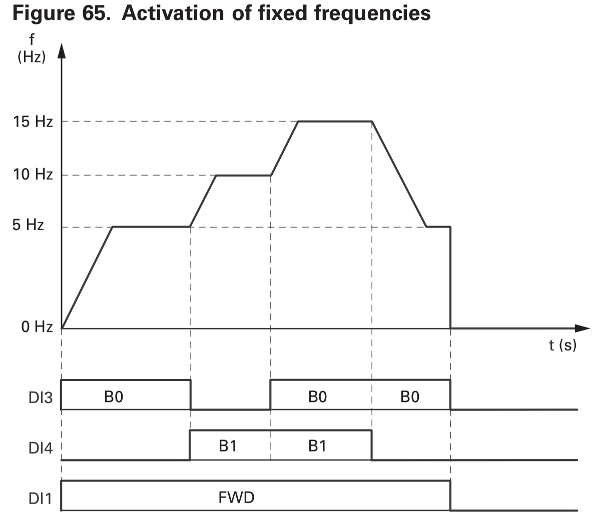
Modbus ID	Code	Parameters	Application	RO/RW
198	**P3.5**	**Reverse** Allows for switching the direction of the motor when using 3 wire start/stop logic. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X Contact Open = Forward direction. Contact Close = Reverse direction.	**1, 2, 3, 4**	RW
192	**P3.6**	**Ext. Fault 1 NO** Allows for external input causing drive to fault. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open - the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Different Settings DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. The description on the fault can be changed in P3.52. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = external fault. Open contact = no external fault.	**1, 2, 3, 4**	RW
193	**P3.7**	**Ext. Fault 1 NC** Allows for external input causing drive to fault. This function is defined as NC so the function activates on a open contact. If this function is assigned to Normally Closed - the function is always on so the drive will not fault, when set to Normally Open the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Different Settings DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. The description on the fault can be changed in P3.52. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = no external fault. Open contact = external fault.	**1, 2, 3, 4**	RW
200	**P3.8**	**Fault Reset** Allows for external fault reset input. This function is looking for a rising edge to reset a fault. If this function is set for Normally Open, the drive will not do a reset via the control terminals. When set for Normally Closed, the fault condition will always be trying to reset on the rising edge. When it is tied to an input on the control board or option card the function would be set to DIGIN: and the input desired. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. DI change from open contact to closed contact: reset fault.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
194	P3.9	**Run Enable** Allows for safety start input that is required along with start command for frequency converter to turn on output. When using this command if the function is set for Normally Open, the drive will see this as a open input and not allow the drive to run due to no Ready. The default state being Normally Closed indicates that the drive is in a Ready condition and will accept the start command. When assigned to one of the DIGIN or Time channels it requires the input to be high to activate output. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = Start of motor enabled Open contact = Start of motor disabled	1, 2, 3, 4	RW
205	P3.10	**Preset Speed B0** Preset bit select inputs to select preset speed reference values. Validating 3 digital inputs will allow for 7 preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. When all the inputs are set to Normally Open none of the preset speeds will be enabled and the output will follow the control place reference command. If the function is set for Normally Closed the drive will follow the preset speed assigned to the inputs enabled. When assigned to one of the DIGIN on the control board or an installed option card it is looking for a high input to enable that preset. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	1, 2, 3, 4	RW
206	P3.11	**Preset Speed B1** Preset bit select inputs to select preset speed reference values. Validating 3 digital inputs will allow for 7 preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. When all the inputs are set to Normally Open none of the preset speeds will be enabled and the output will follow the control place reference command. If the function is set for Normally Closed the drive will follow the preset speed assigned to the inputs enabled. When assigned to one of the DIGIN on the control board or an installed option card it is looking for a high input to enable that preset. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
207	P3.12	**Preset Speed B2**	1, 2, 3, 4	RW

Preset bit select inputs to select preset speed reference values. Validating 3 digital inputs will allow for 7 preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. When all the inputs are set to Normally Open none of the preset speeds will be enabled and the output will follow the control place reference command. If the function is set for Normally Closed the drive will follow the preset speed assigned to the inputs enabled. When assigned to one of the DIGIN on the control board or an installed option card it is looking for a high input to enable that preset. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.

Figure 65. Activation of fixed frequencies



ixed frequency

Input (Binary)			Fixed frequency
B0	B1	B2	(Factory setting)
X	—	—	Preset Speed 1, ID105 = 5 Hz
—	X	—	Preset Speed 2, ID106 = 10 Hz
X	X	—	Preset Speed 3, ID118 = 15 Hz
—	—	X	Preset Speed 4, ID119 = 20 Hz
X	—	X	Preset Speed 5, ID120 = 25 Hz
—	X	X	Preset Speed 6, ID121 = 30 Hz
X	X	X	Preset Speed 7, ID122 = 35 Hz

Modbus ID	Code	Parameters	Application	RO/RW
550	P3.13	**PID1 Control Enable**	2, 3, 4	RW

Allows for activating PID1 control mode when it is set as a reference place in P1.1.13 or P1.1.14. If the input is not enabled when starting the drive with PID1 Controller set as the reference the drive output will not start. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.

Contact Close: Enables PID 1 control mode.

Modbus ID	Code	Parameters	Application	RO/RW
553	P3.14	**PID2 Control Enable**	3, 4	RW

Allows for activating PID2 control mode. If the input is not enabled when starting the drive with PID1 Controller set as the reference the drive output will not start.Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.

Contact Close: Enables PID 2 control mode.

Modbus ID	Code	Parameters	Application	RO/RW
195	P3.15	**Accel/Decel Time Set** Selects between accel/decel time 1 and accel/decel time 2. When this function is set for Normally Open the Accel/Decel time set will follow time 1 always, when set for Normally Closed it will follow the 2nd Accel/Decel time always. Assigning it to an input will allow for the input to control this. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = 2nd set of acc/dec time applied. Open contact = 1st set of acc/dec time applied.	**1, 2, 3, 4**	RW
201	P3.16	**Accel/Decel Prohibit** Disables the ability to change speed, even if the reference signal changes if this input is enabled the output stays at the value it was at before the input was enabled. When this functions is set for Normally Open the Accel/Decel will be allowed via the desired control source, when is set for Normally Closed the drive will prohibit changing of speed from any control source. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive output frequency cannot rise or fall, it keeps on current output.	**1, 2, 3, 4**	RW
215	P3.17	**No Access To Param** Locks out the ability to change parameters when this input is enabled, this can be used with the password protection. When this function is set for Normally Open it will allow for changing of parameters, if it is set for Normally Closed it prevents any changes to parameters. If a input is desired to control this DIGIN X can be used. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: all writable parameters cannot be edited.	**1, 2, 3, 4**	RW
203	P3.18	**Accel Pot Value** Motor Potentiometer is set for a reference, when this input is enabled it will increase reference value till contact opens. When this function is set for Normally Open it will not cause the Motor Pot reference to increase, when this is set for Normally Closed it will cause the Motor pot reference to increase till it reaches max frequency. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Potentiometer value keeps on rising.	**4**	RW
204	P3.19	**Decel Pot Value** Motor Potentiometer is set for a reference, when this input is enabled it decrease reference value till contact opens. When this function is set for Normally Open it will not cause the Motor Pot reference to decrease, when this is set for Normally Closed it will cause the Motor pot reference to decrease till the min frequency is reached.Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Potentiometer value keeps on falling.	**4**	RW
216	P3.20	**Reset Pot Zero** Sets Motor Potentiometer reference value to zero when using the Motor Potentiometer as a Reference signal when contact closes. When this is set for Normally Open it will not cause the Motor Pot reference to not reset to 0 speed, when this is set for Normally Closed it will cause the Motor pot reference to reset to 0 speed and stay there till the opens. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Potentiometer value reset to zero.	**4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
196	P3.21	**Remote Control** Selection allows for external control panel to control frequency converters control place. When this function is set for Normally Open the drive will not go into the remote control unless the keypad input is pressed. When set for Normally Closed the drive will always be in the remote location no matter the keypad loc/rem is pressed.Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed Contact: force to remote control.	1, 2, 3, 4	RW
197	P3.22	**Local Control** Selection allows for external control panel to control frequency converters control place. When this function is set for Normally Open the drive will not go into the local control place unless the keypad Loc/Rem button is used. When it is set for Normally Closed it will always be in the local control location no matter if the keypad loc/rem button is pressed. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: force to local control.	1, 2, 3, 4	RW
209	P3.23	**Remote 1/2 Select** Selection allows for switching between Remote control 1 (P1.11 and P1.14) and control 2 (P7.1 and P7.2), this switches control and reference locations. When this function is set for Normally Open the drive will not go into the Remote 2 control place and will stay in Remote 1. When it is set for Normally Closed the drive will always be in the Remote 2 Control Place. When a DIGIN is used it will allow cycling between the 2 based off high/low state. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: remote2 is selected as control source. Open contact: remote1 is selected as control.	1, 2, 3, 4	RW
217	P3.24	**Second Motor Para Select** Selection allows for switching between motor parameter set 1(P1 Group) and set 2 (P16 Group). When this function is set for Normally pen the drive will follow the first set of motor parameters and when the input is set for Normally Closed it will used the Second Motor Parameter set. If an input is used the function will follow the logic of the input being high/low. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: the 2nd motor parameters is applied.	2, 3, 4	RW
218	P3.25	**Force Bypass** Selection allows for switching between bypass and drive modes. When this input is enabled the Bypass output contactor is enabled to bypass the drive, when disabled this relay opens. When the input is enabled on the rising edge the bypass output contactor function is enabled in the output functions on the drive. When this fault is set for Normally Open/Normally Closed the drive will not activate the bypass relay output function due to the drive looking for a rising edge trigger. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: switch to bypass. Open contact: switch to drive.	2, 3, 4	RW
202	P3.26	**DC Brake Active** Selection enables DC brake on a closed contact. When enabled this will cause the DG1 drive inject DC voltage into the motor to assist in bring it to a stop. When this function is set for Normally Open the drive will not activate the DC brake function. When Normally Closed is used the drive will always have the DC brake function activated. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: DC brake function is enable.	1, 2, 3, 4	RW

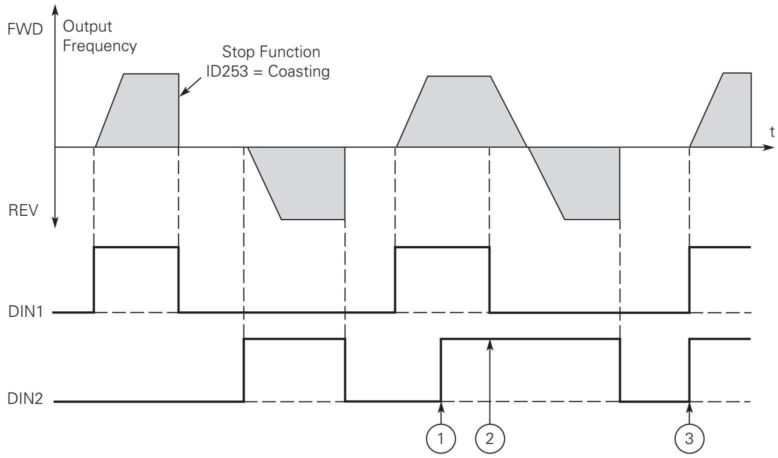
Modbus ID	Code	Parameters	Application	RO/RW
219	**P3.27**	**Smoke Mode** Selection enables the smoke purge preset speed to be enabled. When this function is set for Normally Open the drive will not activate the Smoke Mode frequency. When Normally Closed is used the drive will always run at the Smoke Purge Frequency. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive is in smoke purge mode.	**2, 3, 4**	RW
220	**P3.28**	**Fire Mode** Selection enables drive into fire mode where faults will be ignored and preset speeds are given for reference commands to the drive, the reference are selectable in the P15 Group. When this function is set for Normally Open or Normally Closed it will depend on the setting in the Fire Mode parameter group, if the function activates on an open contact and this is set for Normally Open it will always be in the Fire Mode, if Normally Closed is used then the function will always be off. Vise versa will occur if Fire Mode is active on an Closed contact. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive is in fire mode. Ignores all the faults. **Note**: When Fire mode is enabled, this causes the drive to ignore all faults except hardware overcurrent, STO, saturation fault. Warranty will be non valid in the case this is enabled and the drive causes issues to the system.	**2, 3, 4**	RW
221	**P3.29**	**Fire Mode Ref 1/2 Select** Selection allows for switching between fire mode speed reference 1 and reference 2 which is set via P15.4 and P15.5. When this function is set for Normally Open and the drive is in Fire Mode it will follow Fire Mode Ref 1, if the function is set for Normally Closed it will fallow Fire Mode Ref 2. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive output reference frequency selection 2	**2, 3, 4**	RW
351	**P3.30**	**PID1 Set Point Select** Selection allows for selecting between Setpoint 1 and setpoint 2 when in the PID control mode, depending on the PID Controller you are using this will all for multiple setpoints. When this function is set for Normally Open and the drive is in PID mode, it will use the first PID Set Point Reference. When the function is set for Normally Close the 1st PID Set Point will be active. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: setpoint2 is selected for pid1. Open contact:setpoint1 is selected for pid1.	**2, 3, 4**	RW
352	**P3.31**	**PID2 Set Point Select** Selection allows for selecting between Setpoint 1 and setpoint 2 when in the PID control mode, depending on the PID Controller you are using this will all for multiple setpoints. When this function is set for Normally Open and the drive is in PID mode, it will use the first PID Set Point Reference. When the function is set for Normally Close the 2nd PID Set Point will be active. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: setpoint2 is selected for pid1. Open contact:setpoint1 is selected for pid1.	**3, 4**	RW
199	**P3.32**	**Jog Enable** Selection enables the jog frequency reference and starts the drive to slowly advance the system. When this function is set for Normally Open the drive will not follow the jog enable speed. If the function is set for Normally Close then the output will be activated and run at the Jog Frequency. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive is under jog mode.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
224	P3.33	**Start Timer 1** Selection enables the timer functions to begin counting. When this function is set for Normally Open the drive will not start the Timer sequence. If the function is set for Normally Close the Timer function will start. When assigned to an input the input active will start the timer.Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Timer1,Timer2 or Timer3 will be started.	2, 3, 4	RW
225	P3.34	**Start Timer 2** Selection enables the timer functions to begin counting. When this function is set for Normally Open the drive will not start the Timer sequence. If the function is set for Normally Close the Timer function will start. When assigned to an input the input active will start the timer.Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Timer1,Timer2 or Timer3 will be started.	2, 3, 4	RW
226	P3.35	**Start Timer 3** Selection enables the timer functions to begin counting. When this function is set for Normally Open the drive will not start the Timer sequence. If the function is set for Normally Close the Timer function will start. When assigned to an input the input active will start the timer.Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Timer1,Timer2 or Timer3 will be started.	2, 3, 4	RW
208	P3.36	**AI Ref Source Select** Selection switches between AI1 and AI2 reference signals that are located on the control board. When this function is set for Normally Open the drive will follow the AI1 input. If the function is set for Normally Close the AI2 input would then be active. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: AI2 is selected for reference source. Open contact: AI1 is selected for reference source.	1, 2, 3, 4	RW
210	P3.37	**Motor Interlock 1** Selects inputs allowed to verify aux motors are connected to allow them to run, if inputs are disabled drive will see this as a motor not connected an skip over the motor in the booster/auto-change sequence. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	2, 3, 4	RW
211	P3.38	**Motor Interlock 2** Selects inputs allowed to verify aux motors are connected to allow them to run, if inputs are disabled drive will see this as a motor not connected an skip over the motor in the booster/auto-change sequence. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
212	**P3.39**	**Motor Interlock 3** Selects inputs allowed to verify aux motors are connected to allow them to run, if inputs are disabled drive will see this as a motor not connected an skip over the motor in the booster/auto-change sequence. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	**2, 3, 4**	RW
213	**P3.40**	**Motor Interlock 4** Selects inputs allowed to verify aux motors are connected to allow them to run, if inputs are disabled drive will see this as a motor not connected an skip over the motor in the booster/auto-change sequence. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	**2, 3, 4**	RW
214	**P3.41**	**Motor Interlock 5** Selects inputs allowed to verify aux motors are connected to allow them to run, if inputs are disabled drive will see this as a motor not connected an skip over the motor in the booster/auto-change sequence. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	**2, 3, 4**	RW
747	**P3.42**	**Ext Fault-AR** Function disables the frequency converter from running the motor. Once this function is open the drive will stop on E-stop fault, when input closes drive will return to run with no reset required. If the function is set for Normally Open it will cause the drive to always have this function active. When set to Normally Closed the function will not be active and allow operation of the drive. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. This input will automatically reset once the input is closed Contact Open: Disables the ability for the motor to Run Contact Close: Enables the ability for the motor to Run	**1, 2, 3, 4**	RW
1246	**P3.43**	**Bypass Overload** Function faults frequency converter when using an external overload block, the relay would be fed into this input to fault the drive. When the function is set for Normally Open the drive will not go into the fault state, if it is set for Normally Closed the drive will go into this fault state and stay even if reset is applied. Input needs to be low to allow operation. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor is over load in bypass. Use TTF method to realize the above functions.	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2119	**P3.44**	**Fire Mode Direction Invert** Function allows motor to run in reverse when in fire mode input is enabled. when the function is set for Normally Open and not in Fire mode the drive will run as normal, when the function is set for Normally Closed and the Fire Mode input is enabled the motor will spin in the counter clockwise direction. DigiIN:X indicates on-board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot and DigiIN:B:IOX:X indicates optional board inputs in B slot or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**2, 3, 4**	RW
2206	**P3.45**	**IO Terminal 2 Start Stop Logic** For the DI function, we use Terminal programming method to function (TTF), you have a fixed input or output that you define a certain function for. 0 = P3.46: DI closed contact = start forward P3.47: DI closed contact = start reverse - This would be considered 2 wire control with either a contact used on the Start FWD or Start REV commands. Contacts Open the motor stops.	**1, 2, 3, 4**	RW

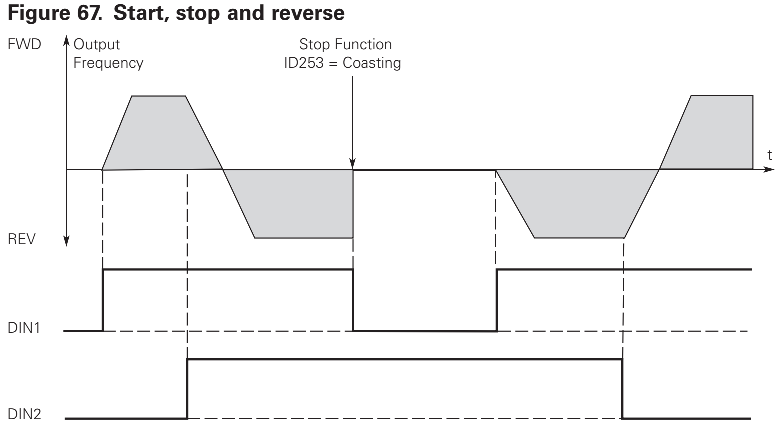
Figure 66. Start forward/start reverse



1 = P3.46: DI closed contact = start /open contact = stop P3.47: DI closed contact = reverse / open contact = forward - This would be considered 2 wire control with a contact on start/stop, contact open it stops and direction on 2nd start signal.

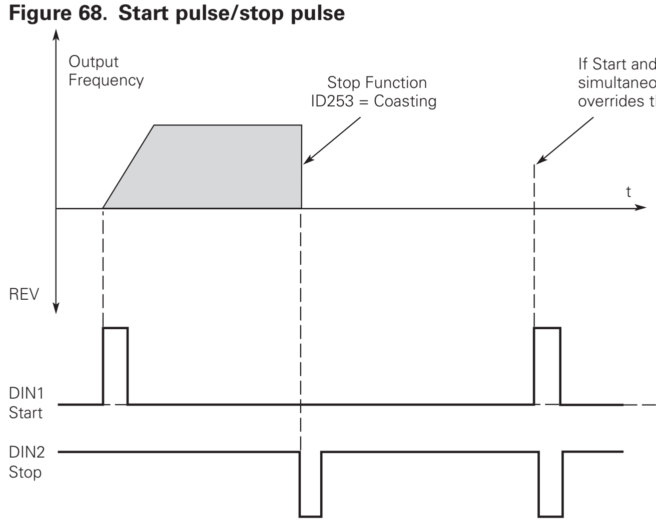
NOTES:
① The first selected direction has the highest priority.
② When the DIN1 contact opens the direction of rotation starts to change.
③ If Start forward (DIN1) and Start reverse (DIN2) signals are active simultaneously the Start forward signal (DIN1) has priority.

Figure 67. Start, stop and reverse



Modbus ID	Code	Parameters	Application	RO/RW
2206	**P3.45**	**IO Terminal 2 Start Stop Logic, continued** 2 = P3.46: DI closed contact = start / open contact = stop P3.47: DI closed contact = start enabled / open contact = start disabled and drive stopped if running Motor direction keeps forward - This would be considered 3 wire control with Start signal 2 required to be closed to enable Start on Start signal 1. 3 = Three-wire connection (pulse control): P3.46: DI changes from open to closed = start pulse P3.47: DI changes from closed to open = stop pulse P3.5: DI closed contact = reverse/ open contact = forward - This would be considered 3 wire control with Start Signal 1 being the Start Pulse and Start Signal 2 being the NC Stop.	**1, 2, 3, 4**	RW

Figure 68. Start pulse/stop pulse



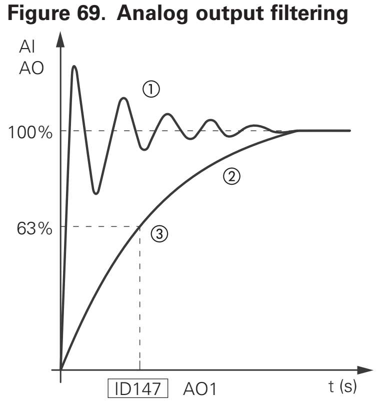
Modbus ID	Code	Parameters	Application	RO/RW
2207	**P3.46**	**IO Terminal 2 Start Signal 1** The 2nd Signal selection 1 for the start/stop logic listed in P3.45. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1, 2, 3, 4**	RW
2208	**P3.47**	**IO Terminal 2 Start Signal 2** The 2nd Signal selection 2 for the start/stop logic listed in P3.45. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1, 2, 3, 4**	RW
2293	**P3.48**	**Ext. Fault 2 NO** Allows for external input causing drive to fault. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open - the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function.Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.The description on the fault can be changed in P3.53. Closed contact = external fault. Open contact = no external fault.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2294	**P3.49**	**Ext. Fault 2 NC** Allows for external input causing drive to fault. This function is defined as NC so the function activates on a open contact. If this function is assigned to Normally Closed - the function is always on so the drive will not fault, when set to Normally Open the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function.Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.The description on the fault can be changed in P3.53. Closed contact = no external fault. Open contact = external fault.	**1, 2, 3, 4**	RW
2295	**P3.50**	**Ext. Fault 3 NO** Allows for external input causing drive to fault. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open - the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. The description on the fault can be changed in P3.54. Closed contact = external fault. Open contact = no external fault.	**1, 2, 3, 4**	RW
2296	**P3.51**	**Ext. Fault 3 NC** Allows for external input causing drive to fault. This function is defined as NC so the function activates on a open contact. If this function is assigned to Normally Closed - the function is always on so the drive will not fault, when set to Normally Open the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.The description on the fault can be changed in P3.54. Closed contact = no external fault. Open contact = external fault.	**1, 2, 3, 4**	RW
2297	**P3.52**	**Ext. Fault 1 Text** This parameter allows for the text to be changed when using external Fault 1 NO or NC. 0 = External Fault 1 = Vibration Cut Out 2 = High Motor Temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2298	P3.53	**Ext. Fault 2 Text** This parameter allows for the text to be changed when using external Fault 1 NO or NC. 0 = External Fault 1 = Vibration Cut Out 2 = High Motor Temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage	1, 2, 3, 4	RW
2299	P3.54	**Ext. Fault 3 Text** This parameter allows for the text to be changed when using external Fault 1 NO or NC. 0 = External Fault 1 = Vibration Cut Out 2 = High Motor Temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage	1, 2, 3, 4	RW
2312	P3.55	**Parameter Set1/2 Sel** Allows for the drive to select between the stored parameter set1 or set2, this requires saving parameters to the stored sets via P21.1.3. When the function is set for Normally Open the drive will use the standard Parameter Set 1 in the keypad, if the function is set for Normally Closed the drive will follow Parameter Set 2 setting when stored to the keypad. DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	1, 2, 3, 4	RW
2394	P3.56	**Deragging Enable** When Deragging Enable is Enabled it will allow the drive to cycle the motor forward and reverse for 3 cycles, this would be used to remove any jamming on start. If the function is set for Normally Open the deragging function will not be activated, if he function is set for Normally Closed then the Derag Function will always be active. Can be set to DigiIN: X indicates on board terminal inputs, DigiIN:A:IOX:X indicates option boards in A slot, DigiIN:B:IOX:X indicates optional board in B slot, or Timer Channel X. RO X function allows for having an input to run on without having to hard wire it to the physical relay output.	2, 3, 4	RW
2395	P3.57	**HOA On/Off** HOA off control allows for disabling any control signal when the input is the off/open position, when closed drive will follow the desired control signal. If the function is set for Normally Open this will cause the drive to operate, if the function i set for Normally Closed then the drive will e in the off location and not allow operation. Can be set to DigiIN: X indicates on board terminal inputs, DigiIN:A:IOX:X indicates option boards in A slot, DigiIN:B:IOX:X indicates optional board in B slot, or Timer Channel X. RO X function allows for having an input to run on without having to hard wire it to the physical relay output.	1, 2, 3, 4	RW
2658	P3.58	**Multi-pump Mode 1/2 Select** This parameter specifies Multi-pump Mode 1/2 mode DI selection.	2, 3, 4	RW

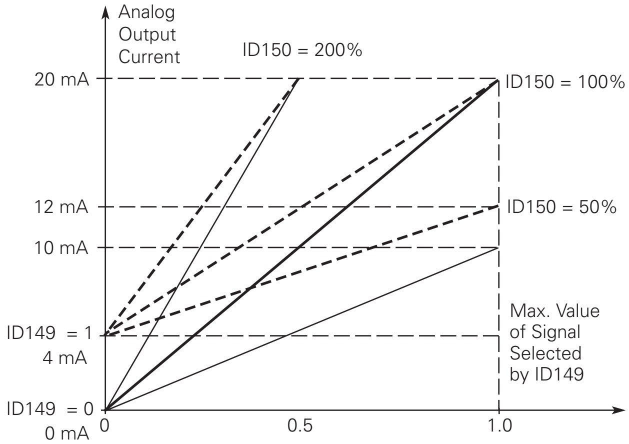
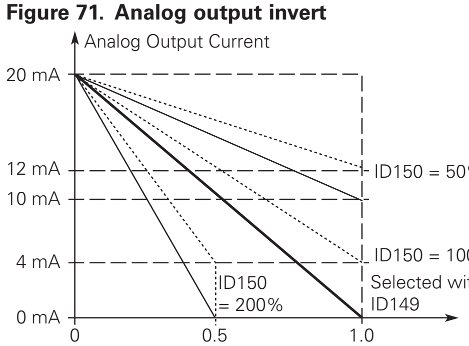
Modbus ID	Code	Parameters	Application	RO/RW
2801	P3.59	**OP Cont Interlock NO** Output contactor interlock - normally open. The fault is active when the drive is in run mode and has a time delay of 250ms for which the fault could occur. If the input contactor does not close within that time, the drive will fault.	1, 2, 3, 4	RW
2802	P3.60	**OP Cont Interlock NC** Output contactor interlock - normally close. The fault is active when the drive is in run mode and has a time delay of 250ms for which the fault could occur. If the input contactor does not close within that time, the drive will fault.	1, 2, 3, 4	RW
227	P4.1	**AO1 Mode** Selects the analog output mode for AO1 current or voltage. There are internal relays to perform the switching of the signal between mA or V.	1, 2, 3, 4	RW
146	P4.2	**AO1 Function** Select the function desired to the terminal AO1 terminal 22	1, 2, 3, 4	RW
149	P4.3	**AO1 Minimum** Defines the signal minimum to be either 0 mA or 4 mA (AO1 mode = 0–20 mA); 0V or 2V (AO1 mode = 0–10V). 0 = Set minimum value to 0V/0 mA. 1 = Set minimum value to 2V/4 mA.	1, 2, 3, 4	RW
147	P4.4	**AO1 Filter Time** Defines the filtering time for the analog output signal, with a higher number the more filtering time is added on the output signal. Setting this parameter value to 0.00 will deactivate filtering.	1, 2, 3, 4	RW

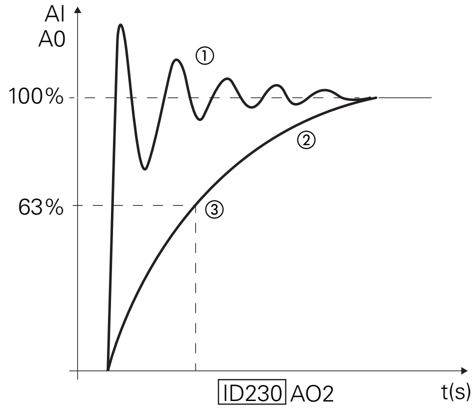
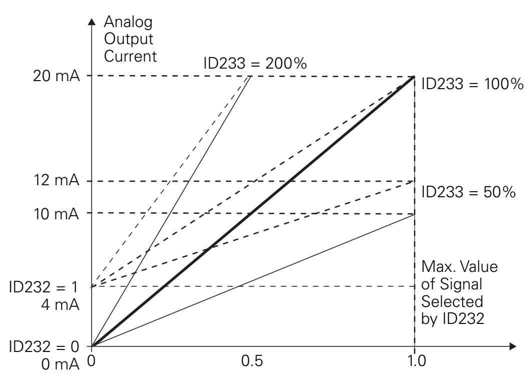
Figure 69. Analog output filtering



Notes

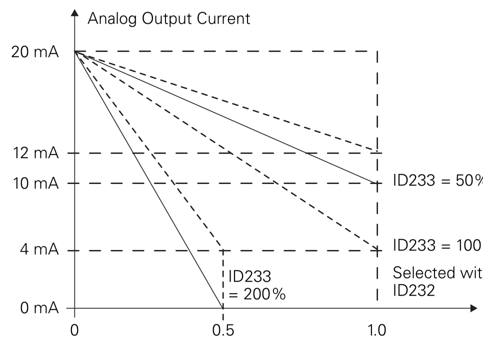
① Analog signal with faults (unfiltered).
② Filtered analog signal.
③ Filter time constant at 63% of the set value.

Modbus ID	Code	Parameters	Application	RO/RW
150	P4.5	**AO1 Scale** Scaling factor for analog output function from 10% to 1000%, in adjusting this value it will either extend or shrink the scale on the analog signal from 0–10 V/0–20 mA or 2–10 V/ 4–20 mA. **Figure 70. Analog output scaling** 	1, 2, 3, 4	RW
148	P4.6	**AO1 Inversion** Inverts the analog output signal, normally 0 V/0 mA/2 V/4 mA = 0% and 10 V/ 20 mA = 100%, when inverted 0 V/0 mA/2 V/4 mA = 100% and 10 V/20 mA = 0%: Maximum output signal = Minimum set value. Minimum output signal = Maximum set value. **Figure 71. Analog output invert** 	1, 2, 3, 4	RW
173	P4.7	**AO1 Offset** Add –100.0 to 100.0% to the analog output minimum value to add in an additional offset scale factor.	1, 2, 3, 4	RW
228	P4.8	**AO2 Mode** Selects the analog output mode for AO2 as current or voltage. There are internal relays to perform the switching of the signal between mA or V.	1, 2, 3, 4	RW
229	P4.9	**AO2 Function** Selects the desired function for the AO2 terminal 24.	1, 2, 3, 4	RW
232	P4.10	**AO2 Minimum** Defines the signal minimum to be either 0 mA or 4 mA (AO1 mode = 0–20 mA); 0 V or 2 V (AO1 mode = 0–10 V). 0 = Set minimum value to 0 V/0 mA. 1 = Set minimum value to 2 V/4 mA.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
230	P4.11	**AO2 Filter Time** Defines the filtering time for the analog output signal, with a higher number the more filtering time is added on the output signal. Setting this parameter value to 0.00 will deactivate filtering. **Figure 72. AO2 Filter Time**  **Notes:** ① Analog signal with faults (unfiltered) ② Filtered analog signal. ③ Filter time constant at 63% of the set value.	1, 2, 3, 4	RW
233	P4.12	**AO2 Scale** Scaling factor for analog output function from 10% to 1000%, in adjusting this value it will either extend or shrink the scale on the analog signal from 0–10 V/0–20 mA or 2–10 V/ 4–20 mA. **Figure 73. Analog output scaling**  	1, 2, 3, 4	RW
231	P4.13	**AO2 Inversion** Inverts the analog output signal, normally 0 V/0 mA/2 V/4 mA = 0% and 10 V/ 20 mA = 100%, when inverted 0 V/0m A/2 V/4 mA = 100% and 10 V/20 mA = 0%: Maximum output signal = Minimum set value. Minimum output signal = Maximum set value.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
234	P4.14	**A02 Offset** Add –100.0 to 100.0% to the analog output minimum value to add in an additional offset scale factor.	1, 2, 3, 4	RW

Figure 74. Analog output invert



Modbus ID	Code	Parameters	Application	RO/RW
151	P5.1	**DO1 Function** Setting Value Signal Content 0 = not used - Out of operation 1 = ready - Frequency converter is ready for operation 2 = run - Frequency converter is operating (motor is running 3 = fault - A fault trip has occurred 4 = fault invert - A fault trip not occurred 5 = warning - Always if a warning exists 6 = reverse - The reverse command has been selected 7 = at speed - The output frequency has reached the set reference 8 = zero frequency - Motor output is at zero frequency 9 = frequency limit1 supervision - Supervision for frequency limit1 is activated 10 = frequency limit2 supervision -Supervision for frequency limit2 is activated 11 = pid1 supervision - Supervision for pid1 controller is activated 12 = pid2 supervision - Supervision for pid2 controller is activated 13 = over heat warning - Drive over heat has occurred 14 = over current regular - Over current regulator is enabled 15 = over volt regular - Over volt regulator is enabled 16 = under volt regular - Under volt regulator is enabled 17 = 4 mA fault - 4 mA fault has occurred 18 = external brake - External brake is enabled 19 = external brake inverted - External brake control inverted 20 = torque limit supervision - Supervision for torque limit 21 = reference limit supervision - Supervision for reference limit 22 = control from IO - I/O is the control place 23 = unrequired rotation direction - The active direction isn't the same with the reference direction 24 = thermal fault - Thermal fault has occurred 25 = fire mode - Drive is in fire mode 26 = bypass running - Drive is in bypass mode 27 = external fault - External fault has occurred 28 = remote control - Remote is the control place 29 = jog speed - Drive is in jog mode 30 = motor thermal protection - Motor is thermal protected 31 = fieldbus input1 - Controlled by FB control word, look at com manuals. 32 = fieldbus input2 - Controlled by FB control word, look at com manuals. 33 = fieldbus input3 - Controlled by FB control word, look at com manuals. 34 = fieldbus intpu4 - Controlled by FB control word, look at com manuals. 35 = damper control - Drive is in damper control 36 = timer1 status - The status of timer1	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
151	P5.1	**DO1 Function, continued** Setting Value Signal Content 37 = timer2 status - The status of timer2 38 = timer3 status - The status of timer3 39 = emergency stop - Emergency stop digital input is enabled, drive faulted 40 = power limit supervision - Supervision for power limit 41 = temperature limit supervision - Supervision for temperature limit 42 = analog input supervision - Supervision for analog input 43 = motor1 control - Motor1 is controlled 44 = motor2 control - Motor2 is controlled 45 = motor3 control - Motor3 is controlled 46 = motor4 control - Motor4 is controlled 47 = motor5 control - Motor5 is controlled 48 = logic fulfilled - The status of logic function 49 = pid1 sleep - PID1 controller is in sleep mode 50 = pid2 sleep - PID2 controller is in sleep mode 51 = Motor Current 1 Supv - Motor current supervision value active 52 = Motor Current 2 Supv - Motor current supervision value active 53 = Second AI Limit Supv - Analog input supervision active 54 = DC Charge Switch Close - DC bus is charged (230 Vac–230 Vdc, 480 Vac–380 Vdc, 575 Vac–520 Vdc) fault signal is not effective by this output. 55 = Preheat Active - Preheat Control mode is activated 56 = Cold Weather Active - Cold Weather mode is activated 57 = Pre-Charge Active - Pre-charge resistor is active 58 = 2th Stage Ramp Frequency Active - 2nd stage ramp frequency limit reached 59 = STO Fault Output - STO fault is active 60 = Run Bypass/Drive - Run indication for drive and bypass.	**1, 2, 3, 4**	RW
152	P5.2	**RO1 Function** Setting Value Signal Content 0 = not used - Out of operation 1 = ready - Frequency converter is ready for operation 2 = run - Frequency converter is operating (motor is running 3 = fault - A fault trip has occurred 4 = fault invert - A fault trip not occurred 5 = warning - Always if a warning exists 6 = reverse - The reverse command has been selected 7 = at speed - The output frequency has reached the set reference 8 = zero frequency - Motor output is at zero frequency 9 = frequency limit1 supervision - Supervision for frequency limit1 is activated 10 = frequency limit2 supervision -Supervision for frequency limit2 is activated 11 = pid1 supervision - Supervision for pid1 controller is activated 12 = pid2 supervision - Supervision for pid2 controller is activated 13 = over heat warning - Drive over heat has occurred 14 = over current regular - Over current regulator is enabled 15 = over volt regular - Over volt regulator is enabled 16 = under volt regular - Under volt regulator is enabled 17 = 4 mA fault - 4 mA fault has occurred 18 = external brake - External brake is enabled 19 = external brake inverted - External brake control inverted 20 = torque limit supervision - Supervision for torque limit 21 = reference limit supervision - Supervision for reference limit 22 = control from IO - I/O is the control place 23 = unrequired rotation direction - The active direction isn't the same with the reference direction	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
152	P5.2	**RO1 Function, continued** Setting Value Signal Content 24 = thermal fault - Thermal fault has occurred 25 = fire mode - Drive is in fire mode 26 = bypass running - Drive is in bypass mode 27 = external fault - External fault has occurred 28 = remote control - Remote is the control place 29 = jog speed - Drive is in jog mode 30 = motor thermal protection - Motor is thermal protected 31 = fieldbus input1 - Controlled by FB control word, look at com manuals. 32 = fieldbus input2 - Controlled by FB control word, look at com manuals. 33 = fieldbus input3 - Controlled by FB control word, look at com manuals. 34 = fieldbus intpu4 - Controlled by FB control word, look at com manuals. 35 = damper control - Drive is in damper control 36 = timer1 status - The status of timer1 37 = timer2 status - The status of timer2 38 = timer3 status - The status of timer3 39 = emergency stop - Emergency stop digital input is enabled, drive faulted 40 = power limit supervision - Supervision for power limit 41 = temperature limit supervision - Supervision for temperature limit 42 = analog input supervision - Supervision for analog input 43 = motor1 control - Motor1 is controlled 44 = motor2 control - Motor2 is controlled 45 = motor3 control - Motor3 is controlled 46 = motor4 control - Motor4 is controlled 47 = motor5 control - Motor5 is controlled 48 = logic fulfilled - The status of logic function 49 = pid1 sleep - PID1 controller is in sleep mode 50 = pid2 sleep - PID2 controller is in sleep mode 51 = Motor Current 1 Supv - Motor current supervision value active 52 = Motor Current 2 Supv - Motor current supervision value active 53 = Second AI Limit Supv - Analog input supervision active 54 = DC Charge Switch Close - DC bus is charged (230 Vac–230 Vdc, 480 Vac–380 Vdc, 575 Vac–520 Vdc) fault signal is not effective by this output. 55 = Preheat Active - Preheat Control mode is activated 56 = Cold Weather Active - Cold Weather mode is activated 57 = Pre-Charge Active - Pre-charge resistor is active 58 = 2th Stage Ramp Frequency Active - 2nd stage ramp frequency limit reached 59 = STO Fault Output - STO fault is active 60 = Run Bypass/Drive - Run indication for drive and bypass.	**1, 2, 3, 4**	RW
153	P5.3	**RO2 Function** Setting Value Signal Content 0 = not used - Out of operation 1 = ready - Frequency converter is ready for operation 2 = run - Frequency converter is operating (motor is running 3 = fault - A fault trip has occurred 4 = fault invert - A fault trip not occurred 5 = warning - Always if a warning exists 6 = reverse - The reverse command has been selected 7 = at speed - The output frequency has reached the set reference 8 = zero frequency - Motor output is at zero frequency 9 = frequency limit1 supervision - Supervision for frequency limit1 is activated 10 = frequency limit2 supervision -Supervision for frequency limit2 is activated	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
153	**P5.3**	**RO2 Function, continued** Setting Value Signal Content 11 = pid1 supervision - Supervision for pid1 controller is activated 12 = pid2 supervision - Supervision for pid2 controller is activated 13 = over heat warning - Drive over heat has occurred 14 = over current regular - Over current regulator is enabled 15 = over volt regular - Over volt regulator is enabled 16 = under volt regular - Under volt regulator is enabled 17 = 4 mA fault - 4 mA fault has occurred 18 = external brake - External brake is enabled 19 = external brake inverted - External brake control inverted 20 = torque limit supervision - Supervision for torque limit 21 = reference limit supervision - Supervision for reference limit 22 = control from IO - I/O is the control place 23 = unrequired rotation direction - The active direction isn't the same with the reference direction 24 = thermal fault - Thermal fault has occurred 25 = fire mode - Drive is in fire mode 26 = bypass running - Drive is in bypass mode 27 = external fault - External fault has occurred 28 = remote control - Remote is the control place 29 = jog speed - Drive is in jog mode 30 = motor thermal protection - Motor is thermal protected 31 = fieldbus input1 - Controlled by FB control word, look at com manuals. 32 = fieldbus input2 - Controlled by FB control word, look at com manuals. 33 = fieldbus input3 - Controlled by FB control word, look at com manuals. 34 = fieldbus intpu4 - Controlled by FB control word, look at com manuals. 35 = damper control - Drive is in damper control 36 = timer1 status - The status of timer1 37 = timer2 status - The status of timer2 38 = timer3 status - The status of timer3 39 = emergency stop - Emergency stop digital input is enabled, drive faulted 40 = power limit supervision - Supervision for power limit 41 = temperature limit supervision - Supervision for temperature limit 42 = analog input supervision - Supervision for analog input 43 = motor1 control - Motor1 is controlled 44 = motor2 control - Motor2 is controlled 45 = motor3 control - Motor3 is controlled 46 = motor4 control - Motor4 is controlled 47 = motor5 control - Motor5 is controlled 48 = logic fulfilled - The status of logic function 49 = pid1 sleep - PID1 controller is in sleep mode 50 = pid2 sleep - PID2 controller is in sleep mode 51 = Motor Current 1 Supv - Motor current supervision value active 52 = Motor Current 2 Supv - Motor current supervision value active 53 = Second AI Limit Supv - Analog input supervision active 54 = DC Charge Switch Close - DC bus is charged (230 Vac–230 Vdc, 480 Vac–380 Vdc, 575 Vac–520 Vdc) fault signal is not effective by this output. 55 = Preheat Active - Preheat Control mode is activated 56 = Cold Weather Active - Cold Weather mode is activated 57 = Pre-Charge Active - Pre-charge resistor is active 58 = 2th Stage Ramp Frequency Active - 2nd stage ramp frequency limit reached 59 = STO Fault Output - STO fault is active 60 = Run Bypass/Drive - Run indication for drive and bypass.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
538	P5.4	**RO3 Function** Setting Value Signal Content 0 = not used - Out of operation 1 = ready - Frequency converter is ready for operation 2 = run - Frequency converter is operating (motor is running 3 = fault - A fault trip has occurred 4 = fault invert - A fault trip not occurred 5 = warning - Always if a warning exists 6 = reverse - The reverse command has been selected 7 = at speed - The output frequency has reached the set reference 8 = zero frequency - Motor output is at zero frequency 9 = frequency limit1 supervision - Supervision for frequency limit1 is activated 10 = frequency limit2 supervision -Supervision for frequency limit2 is activated 11 = pid1 supervision - Supervision for pid1 controller is activated 12 = pid2 supervision - Supervision for pid2 controller is activated 13 = over heat warning - Drive over heat has occurred 14 = over current regular - Over current regulator is enabled 15 = over volt regular - Over volt regulator is enabled 16 = under volt regular - Under volt regulator is enabled 17 = 4 mA fault - 4 mA fault has occurred 18 = external brake - External brake is enabled 19 = external brake inverted - External brake control inverted 20 = torque limit supervision - Supervision for torque limit 21 = reference limit supervision - Supervision for reference limit 22 = control from IO - I/O is the control place 23 = unrequired rotation direction - The active direction isn't the same with the reference direction 24 = thermal fault - Thermal fault has occurred 25 = fire mode - Drive is in fire mode 26 = bypass running - Drive is in bypass mode 27 = external fault - External fault has occurred 28 = remote control - Remote is the control place 29 = jog speed - Drive is in jog mode 30 = motor thermal protection - Motor is thermal protected 31 = fieldbus input1 - Controlled by FB control word, look at com manuals. 32 = fieldbus input2 - Controlled by FB control word, look at com manuals. 33 = fieldbus input3 - Controlled by FB control word, look at com manuals. 34 = fieldbus intpu4 - Controlled by FB control word, look at com manuals. 35 = damper control - Drive is in damper control 36 = timer1 status - The status of timer1 37 = timer2 status - The status of timer2 38 = timer3 status - The status of timer3 39 = emergency stop - Emergency stop digital input is enabled, drive faulted 40 = power limit supervision - Supervision for power limit 41 = temperature limit supervision - Supervision for temperature limit 42 = analog input supervision - Supervision for analog input 43 = motor1 control - Motor1 is controlled 44 = motor2 control - Motor2 is controlled 45 = motor3 control - Motor3 is controlled 46 = motor4 control - Motor4 is controlled 47 = motor5 control - Motor5 is controlled 48 = logic fulfilled - The status of logic function 49 = pid1 sleep - PID1 controller is in sleep mode 50 = pid2 sleep - PID2 controller is in sleep mode 51 = Motor Current 1 Supv - Motor current supervision value active 52 = Motor Current 2 Supv - Motor current supervision value active	1, 2, 3, 4	RW

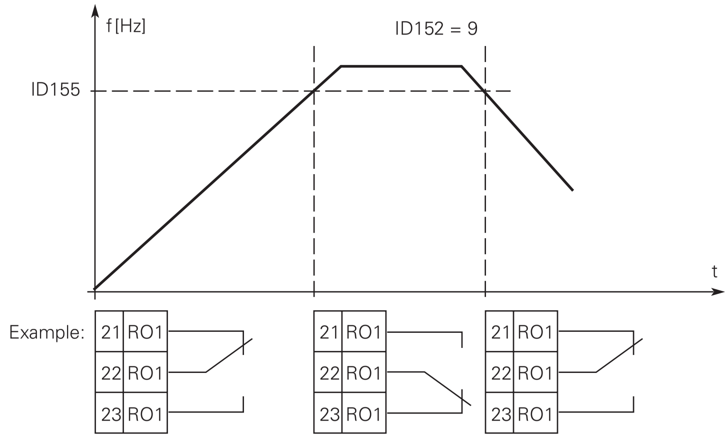
Modbus ID	Code	Parameters	Application	RO/RW
538	P5.4	**RO3 Function, continued** Setting Value Signal Content 53 = Second AI Limit Supv - Analog input supervision active 54 = DC Charge Switch Close - DC bus is charged (230 Vac–230 Vdc, 480 Vac–380 Vdc, 575 Vac–520 Vdc) fault signal is not effective by this output. 55 = Preheat Active - Preheat Control mode is activated 56 = Cold Weather Active - Cold Weather mode is activated 57 = Pre-Charge Active - Pre-charge resistor is active 58 = 2th Stage Ramp Frequency Active - 2nd stage ramp frequency limit reached 59 = STO Fault Output - STO fault is active 60 = Run Bypass/Drive - Run indication for drive and bypass.	1, 2, 3, 4	RW
2463	P5.5	**Virtual RO1 Function** This relay is a internal relay that can be used to tie to internal functions in the drive. The functions are the same with the standard hardware relays. Setting Value Signal Content 0 = not used - Out of operation 1 = ready - Frequency converter is ready for operation 2 = run - Frequency converter is operating (motor is running 3 = fault - A fault trip has occurred 4 = fault invert - A fault trip not occurred 5 = warning - Always if a warning exists 6 = reverse - The reverse command has been selected 7 = at speed - The output frequency has reached the set reference 8 = zero frequency - Motor output is at zero frequency 9 = frequency limit1 supervision - Supervision for frequency limit1 is activated 10 = frequency limit2 supervision -Supervision for frequency limit2 is activated 11 = pid1 supervision - Supervision for pid1 controller is activated 12 = pid2 supervision - Supervision for pid2 controller is activated 13 = over heat warning - Drive over heat has occurred 14 = over current regular - Over current regulator is enabled 15 = over volt regular - Over volt regulator is enabled 16 = under volt regular - Under volt regulator is enabled 17 = 4 mA fault - 4 mA fault has occurred 18 = external brake - External brake is enabled 19 = external brake inverted - External brake control inverted 20 = torque limit supervision - Supervision for torque limit 21 = reference limit supervision - Supervision for reference limit 22 = control from IO - I/O is the control place 23 = unrequired rotation direction - The active direction isn't the same with the reference direction 24 = thermal fault - Thermal fault has occurred 25 = fire mode - Drive is in fire mode 26 = bypass running - Drive is in bypass mode 27 = external fault - External fault has occurred 28 = remote control - Remote is the control place 29 = jog speed - Drive is in jog mode 30 = motor thermal protection - Motor is thermal protected 31 = fieldbus input1 - Controlled by FB control word, look at com manuals. 32 = fieldbus input2 - Controlled by FB control word, look at com manuals. 33 = fieldbus input3 - Controlled by FB control word, look at com manuals. 34 = fieldbus intpu4 - Controlled by FB control word, look at com manuals. 35 = damper control - Drive is in damper control	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
2463	**P5.5**	**Virtual RO1 Function, continued** This relay is a internal relay that can be used to tie to internal functions in the drive. The functions are the same with the standard hardware relays. Setting Value Signal Content 36 = timer1 status - The status of timer1 37 = timer2 status - The status of timer2 38 = timer3 status - The status of timer3 39 = emergency stop - Emergency stop digital input is enabled, drive faulted 40 = power limit supervision - Supervision for power limit 41 = temperature limit supervision - Supervision for temperature limit 42 = analog input supervision - Supervision for analog input 43 = motor1 control - Motor1 is controlled 44 = motor2 control - Motor2 is controlled 45 = motor3 control - Motor3 is controlled 46 = motor4 control - Motor4 is controlled 47 = motor5 control - Motor5 is controlled 48 = logic fulfilled - The status of logic function 49 = pid1 sleep - PID1 controller is in sleep mode 50 = pid2 sleep - PID2 controller is in sleep mode 51 = Motor Current 1 Supv - Motor current supervision value active 52 = Motor Current 2 Supv - Motor current supervision value active 53 = Second AI Limit Supv - Analog input supervision active 54 = DC Charge Switch Close - DC bus is charged (230 Vac–230 Vdc, 480 Vac–380 Vdc, 575 Vac–520 Vdc) fault signal is not effective by this output. 55 = Preheat Active - Preheat Control mode is activated 56 = Cold Weather Active - Cold Weather mode is activated 57 = Pre-Charge Active - Pre-charge resistor is active 58 = 2th Stage Ramp Frequency Active - 2nd stage ramp frequency limit reached 59 = STO Fault Output - STO fault is active 60 = Run Bypass/Drive - Run indication for drive and bypass.	**1, 2, 3, 4**	RW
2464	**P5.6**	**Virtual RO2 Function** This relay is a internal relay that can be used to tie to internal functions in the drive. The functions are the same with the standard hardware relays. Setting Value Signal Content 0 = not used - Out of operation 1 = ready - Frequency converter is ready for operation 2 = run - Frequency converter is operating (motor is running 3 = fault - A fault trip has occurred 4 = fault invert - A fault trip not occurred 5 = warning - Always if a warning exists 6 = reverse - The reverse command has been selected 7 = at speed - The output frequency has reached the set reference 8 = zero frequency - Motor output is at zero frequency 9 = frequency limit1 supervision - Supervision for frequency limit1 is activated 10 = frequency limit2 supervision -Supervision for frequency limit2 is activated 11 = pid1 supervision - Supervision for pid1 controller is activated 12 = pid2 supervision - Supervision for pid2 controller is activated 13 = over heat warning - Drive over heat has occurred 14 = over current regular - Over current regulator is enabled 15 = over volt regular - Over volt regulator is enabled 16 = under volt regular - Under volt regulator is enabled 17 = 4 mA fault - 4 mA fault has occurred 18 = external brake - External brake is enabled 19 = external brake inverted - External brake control inverted	**1, 2, 3, 4**	RW

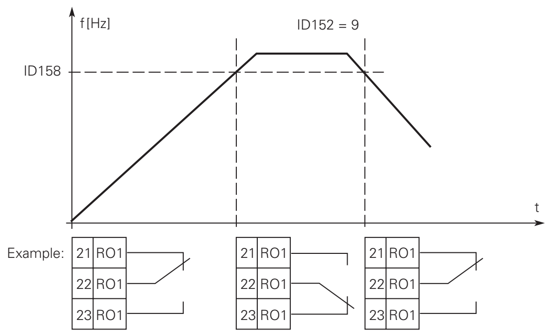
Modbus ID	Code	Parameters	Application	RO/RW
2464	P5.6	**Virtual RO2 Function, continued** This relay is a internal relay that can be used to tie to internal functions in the drive. The functions are the same with the standard hardware relays. Setting Value Signal Content 20 = torque limit supervision - Supervision for torque limit 21 = reference limit supervision - Supervision for reference limit 22 = control from IO - I/O is the control place 23 = unrequired rotation direction - The active direction isn't the same with the reference direction 24 = thermal fault - Thermal fault has occurred 25 = fire mode - Drive is in fire mode 26 = bypass running - Drive is in bypass mode 27 = external fault - External fault has occurred 28 = remote control - Remote is the control place 29 = jog speed - Drive is in jog mode 30 = motor thermal protection - Motor is thermal protected 31 = fieldbus input1 - Controlled by FB control word, look at com manuals. 32 = fieldbus input2 - Controlled by FB control word, look at com manuals. 33 = fieldbus input3 - Controlled by FB control word, look at com manuals. 34 = fieldbus intpu4 - Controlled by FB control word, look at com manuals. 35 = damper control - Drive is in damper control 36 = timer1 status - The status of timer1 37 = timer2 status - The status of timer2 38 = timer3 status - The status of timer3 39 = emergency stop - Emergency stop digital input is enabled, drive faulted 40 = power limit supervision - Supervision for power limit 41 = temperature limit supervision - Supervision for temperature limit 42 = analog input supervision - Supervision for analog input 43 = motor1 control - Motor1 is controlled 44 = motor2 control - Motor2 is controlled 45 = motor3 control - Motor3 is controlled 46 = motor4 control - Motor4 is controlled 47 = motor5 control - Motor5 is controlled 48 = logic fulfilled - The status of logic function 49 = pid1 sleep - PID1 controller is in sleep mode 50 = pid2 sleep - PID2 controller is in sleep mode 51 = Motor Current 1 Supv - Motor current supervision value active 52 = Motor Current 2 Supv - Motor current supervision value active 53 = Second AI Limit Supv - Analog input supervision active 54 = DC Charge Switch Close - DC bus is charged (230 Vac–230 Vdc, 480 Vac–380 Vdc, 575 Vac–520 Vdc) fault signal is not effective by this output. 55 = Preheat Active - Preheat Control mode is activated 56 = Cold Weather Active - Cold Weather mode is activated 57 = Pre-Charge Active - Pre-charge resistor is active 58 = 2th Stage Ramp Frequency Active - 2nd stage ramp frequency limit reached 59 = STO Fault Output - STO fault is active 60 = Run Bypass/Drive - Run indication for drive and bypass.	1, 2, 3, 4	RW
154	P5.7	**Freq Limit 1 Supv** Selects how the Frequency converter supervision controller functions as either a high or low limit based off the set supervision value. It can also be used to enabled an external brake control relay. 0 = No supervision 1 = Low limit supervision 2 = High limit supervision 3 = Brake-on control (Application 4 only)	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
155	P5.8	**Freq Limit 1 Supv Val** Selects the frequency value supervised by P5.7. If the output frequency goes under/over the set limit (P5.8), this function generates a warning message via the digital output DO1 or relay outputs RO1 or RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	1, 2, 3, 4	RW

Figure 75. Supervision function



Modbus ID	Code	Parameters	Application	RO/RW
157	P5.9	**Freq Limit 2 Supv** Selects how the Frequency converter supervision controller functions as either a high or low limit based off the set supervision value. It can also be used to enabled/disabled an external brake control relay. 0 = No limit 1 = Low limit supervision 2 = High limit supervision 3 = Brake-off control (Application 4 only) 4 = Brake-on/off control (Application 4 only)	1, 2, 3, 4	RW
158	P5.10	**Freq Limit 2 Supv Val** Selects the frequency value supervised by P5.9. If the output frequency goes under/over the set limit (P5.9), this function generates a warning message via the digital output DO1 or relay outputs RO1 or RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	1, 2, 3, 4	RW

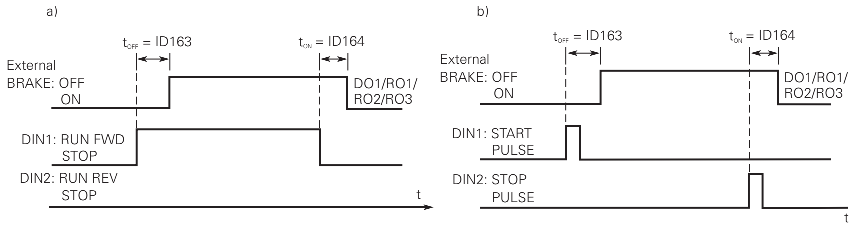
Modbus ID	Code	Parameters	Application	RO/RW
159	**P5.11**	**Torque Limit Supv** Selects how the frequency converter functions upon the torque limit supervision value being met as a high or low limit. It can also control a mechanical brake to disable once torque is built up with the motor (Torque proofing). 0 = No limit 1 = Low limit supervision 2 = High limit supervision 3 = Brake-off control (Application 4 only) **Figure 76. Supervision function** 	**1, 2, 3, 4**	RW
160	**P5.12**	**Torque Limit Supv Val** Set here the torque value to be supervised by P5.11. If the output frequency goes under/over the set limit (P5.12), this function generates a warning message via the digital output DO1 or via the relay outputs RO1 or RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
161	**P5.13**	**Ref Limit Supv** Selects how the frequency converter functions upon the reference supervision value being a high or low limit. 0 = No supervision 1 = Low limit supervision 2 = High limit supervision	**1, 2, 3, 4**	RW
162	**P5.14**	**Ref Limit Supv Val** The frequency value to be supervised by P5.13. If the output frequency goes under/over the set limit (P5.14), this function generates a warning message via the digital output DO1 or via the relay outputs RO1 or RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
163	**P5.15**	**Ext Brake Off Delay** The function of the external brake can be timed on or time off delay to provide ample time to enable and disable an external brake module. The brake control signal can be programmed via digital output DO1 or via one of the relay outputs RO1, RO2 and RO3; see P5.1 to P5.2, P5.3, and P5.4. a) Start/Stop Logic Selection, P3.1 =0, 1 or 2 b) Start/Stop Logic Selection, P3.1 = 3	**4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
164	P5.16	**Ext Brake On Delay**	4	RW

The function of the external brake can be timed on or time off delay to provide ample time to enable and disable an external brake module.

The brake control signal can be programmed via digital output DO1 or via one of the relay outputs RO1, RO2 and RO3; see P5.1 to P5.2, P5.3, and P5.4.

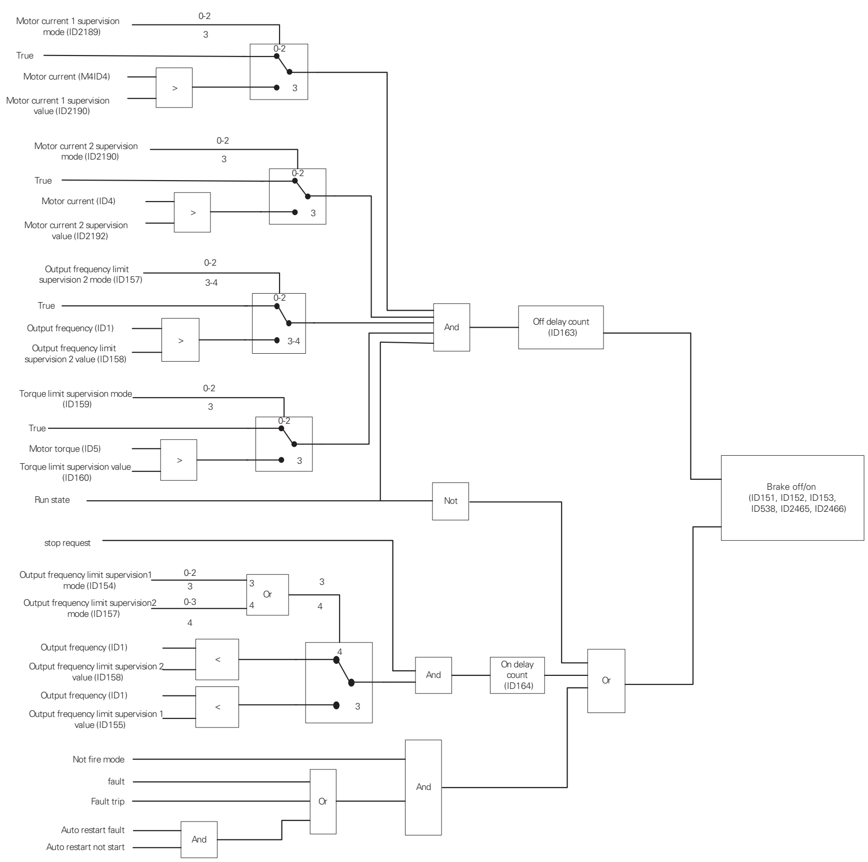
Figure 77. External brake control



a) Start/Stop Logic Selection, P3.1 =0, 1 or 2

b) Start/Stop Logic Selection, P3.1 = 3

When using the brake control the following table is used to demonstrate the control functions. Brake on delay should be set longer than the ramp time in order to avoid damaging the brake.



Modbus ID	Code	Parameters	Application	RO/RW
165	P5.17	**Temp Limit Supv**	1, 2, 3, 4	RW

Selects how the frequency converter functions upon the value setting based off the Drive Temperature.

0 = No supervision

1 = Low limit supervision

2 = High limit supervision

Modbus ID	Code	Parameters	Application	RO/RW
166	**P5.18**	**Temp Limit Supv Val** This temperature value is supervised by P5.17. If the temperature of the frequency converter unit falls below or exceeds the set limit (P5.18), this function generates a warning message via the digital output DO1 or via a relay output RO1, RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
167	**P5.19**	**Power Limit Supv** Selects how the frequency converter functions based off the power monitor upon the limit value setting 0 = No supervision 1 = Low limit supervision 2 = High limit supervision	**1, 2, 3, 4**	RW
168	**P5.20**	**Power Limit Supv Val** This power value is supervised by P5.19. If the calculated power value falls below or exceeds the set limit (P5.20), this function generates a warning message via the digital output DO1 or via a relay output RO1, RO2 or RO3, depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
170	**P5.21**	**AI Supv Select** Selects analog signal to use for the analog input supervision 0 = Analog reference from AI1 (terminals 2 and 3, e.g., potentiometer) 1 = Analog reference from AI2 (terminals 4 and 5, e.g., transducer)	**1, 2, 3, 4**	RW
171	**P5.22**	**AI Limit Supv** Selects how the frequency converter functions based off the analog input limit value setting 0 = No supervision 1 = Low limit supervision 2 = High limit supervision	**1, 2, 3, 4**	RW
172	**P5.23**	**AI Limit Supv Val** The value of the selected analog input to be supervised by P5.22. If the value of the selected analog input goes under/over the set limit (P5.23), this function generates a warning message through the digital output or the relay outputs depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
1346	**P5.24**	**PID1 Superv Enable** Upper and lower limits around the reference are set. When the actual value goes above or below these, a counter starts counting up toward the Delay. When the actual value is within the allowed area, the same counter counts down instead. After the delay time it will turn on an relay output value. These can be fed into a digital input for pressure level faults.	**2, 3, 4**	RW
1347	**P5.25**	**PID1 Superv Upper Limit** Upper and lower limits around the reference are set. When the actual value goes above or below these, a counter starts counting up toward the Delay. When the actual value is within the allowed area, the same counter counts down instead. After the delay time it will turn on an relay output value. These can be fed into a digital input for pressure level faults.	**2, 3, 4**	RW
1349	**P5.26**	**PID1 Superv Lower Limit** Upper and lower limits around the reference are set. When the actual value goes above or below these, a counter starts counting up toward the Delay. When the actual value is within the allowed area, the same counter counts down instead. After the delay time it will turn on an relay output value. These can be fed into a digital input for pressure level faults.	**2, 3, 4**	RW
1351	**P5.27**	**PID1 Superv Delay** Upper and lower limits around the reference are set. When the actual value goes above or below these, a counter starts counting up toward the Delay. When the actual value is within the allowed area, the same counter counts down instead. After the delay time it will turn on an relay output value. These can be fed into a digital input for pressure level faults.	**2, 3, 4**	RW
1408	**P5.28**	**PID2 Superv Enable** Upper and lower limits around the reference are set. When the actual value goes above or below these, a counter starts counting up toward the Delay. When the actual value is within the allowed area, the same counter counts down instead. After the delay time it will turn on an relay output value. These can be fed into a digital input for pressure level faults.	**3, 4**	RW

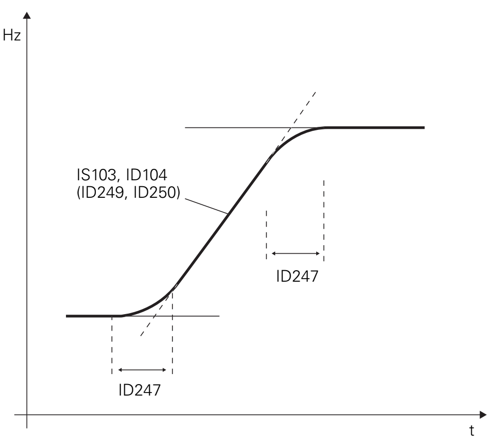
Modbus ID	Code	Parameters	Application	RO/RW
1409	**P5.29**	**PID2 Superv Upper Limit** Upper and lower limits around the reference are set. When the actual value goes above or below these, a counter starts counting up toward the Delay. When the actual value is within the allowed area, the same counter counts down instead. After the delay time it will turn on an relay output value. These can be fed into a digital input for pressure level faults.	**3, 4**	RW
1411	**P5.30**	**PID2 Superv Lower Limit** Upper and lower limits around the reference are set. When the actual value goes above or below these, a counter starts counting up toward the Delay. When the actual value is within the allowed area, the same counter counts down instead. After the delay time it will turn on an relay output value. These can be fed into a digital input for pressure level faults.	**3, 4**	RW
1413	**P5.31**	**PID2 Superv Delay** Upper and lower limits around the reference are set. When the actual value goes above or below these, a counter starts counting up toward the Delay. When the actual value is within the allowed area, the same counter counts down instead. After the delay time it will turn on an relay output value. These can be fed into a digital input for pressure level faults.	**3, 4**	RW
2112	**P5.32**	**RO1 On Delay** Delay time for RO1 relay to turn on after signal received.	**1, 2, 3, 4**	RW
2113	**P5.33**	**RO1 Off Delay** Delay time for RO1 relay to turn off after signal removed.	**1, 2, 3, 4**	RW
2114	**P5.34**	**RO2 On Delay** Delay time for RO2 relay to turn on after signal received.	**1, 2, 3, 4**	RW
2115	**P5.35**	**RO2 Off Delay** Delay time for RO2 relay to turn off after signal removed.	**1, 2, 3, 4**	RW
2116	**P5.36**	**RO3 On Delay** Delay time for RO3 relay to turn on after signal received.	**1, 2, 3, 4**	RW
2117	**P5.37**	**RO3 Off Delay** Delay time for RO3 relay to turn off after signal removed.	**1, 2, 3, 4**	RW
2118	**P5.38**	**RO3 Reverse** Inverts the output function of RO3 to be normally closed. Instead of normally open, on the Form A relay.	**1, 2, 3, 4**	RW
2189	**P5.39**	**Motor Current 1 Supv** Selects how the frequency converter functions based off the motor current limit value setting. The drive monitors the active motor current and will enable itself based off the supervision value. 0 = No supervision 1 = Low limit supervision 2 = High limit supervision 3 = Brake Off Control (Application 4 only)	**1, 2, 3, 4**	RW
2190	**P5.40**	**Motor Current 1 Supv Value** The value of the selected motor current value to be monitored by P5.39. If the value of the selected analog input goes under/over the set limit (P5.40), this function generates a warning message through the digital output or the relay outputs depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
2191	**P5.41**	**Motor Current 2 Supv** Selects how the frequency converter functions based off the motor current limit value setting. The drive monitors the active motor current and will enable itself based off the supervision value. 0 = No supervision 1 = Low limit supervision 2 = High limit supervision 3 = Brake Off Control (Application 4 only)	**1, 2, 3, 4**	RW
2192	**P5.42**	**Motor Current 2 Supv Value** The value of the selected motor current value to be monitored by P5.41. If the value of the selected analog input goes under/over the set limit (P5.42), this function generates a warning message through the digital output or the relay outputs depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2193	P5.43	**Second AI Supv Select** Selects analog signal to use for the analog input supervision 0 = Analog reference from AI1 (terminals 2 and 3, e.g., potentiometer) 1 = Analog reference from AI2 (terminals 4 and 5, e.g., transducer)	1, 2, 3, 4	RW
2194	P5.44	**Second AI Limit Supv** Selects how the frequency converter functions based off the analog input limit value setting 0 = No supervision 1 = Low limit supervision 2 = High limit supervision	1, 2, 3, 4	RW
2195	P5.45	**Second AI Limit Supv Val** The value of the selected analog input to be supervised by P5.44. If the value of the selected analog input goes under/over the set limit (P5.45), this function generates a warning message through the digital output or the relay outputs depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	1, 2, 3, 4	RW
2196	P5.46	**Motor Current 1 Supv Hyst** This value selects the bandwidth between when the motor current 1 supervision enables and disables itself.	1, 2, 3, 4	RW
2197	P5.47	**Motor Current 2 Supv Hyst** This value selects the bandwidth between when the motor current 1 supervision enables and disables itself.	1, 2, 3, 4	RW
2198	P5.48	**AI Supv Hyst** This value selects the bandwidth between when the AI supervision enables and disables itself.	1, 2, 3, 4	RW
2199	P5.49	**Second AI Supv Hyst** This value selects the bandwidth between when the AI supervision enables and disables itself.	1, 2, 3, 4	RW
2200	P5.50	**Freq Limit 1 Supv Hyst** This value selects the bandwidth between when the Output Frequency supervision enables and disables itself.	1, 2, 3, 4	RW
2201	P5.51	**Freq Limit 2 Supv Hyst** This value selects the bandwidth between when the Output Frequency supervision enables and disables itself.	1, 2, 3, 4	RW
2202	P5.52	**Torque Limit Supv Hyst** This value selects the bandwidth between when the Torque supervision enables and disables itself.	1, 2, 3, 4	RW
2203	P5.53	**Ref Limit Supv Hyst** This value selects the bandwidth between when the Reference limit supervision enables and disables itself.	1, 2, 3, 4	RW
2204	P5.54	**Temp Limit Supv Hyst** This value selects the bandwidth between when the Temp limit supervision enables and disables itself.	1, 2, 3, 4	RW
2205	P5.55	**Power Limit Supv Hyst** This value selects the bandwidth between when the Power limit supervision enables and disables itself.	1, 2, 3, 4	RW
751	P6.1	**Logic Function Select** The logic function enables you to link both parameters P6.2(A) and P6.3 (B) logically with each other. The value can be And - indicating both being active then enable the logic, OR - if one or both inputs are active then it will enabled the logic, XOR - if any one of the inputs are active the logic is enabled, if both logic's are the same state it disables the logic. The result (LOG) can then be assigned to the digital outputs DO, RO1, RO2 and RO3. The type of operation is defined in parameter P6.1: 0 = AND 1 = OR 2 = XOR	4	RW
752	P6.2	**Logic Operation Input A** Input A for Logic function calculation defined in P6.1. See P5.1 DO/RO Functions for settings.	4	RW
753	P6.3	**Logic Operation Input B** Input B for Logic function calculation defined in P6.1. See P5.1 DO/RO Functions for settings.	4	RW

Modbus ID	Code	Parameters	Application	RO/RW
138	P7.1	**Remote 2 Control Place** Selects where the drive will look for the 2nd start command, I/O terminals would be from≈the Digital hardwired inputs, Fieldbus would be a communication bus. Keypad will indicate what mode is selected. Digital input will select between control place 1 and control place 2.	1, 2, 3, 4	RW
139	P7.2	**Remote 2 Reference** Selects what frequency reference source to look at when in the Remote 2 control mode.	1, 2, 3, 4	RW
141	P7.3	**Keypad Reference** Keypad Reference value.	1, 2, 3, 4	RW
116	P7.4	**Keypad Direction** 0 = Forward: The rotation of the motor is forward or clockwise direction, when the keypad is the active control place. 1 = Reverse: The rotation of the motor is reversed or counter clockwise direction, when the keypad is the active control place.	1, 2, 3, 4	RW
114	P7.5	**Keypad Stop** To make the STOP button a "hotspot" that always stops the drive regardless of the selected control place, set the value of this parameter to Always Enabled for being used in local and remote. Enable - Keypad operation activates the stop button only in keypad mode or the local control place.	1, 2, 3, 4	RW
117	P7.6	**Jog Reference** Defines the jogging speed set point, this speed is selected with the digital input programmed for Jogging speed. When enabled the drive starts and ramps to this speed, input removed drive stops. This parameter's value is automatically limited between minimum and maximum frequency (P1.1.1 and P1.1.2).	1, 2, 3, 4	RW
156	P7.7	**Motor Pot Ramp Time** Defines the speed of change for the motor potentiometer reference value.	4	RW
169	P7.8	**Motor Pot Ref Reset** Defines how the motor pot reference signal is handled on shutting down frequency converter output or powering down the frequency converter. 0 = No reset - reference stays at last setting 1 = Memory reset in stop and power down - reference resets to 0 when drive is stopped or the power is cycled to the drive 2 = Memory reset in power down - reference resets to 0 when drive is powered down only	4	RW
252	P7.9	**Start Mode** Ramp 0 = The frequency converter starts from 0 Hz and accelerates to the set reference frequency within the set acceleration time. (Load inertia or starting friction may cause prolonged acceleration times.) 1 = Flying Start from Stop Frequency 2 = Flying Start from Max. Frequency The frequency converter is able to start into a running motor by applying a small voltage to motor to search for the frequency corresponding to the speed the motor is running at. Searching starts from the maximum frequency toward the actual frequency until the correct value is detected. Thereafter, the output frequency will be increased/decreased to the set reference value according to the set acceleration/deceleration parameters. Use this mode if the motor is coasting when the start command is given, with the flying start	1, 2, 3, 4	RW
253	P7.10	**Stop Mode** Coasting 0 = The motor coasts to a halt without any control from the frequency converter, after the Stop command, output of drive shuts off. The Motor slows based off the inertia loss. Ramp 1 = After the Stop command, the speed of the motor is decelerated according to the set deceleration parameters. If the regenerated energy is high and a faster deceleration is required, it may be necessary to use an external braking resistor for faster deceleration. Enabled Normal stop: Ramp/ Run Disable stop: coasting	1, 2, 3, 4	RW

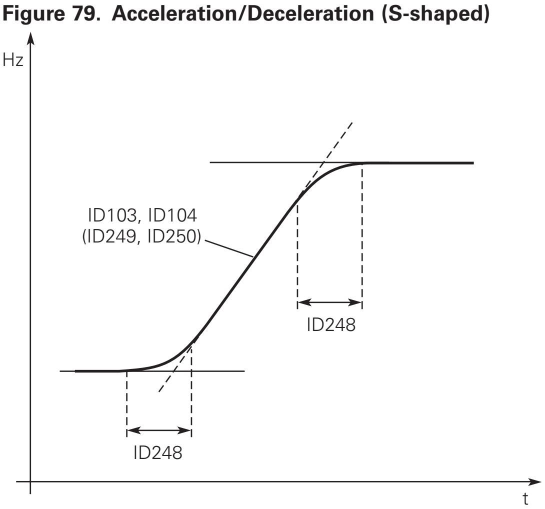
Modbus ID	Code	Parameters	Application	RO/RW
247	**P7.11**	**Ramp 1 Shape** The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.0 gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.1 to 10 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope. The acceleration time is determined with P1.3 and P1.4 or P7.13 and P7.14.	**1, 2, 3, 4**	RW

Figure 78. Acceleration/Deceleration (S-shaped)



Modbus ID	Code	Parameters	Application	RO/RW
248	**P7.12**	**Ramp 2 Shape** The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.0 gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.1 to 10 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope. The acceleration time is determined with P1.3 and P1.4 or P7.13 and P7.14.	**1, 2, 3, 4**	RW

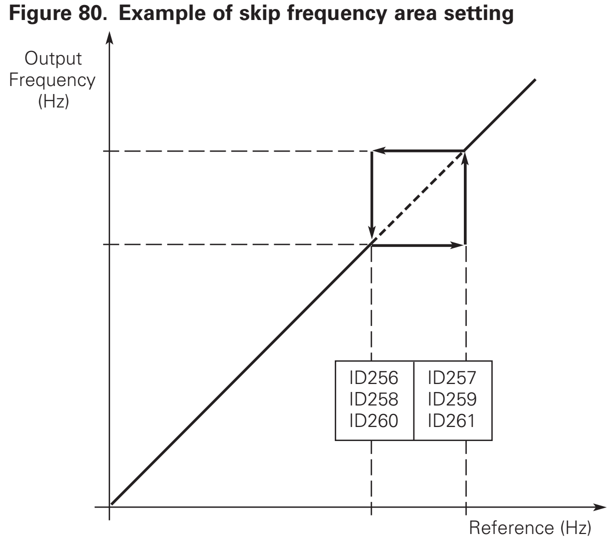
Figure 79. Acceleration/Deceleration (S-shaped)



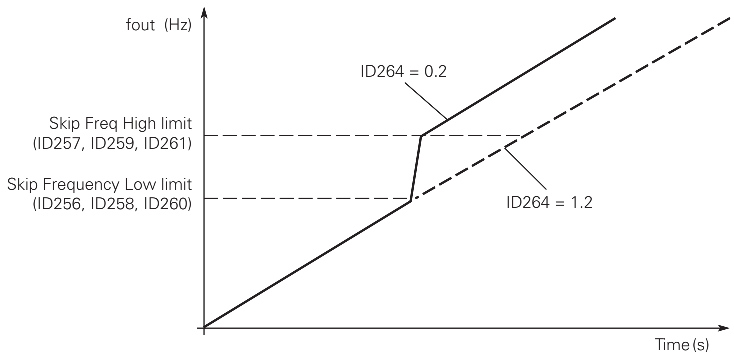
Modbus ID	Code	Parameters	Application	RO/RW
249	**P7.13**	**Accel Time 2** These values correspond to the time required for the output frequency to accelerate from the zero frequency to the set maximum frequency (P1.2). These parameters provide the possibility to set two different acceleration/deceleration time sets for one application. The active set can be selected with the programmable digital input.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
250	**P7.14**	**Decel Time 2** These values correspond to the time required for the output frequency to accelerate from the zero frequency to the set maximum frequency (P1.2). These parameters provide the possibility to set two different acceleration/deceleration time sets for one application. The active set can be selected with the programmable digital input.	**1, 2, 3, 4**	RW
256	**P7.15**	**Skip F1 Low Limit** In some systems it may be necessary to avoid certain frequencies because of mechanical resonance problems. With these parameters, limits are set for the "skip frequency" regions, the frequency converter will skip the set frequencies, ramp time will be the same.	**1, 2, 3, 4**	RW
257	**P7.16**	**Skip F1 High Limit** In some systems it may be necessary to avoid certain frequencies because of mechanical resonance problems. With these parameters, limits are set for the "skip frequency" regions, the frequency converter will skip the set frequency, ramp time will be the same.	**1, 2, 3, 4**	RW
258	**P7.17**	**Skip F2 Low Limit** In some systems it may be necessary to avoid certain frequencies because of mechanical resonance problems. With these parameters, limits are set for the "skip frequency" regions, the frequency converter will skip the set frequency, ramp time will be the same.	**1, 2, 3, 4**	RW
259	**P7.18**	**Skip F2 High Limit** In some systems it may be necessary to avoid certain frequencies because of mechanical resonance problems. With these parameters, limits are set for the "skip frequency" regions, the frequency converter will skip the set frequency, ramp time will be the same.	**1, 2, 3, 4**	RW
260	**P7.19**	**Skip F3 Low Limit** In some systems it may be necessary to avoid certain frequencies because of mechanical resonance problems. With these parameters, limits are set for the "skip frequency" regions, the frequency converter will skip the set frequency, ramp time will be the same.	**1, 2, 3, 4**	RW
261	**P7.20**	**Skip F3 High Limit** In some systems it may be necessary to avoid certain frequencies because of mechanical resonance problems. With these parameters, limits are set for the "skip frequency" regions, the frequency converter will skip the set frequency, ramp time will be the same.	**1, 2, 3, 4**	RW

Figure 80. Example of skip frequency area setting



Modbus ID	Code	Parameters	Application	RO/RW
264	P7.21	**Skip Range Ramp Factor** Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor. e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits. **Figure 81. Ramp speed scaling between skip frequencies**	1, 2, 3, 4	RW



Modbus ID	Code	Parameters	Application	RO/RW
267	P7.22	**Power Loss Function** This enables the drive to reduce output voltage to the motor to keep the drive powered up as long as it can before power is lost. The motor is used as a generator to feed the DC bus. This mode is engaged at the following levels - 230 V - 156.8 Vdc, 480 V - 303 Vdc, and 575 - 426.65 Vdc. 1 = Enable power loss function 0 = Disable power loss function	1, 2, 3, 4	RW
268	P7.23	**Power Loss Time** Allowable power loss max time before the drive shuts down. If AC input voltage recovers before this time setting, drive shall continue to operate.	1, 2, 3, 4	RW
2122	P7.24	**Currency** Sets the local currency value for where the drive is located so it can perform the Energy Savings estimation in terms of currency saved.	1, 2, 3, 4	RW
2123	P7.25	**Energy Cost** Sets the local energy cost per kW, with this value the drive will use it in the energy savings calculation.	1, 2, 3, 4	RW
2124	P7.26	**Data Type** Selects the format to view Energy Savings. The drive takes four recordings in an hour and then calculates the average based off this setting. The savings is compared to what it would cost to run a across the line starter in the same load.	1, 2, 3, 4	RW
2125	P7.27	**Energy Savings Reset** Resets the Energy Savings calculation value.	1, 2, 3, 4	RW
2444	P7.28	**2th Stage Ramp Frequency** When 2nd Stage Ramp Frequency is the frequency level at which the drive will enable the 2th Stage Ramp Frequency output function. This then can be used for other inputs or devices to signal a frequency level.	1, 2, 3, 4	RW
2515	P7.29	**Change Phase Sequence Motor** This parameter allows for swapping the motor phase output from u, v, w to u, w, v.	1, 2, 3, 4	RW
2667	P7.30	**Run Remove Stop Mode** If the user opens the run enable or start/stop logic run enable then it follows the parameter set to stop mode	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
287	**P8.1**	**Motor Control Mode** 0 = Frequency control: Motor is controlled by giving a frequency reference to it. Voltage reference is calculated from scalar U/f ratio according to preprogrammed curve. (Output frequency resolution = 0.01 Hz). The frequency reference can be from I/O terminal, keypad or communication bus. 1 = Speed control: Motor is controlled by giving a frequency reference to it with slip compensation. Voltage reference is calculated from scalar U/f ratio according to preprogrammed curve. (Output frequency resolution = 0.01 Hz). The speed reference can be from I/O terminal, keypad or communication bus (accuracy ±0.5%). 5 = Speed Control (Open Loop): Similar to the standard Speed Control mode, but it internally calculates for the amount of slip feedback from the motor. Requires running a motor Identification to perform the calculations. 6 = Torque control (Open loop): Motor is controlled based off a torque reference given to the drive and then based on the motor load the drive will maintain that torque level. Requires running a motor Identification to perform the calculations. **Note**: Option 0/1 is V/Hz mode, Options 5/6 are Vector control modes.	**1, 2, 3, 4**	RW
107	**P8.2**	**Current Limit** This parameter determines the maximum motor current allowed from the frequency converter. The parameter value range differs from size to size. Once the motor current hits this level it goes into the current controller and tries to limit the output to drop this current.	**1, 2, 3, 4**	RW
109	**P8.3**	**V/Hz Optimization** Automatic torque boost The voltage to the motor changes automatically, which makes the motor produce sufficient torque to start and run at low frequencies. The voltage increase depends on the motor type and power. Automatic torque boost can be used in applications where starting torque due to starting friction is high, e.g., in conveyors. Example: What changes are required to start the load from 0 Hz? First set the motor nominal values (Parameter group P1). Option 1: Activate the Automatic torque boost. Option 2: Programmable V/Hz curve. To obtain the required torque, the zero point voltage and midpoint voltage/frequency (in parameter group P8) need to be set, so that the motor can draw enough current at the low frequencies. First set parameter P8.4 to Programmable V/Hz curve (value 2). Increase the zero point voltage P8.9 to get enough current at zero speed. Then set the midpoint voltage P8.8 to 100% and the midpoint frequency P8.7 to value P8.8/100%*P1.9. **Note**: In high torque — low speed applications — it is likely that the motor will overheat. If the motor has to run a prolonged time under these conditions, special attention must be paid to cooling the motor. Use external cooling for the motor if the temperature tends to rise too high.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
108	**P8.4**	**V/Hz Ratio**	**1, 2, 3, 4**	RW

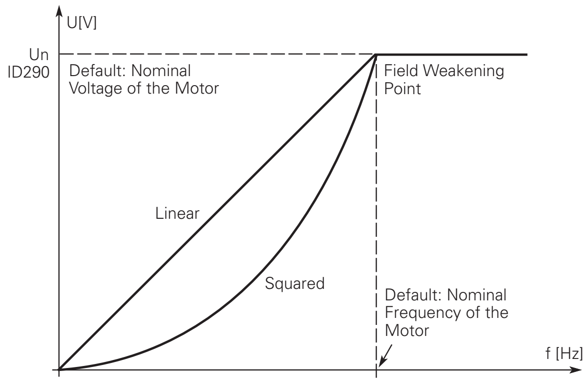
Linear

0 = The voltage of the motor changes linearly with the frequency in the constant flux area from 0 Hz to the field weakening point where the nominal voltage is supplied to the motor. A linear V/Hz ratio should be used in constant torque applications. This default setting should be used if there is no special need for another setting.

Squared

1 = The voltage of the motor changes following a squared curve form with the frequency in the area from 0 Hz to the field weakening point where the nominal voltage is supplied to the motor. The motor runs under magnetized below the field weakening point and produces less torque and electromechanical noise. A squared V/Hz ratio can be used in applications where the torque demand of the load is proportional to the square of the speed, e.g., in centrifugal fans and pumps.

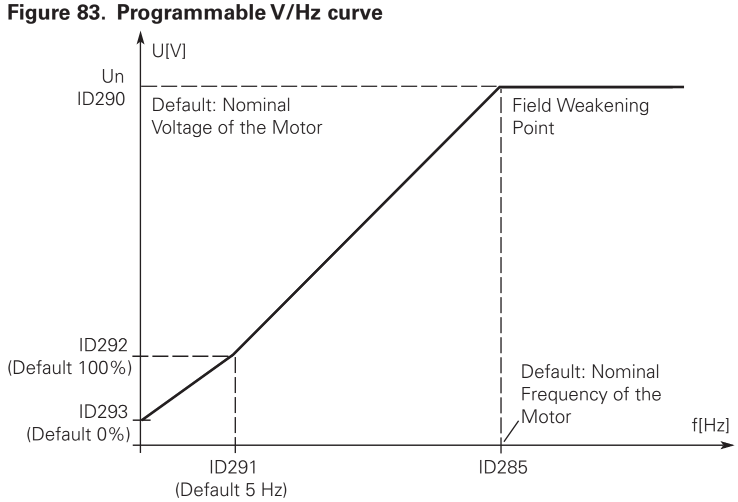
Figure 82. Linear and squared change of motor voltage



Programmable V/Hz curve

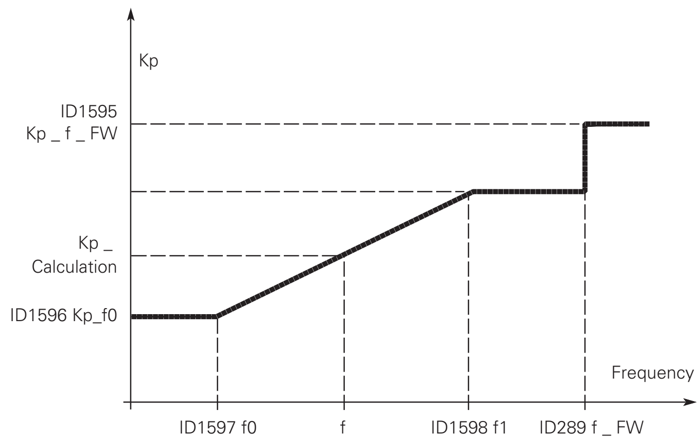
2 = The V/Hz curve can be programmed with three different points. These points are the 0 frequency voltage, midpoint and weakening point. A programmable V/Hz curve can be used if the other settings do not satisfy the needs of the application. When running the Motor Identification this parameter gets set by default along with the values below for the V/Hz curve along with the resistance information of the motor.

Figure 83. Programmable V/Hz curve



Modbus ID	Code	Parameters	Application	RO/RW
108	P8.4	**V/Hz Ratio, continued** **Manual Motor Tuning - in Multi-Purpose App** 1. Setting the Motor Magnetizing current: • Run the Motor at 2/3 of the motor nominal frequency as the frequency reference • Read the Motor current in the Monitor Menu or via the InControl PC tool. • Set the current as the Motor Excitation Current(P8.54) 2. Set the V/Hz optimization parameter (P8.4) to value 2 "Programmable V/Hz curve". 3. Run the Motor with zero frequency reference and increase the motor zero point voltage (P8.9) until the motor current is approximately same as the motor Excitation Current. If the Motor is in a low frequency area for only short periods, 65% of the motor nominal current is possible. 4. Set the Midpoint Voltage (P8.8) to 1.4142*(P8.9) and midpoint frequency(P8.7) to value P8.7/100%*P1.9. 5. If required, activate the speed control or V/Hz Optimization (Torque Boost). 6. If required, activate the speed control and V/Hz Optimization (Torque Boost). **Linear with flux optimization** 3 = The frequency converter starts to search for the minimum motor current in order to save energy, lower the disturbance level and the noise. This mode is called Eaton's Active Energy Control which will reduce the voltage and current but still maintain the desired speed. This function can be used in applications with constant motor load, such as fans, pumps, etc.	1, 2, 3, 4	RW
289	P8.5	**Field Weakening Point** The field weakening point is the frequency at which the output voltage reaches the set (P8.6) maximum value. This value is usually determined by the motor nameplate value or if motor specs were supplied it can be further adjusted.	1, 2, 3, 4	RW
290	P8.6	**Voltage at FWP** Above the frequency at the field weakening point, the output voltage remains at the set maximum value. Below the frequency at the field weakening point, the output voltage depends on the setting of the V/Hz curve parameters. See P8.3, P8.4, P8.6 and P8.8. When the parameters P1.8 and P1.9 (nominal voltage and nominal frequency of the motor) are set, the parameters P8.5 and P8.6 are automatically set to the corresponding values (FWP nominal frequency, voltage 100% = nominal voltage). If you need different values for the field weakening point and the maximum output voltage, change these parameters after setting P1.8 and P1.9.	1, 2, 3, 4	RW
291	P8.7	**V/Hz Mid Frequency** If the programmable V/Hz curve has been selected with P8.4, this parameter defines the midpoint frequency of the curve. This value can be set anywhere between 0 and the FWP, to either have a different V/Hz ramp or if set to the FWP it will provide the max voltage all the way up the curve.	1, 2, 3, 4	RW
292	P8.8	**V/Hz Mid Voltage** If the programmable V/Hz curve has been selected with the P8.4, this parameter defines the mid point voltage of the curve. This value can be set anywhere between zero frequency Volt and the FWP voltage, this can either have a different ramp above and below this point or allow for max voltage.	1, 2, 3, 4	RW
293	P8.9	**Zero Frequency Voltage** If the programmable V/Hz curve has been selected with the P8.4, this parameter defines the zero frequency voltage of the curve. When putting this value above 0% additional voltage is given, in some cases by putting this value to high it can cause the motor to be oversaturated.	1, 2, 3, 4	RW
2522	P8.10	**Switching Frequency** This parameter sets the frequency that the PWM wave rides on, higher switching frequency will be cleaner current sine wave, lower switching frequency will be a choppier current sine wave. Motor noise can be minimized using a high switching frequency but the amount of heat dissipation increases. Increasing the switching frequency reduces the capacity of the frequency converter unit. For protection against thermal overload, the switching frequency automatically is reduce in the fact that the ambient temperature is high as well as high load currents. **Note**: See Installation Manual (MN040002EN) for the values listed for the individual frame size switching frequency ranges. It also provides de-rating tables required for sizing.	1, 2, 3, 4	RW
1665	P8.11	**Sine Filter Enable** Enables the frequency converter to have a sine filter connected to the output motor leads. When this is connected motor output will be adjusted to reflect this. This parameter enables the drive to have a fixed switching frequency when it comes to motor thermal protection.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
294	**P8.12**	**OverVoltage Control** These parameters allow the overvoltage controllers to be switched out of operation. This may be useful, for example, if the main supply voltage varies more than –15% to +10% and the application will not tolerate this overvoltage. In this case, the regulator controls the output frequency taking the supply fluctuations into account. 0 = Controller switched off 1 = Controller switched on	**1, 2, 3, 4**	RW
298	**P8.13**	**Load Drooping** The drooping function enables speed drop as a function of load. This parameter sets that amount corresponding to the nominal torque of the motor. This is typically used in sharing of loads with multiple VFD's.	**4**	RW
299	**P8.14**	**Identification** With this parameter, the drive will identify the motor and adjust tuning parameters to improve starting torque and open loop current control on an unloaded motor. Upon this operation it will be active then set back to 0. When a run command is seen the message on the keypad will indicate "Motor Identification" is being performed and when completed will show "Motor ID Completed". If there is an issue with the Motor Identification a fault message will be displayed. Once completed it will set the V/Hz curve up to correspond to the resistance values obtained for optimized control of the motor. 0 = Not Action 1 = Identification only stator resistor 2 = Identification with run **Note**: Identification with Run must be performed on an unloaded motor shaft for accurate results. 3 = Identification no run - Motor is supplied with current and voltage but at zero frequency. 4 = Identification only inertia - Identification run when the load cannot be decoupled.	**4**	RW
1574	**P8.15**	**Neg Frequency Limit** Frequency limit in the reverse direction in Open Loop Control mode.	**4**	RW
1576	**P8.16**	**Pos Frequency Limit** Frequency limit in the forward direction in Open Loop Control mode.	**4**	RW
1585	**P8.17**	**Frequency Ramp Out FilterTime Constant** Filter time used when ramping the drive to its stop mode	**1, 2, 3, 4**	RW
1591	**P8.18**	**Speed Error Filter Time Constant** Filter time constant for speed reference and actual speed error.	**4**	RW
1592	**P8.19**	**Speed Error Band Stop Frequency** When in stop, the speed error for initializing the speed loop control.	**4**	RW
1593	**P8.20**	**Speed Control Kp0** This parameter is the gain for the speed controller in open loop control mode given in % per Hz. Gain Value of 100% means that the nominal torque reference is produced at the speed controller output fro a frequency error of 1Hz. See image in P8.25.	**4**	RW
1594	**P8.21**	**Speed Control Ti0** Sets the integral time constant for the speed controller.	**4**	RW
1595	**P8.22**	**Speed Control Kp At Field Weakening** The relative gain of the speed controller in the Field weakening area as a percentage of the Speed Control Gain (P8.20). See image in P8.25.	**4**	RW
1596	**P8.23**	**Speed Control Kp Below F0** The relative gain of the speed controller as a percentage of the Speed Control Gain (P8.20) when the speed is below the defined level of Speed Control F0 frequency (P8.24). See Image in P8.25.	**4**	RW
1597	**P8.24**	**Speed Control F0** Speed Level in Hz below the speed controller gain is equal to the Speed Control Gain Below F0 (P8.23). See image in P8.25.	**4**	RW

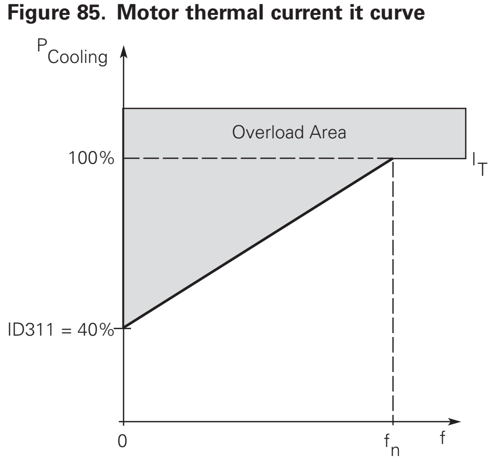
Modbus ID	Code	Parameters	Application	RO/RW
1598	**P8.25**	**Speed Control F1** The Speed level in Hz above the speed controller Gain is equal to the Speed Control Gain (P8.20). From the speed defined by the F0 (P8.24) setting to the speed defined by the F1 setting (P8.25), the speed controller gain changes linearly from the F0 gain to the Speed Gain Kp. See image below. **Figure 84. Speed control F1** 	**4**	RW
1599	**P8.26**	**Speed Control Kp1** The relative gain of the speed controller as a percentage of the Speed Control Gain (P8.20) when torque reference or speed control output is less than the value of Speed Control T0 (P8.27). This parameter is normally used to stabilize the speed controller for a drive system with gear backlash.	**4**	RW
1600	**P8.27**	**Speed Control Ti1** The level of torque reference below which the speed controller gain is changed from the Speed Control Gain (P8.20) to Speed Control T0(P8.27). This is a percentage of nominal Torque.	**4**	RW
1601	**P8.28**	**Speed Control Kp Filter Time Constant** Filter time constant for the speed controller gain.	**4**	RW
1602	**P8.29**	**Motoring Torque Limit** Torque limit setting in the motoring side.	**4**	RW
1603	**P8.30**	**Generator Torque Limit** Torque limit setting for the generating side.	**4**	RW
1604	**P8.31**	**Torque Limit Forward** Torque limit setting in forward direction	**4**	RW
1605	**P8.32**	**Torque Limit Reverse** Torque limit setting in reverse direction	**4**	RW
1607	**P8.33**	**Motoring Power Limit** Motor Power limit setting the generating side used in open loop torque control mode.	**4**	RW
1608	**P8.34**	**Generator Power Limit** Generator Power limit setting the motoring side used in open loop torque control mode.	**4**	RW
1611	**P8.35**	**Acc Compensation Time Constant** This value will compensate for the amount of inertia on the motor when start and stopping. It improves speed response and is defined as acceleration time to nominal speed with nominal torque.	**4**	RW
1612	**P8.36**	**Acc Compensation Filter Time Constant** The Filter time for the Acceleration Compensation time Constant (P8.35). Used to remove any disturbances in the inertia feedback.	**4**	RW
1620	**P8.37**	**Flux Reference** This parameter defines the amount of flux that is output to the motor at any frequency or speed level.	**4**	RW
1621	**P8.38**	**Stop State Magnetization** This parameter defines the % of magnetizing current based off the nominal current the drive will output in a stop state. This value is obtained during motor identification or auto tuning.	**4**	RW
1622	**P8.39**	**Start Boost Rise Time** Acceleration time used with auto torque boost. Limits the amount of time the boost is enabled.	**4**	RW

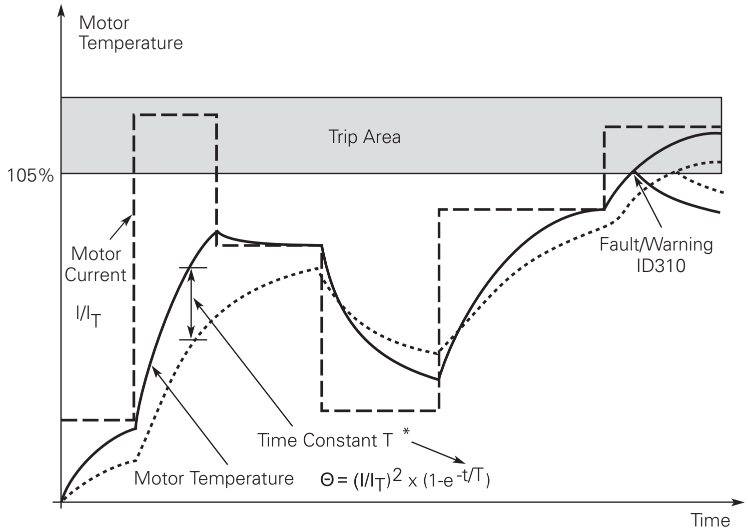
Modbus ID	Code	Parameters	Application	RO/RW
1623	P8.40	**Flux Current Ramp Time** Defines the amount of time required for the Flux Current to build up in the motor.	4	RW
1624	P8.41	**Zero Speed Start Time** After giving the start command the drive will remain at 0 speed for the time defined by this parameter. The speed will then be released to follow the set frequency/speed reference after this time has elapsed from the instant where the command is given.	4	RW
1625	P8.42	**Zero Speed Stop Time** The drive will remain at zero speed with controllers active for the time defined by this parameter after reaching the zero speed when a stop command is given. This parameter has no effect if the selected stop function is coasting. The zero speed time starts when the ramp time is expected to reach zero speed.	4	RW
1630	P8.43	**Droop Control Filter Time Constant** Filter time when using droop control	4	RW
1631	P8.44	**Startup Torque Selection** Selects where the start up torque reference is coming from there are 3 options depending on the desired reference response on startup; either Start Memory (P8.45), Torque Reference, and Start Torque FWD/REV (P8.46 or P8.47). This reference is only active when a start command is given form there it will follow the desired torque reference location.	4	RW
1632	P8.45	**Torque Memory Start** This starting torque reference comes from the P8.48 Actual Torque. On start it will use the measure actual torque value stored to memory and then use that value the next time a start is required.	4	RW
1633	P8.46	**Startup Torque Forward** Defines the amount of Starting torque reference applied on startup in the forward direction when selected in P8.44.	4	RW
1634	P8.47	**Startup Torque Reverse** Defines the amount of Starting torque reference applied on startup in the reverse direction when selected in P8.44.	4	RW
1635	P8.48	**Startup Torque Actual** Actual starting torque	4	RO
1667	P8.49	**Startup Torque Time** This time is used to define the amount of time the Start Torque value assigned in P8.44 will be applied for before the normal torque reference is used.	4	RW
771	P8.50	**Stator Resistor** Motor stator resistor real value, this value is the stator winding resistance of the windings in the motor. Value is measured when performing Identification (P8.14).	4	RW
772	P8.51	**Rotor Resistor** Motor rotor resistor real value, this value is the rotor resistance of the motor. Value is measured when performing Identification (P8.14).	4	RW
773	P8.52	**Leak Inductance** Motor leakage inductance real value, this value is the amount of magnetic inductance that does not link to a winding in the motor. Value is measured when performing Identification (P8.14).	4	RW
774	P8.53	**Mutual Inductance** Motor mutual inductance real value, this value is the amount of inductance between 2 sets of windings in the motor. Value is measured when performing Identification (P8.14).	4	RW
775	P8.54	**Excitation Current** Motor no-load current real value, this value is the amount of electrical current required to generate a rotating magnetic field in the motor. Value is measured when performing Identification (P8.14).	4	RW
1656	P8.55	**VF Stable Kd** Expert control parameter for drive stability. This should only be changed after review and suggestion of an Eaton engineer.	1, 2, 3, 4	RW
1657	P8.56	**VF Stable Kq** Expert control parameter for drive stability. This should only be changed after review and suggestion of an Eaton engineer.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
2835	**P8.57**	**Overmodulation Enable** This parameter specifies overmodulation function Enable. It can increase output voltage under lower input voltage when Overmodulation is enabled. 0 Disabled 1 Enabled	**1, 2, 3, 4**	RW
2837	**P8.58**	**Motor Inertia** This parameter specifies inertia of a complete system. It is recommended to run "Identification Only Inertia" to get better reaction and dynamics.	**4**	RW
306	**P9.1**	**4 mA Input Fault** A warning or a fault action and message is generated if the 4–20 mA reference signal is used and the signal falls below 4 mA for 5 seconds or below 0.5 mA for 0.5 seconds. The information can also be programmed into digital output DO1 or relay outputs RO1 and RO2. 0 = No response 1 = Warning 2 = Warning, the frequency from 10 seconds back is set as reference 3 = Warning, the Preset Frequency P9.2 is set as reference 4 = Fault, stop mode after fault according to P7.10. 5 = Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
331	**P9.2**	**4 mA Fault Frequency** When 4 mA fault happens, the output frequency of drive goes to this preset speed when P9.1 = 3.	**1, 2, 3, 4**	RW
307	**P9.3**	**External Fault** A warning or a fault action and message is generated from the external fault signal in the programmable (digital inputs DIN3 is defaulted). The status information can also be programmed into digital output DO1 and into relay outputs RO1 and RO2. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
332	**P9.4**	**Input Phase Fault** The input phase supervision ensures that the input phases of the frequency converter have approximately equal current draw. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
330	**P9.5**	**Uvolt Fault Response** Frequency converter monitors DC Bus Voltage if drops below set level (via trouble shooting guide for more information on fault level) the drive will respond corresponding to this setting. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
308	**P9.6**	**Output Phase Fault** Output phase supervision of the motor ensures that the motor phases have equal currents, if phases are 5% difference from one another, the frequency converter will respond corresponding to this setting. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
309	P9.7	**Ground Fault** Earth fault protection ensures that the sum of the motor phase currents is zero. There is a current level setting P9.44 that allows for setting the allowable ground current level based off the total drive current. The overcurrent protection is always working and protects the frequency converter from earth faults with high currents. Frequency Converter will cores pond the setting below. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	1, 2, 3, 4	RW
310	P9.8	**Motor Thermal Protection** If a fault condition is selected, the drive will stop and activate the fault stage based off the % of calculated motor temperature. The calculated motor temp is based off the install power on values of the drive and monitoring values as the drive is running. Deactivating this protection, i.e., setting parameter to 0, will reset the thermal stage of the motor to 0%. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to ID506 3 = Fault, stop mode after fault always by coasting	1, 2, 3, 4	RW
311	P9.9	**Motor Thermal F0 Current** The current can be set between 0–150.0% x InMotor. This parameter sets the value for thermal current at zero frequency. See Figure 58 in DG1 Application Manual. The default value is set assuming that there is no external fan cooling the motor. If an external fan is used, this parameter can be set to 90% (or even higher). **Note**: The value is set as a percentage of the motor nameplate data, P1.5 (nominal current of the motor), not the drive's nominal output current. The motor's nominal current is the current that the motor can withstand in direct on-line use without being overheated. If you change the parameter Nominal current of motor, this parameter is automatically restored to the default value. Setting this parameter does not affect the maximum output current of the drive, which is determined by P1.16 alone.	1, 2, 3, 4	RW

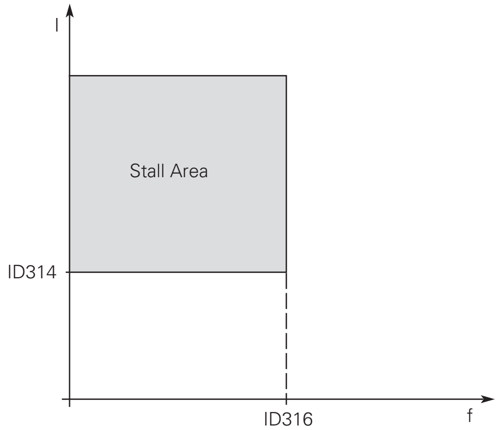
Figure 85. Motor thermal current it curve



Modbus ID	Code	Parameters	Application	RO/RW
312	P9.10	**Motor Thermal Time** This time can be set between 1 and 200 minutes. This is the thermal time constant of the motor; the larger the motor, the longer the time constant. The time constant is the time within which the calculated thermal stage has reached 63% of its final value. The motor thermal time is specific to the motor design and it varies between different motor manufacturers. If the motor's t6–time (t6 is the time in seconds the motor can safely operate at six times the rated current) is known (given by the motor manufacturer) the time constant parameter can be set based on it. As a rule of thumb, the motor thermal time constant in minutes is equal to 2xt6. If the drive is in stop stage, the time constant is internally increased to three times the set parameter value. The cooling in the stop stage is based on convection and the time constant is increased. See Figure 59 in the DG1 Application Manual. **Figure 86. Motor temperature calculation**  * Changes by motor size and adjusted with ID312	**1, 2, 3, 4**	RW
313	P9.11	**Stall Protection** Stall protection is a user defined of overcurrent protection. It protects the motor from short time overload situations like a stalled shaft. This is customer selectable based off of current level, frequency level and time. 0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast	**1, 2, 3, 4**	RW

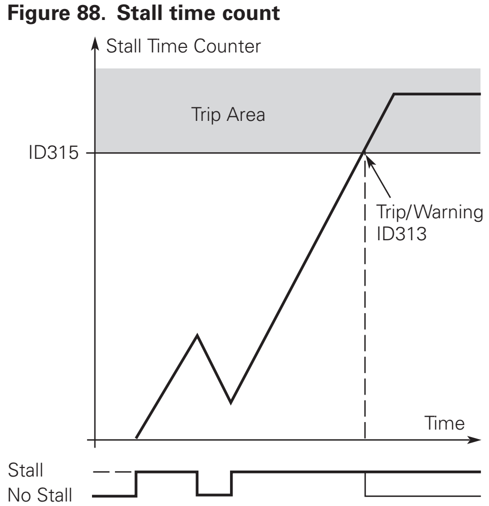
Modbus ID	Code	Parameters	Application	RO/RW
314	P9.12	**Stall Current Limit** The current can be set to 0.1–InMotor*2. For a stall stage to occur, the current must have exceeded this limit. See Figure 60 in DG1 Application Manual. The software does not allow entering a greater value than InMotor*2. If P1.5, nominal motor current is changed, this parameter is automatically restored to the default value (IL).	1, 2, 3, 4	RW

Figure 87. Stall characteristics settings

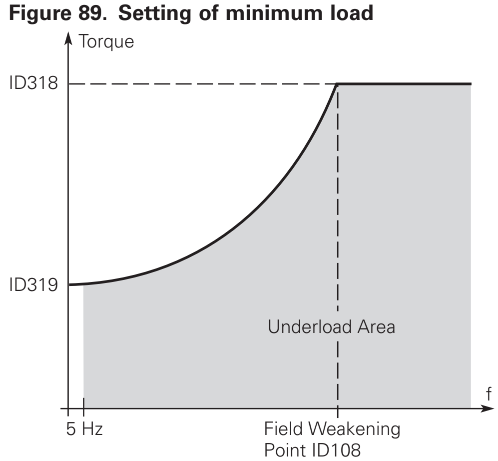


Modbus ID	Code	Parameters	Application	RO/RW
315	P9.13	**Stall Time Limit** This time can be set between 1.0 and 120.0s. This is the maximum time allowed for a stall stage. The stall time is counted by an internal up/down counter based off the current being above the limit setting. If the stall time counter value goes above this limit the protection will cause a trip (see P9.11).	1, 2, 3, 4	RW

Figure 88. Stall time count

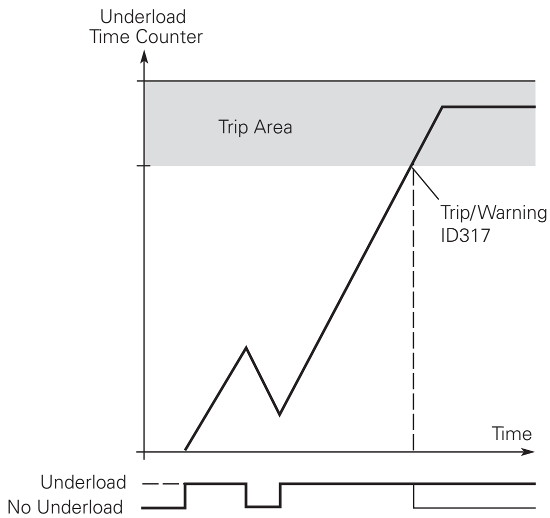


Modbus ID	Code	Parameters	Application	RO/RW
316	P9.14	**Stall Frequency Limit** The frequency can be set between 1–fmax (P1.1.2). For a stall state to occur, the output frequency must have remained below this limit, above the current limit for the stall time to occur.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
317	P9.15	**Underload Protection** If fault is set as the function, the drive will stop and activate the fault stage based on the underload parameter conditions and the monitoring status of the motor. If the motor torque drops below the Fnom and F0 torque levels for the time limit the underload protection is enabled. Deactivating the protection by setting the parameter to 0 will reset the underload time counter to zero. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	1, 2, 3, 4	RW
318	P9.16	**Underload Fnom Torque** The torque limit can be set between 10.0–150.0 % x TnMotor. This parameter gives the value for the minimum torque allowed when the output frequency is at or above the field weakening point. See Figure 62 in DG1 Application Manual. If you change P1.5, nominal motor current, this parameter is automatically restored to the default value. **Figure 89. Setting of minimum load**  	1, 2, 3, 4	RW
319	P9.17	**Underload F0 Torque** The torque limit can be set between 5.0–150.0 % x TnMotor. This parameter gives value for the minimum torque allowed at zero frequency. See Figure 63 in DG1 Application Manual. If you change the value of P1.5, nominal motor current, this parameter is automatically restored to the default value.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
320	P9.18	**Underload Time Limit** This time can be set between 2.0 and 600.0s. This is the time allowed for an underload state to exist. An internal up/down counter counts the accumulated underload time. If the underload counter value goes above this limit, the protection will cause a trip according to P9.15. If the drive is stopped, the underload counter is reset to zero. See Figure 63 in DG1 Application Manual.	1, 2, 3, 4	RW

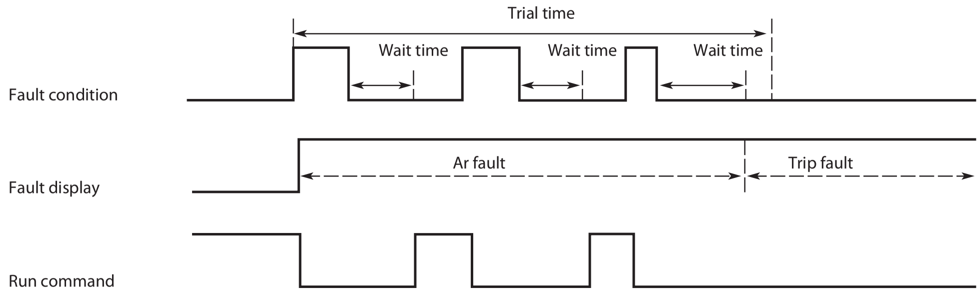
Figure 90. Underload time counter function



Modbus ID	Code	Parameters	Application	RO/RW
333	P9.19	**Thermistor Fault Response** Setting the parameter to 0 will deactivate the protection. If motor thermistors input is enabled it requires enabling the fault condition, the thermistor is usually in the winding of the motor or an external sensor, P9.8 Motor Thermal Protection can be deactivated. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10. 3 = Fault, stop mode after fault always by coasting	1, 2, 3, 4	RW
750	P9.20	**Line Start Lockout** Determines the response of frequency converter going to a run state cycle with I/O run command is still active as the control place. 0 = Respond to I/O run command when power is applied. If in another control place and switched to I/O control do not respond. (Run Command has to be cycled) 1 = Do not respond to I/O run command when power is applied. If in another control place and switched to I/O control do not respond (Run Command has to be cycled) 2 = Respond to I/O commands when power is applied. If in another control place and switched to I/O control the drive will respond to a maintained Run Command. 3 = Do Not respond to I/O commands when power is applied. If in another control place and switched to I/O control the drive will respond to a maintained Run Command.	1, 2, 3, 4	RW
334	P9.21	**Fieldbus Fault Response** This sets the response mode for the fieldbus fault when a fieldbus mode is used and communication is lost between the PLC and communication port. See P9.19.	1, 2, 3, 4	RW
335	P9.22	**OPTCard Fault Response** This sets the response mode for a board slot fault caused by a missing or failed option board not communicating to the Central Processor. See P9.19.	1, 2, 3, 4	RW
1564	P9.23	**Unit Under Temp Prot** This protection sets the response to a low frequency converter temperature on the heat sink. See P9.19.	1, 2, 3, 4	RW
321	P9.24	**AR Wait Time** Defines the time before the frequency converter tries to automatically restart the motor after a specific fault condition has been received. Auto Restart faults listed below P9.27 to P9.33.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
322	**P9.25**	**AR Trail Time** Amount of time after the Wait time that the drive uses the restart tries to attempt to restart the fault, after this time has run out without resetting the alarm drive will fault. See Figure 55 to show how auto restart functions. P9.27 to P9.33 determine the maximum number of automatic restarts during the trial time set by P9.25. The time count starts from the first autorestart. If the number of faults occurring during the trial time exceeds the values of P9.27 to P9.33 the fault state becomes active. Otherwise the fault is cleared after the trial time has elapsed and the next fault starts the trial time count again. If a single fault remains during the trial time, a fault state is true.	**1, 2, 3, 4**	RW

Figure 91. Auto restart fail (try number >2.)



Modbus ID	Code	Parameters	Application	RO/RW
323	**P9.26**	**AR Start Function** The Start function for Automatic restart is selected with this parameter. The parameter defines the start mode upon a auto restart condition: 0 = Flying start from Stop Frequency 1 = Ramp 2 = Flying start from Maximum Frequency	**1, 2, 3, 4**	RW
324	**P9.27**	**Undervoltage Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25 after an undervoltage trip. 0 = No automatic restart >0 = Number of automatic restarts after undervoltage fault. The fault is reset and the drive is started automatically after the DC-link voltage has returned to the normal level.	**1, 2, 3, 4**	RW
325	**P9.28**	**OverVoltage Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25 after an overvoltage trip. 0 = No automatic restart after overvoltage fault trip >0 = Number of automatic restarts after overvoltage fault trip. The fault is reset and the drive is started automatically after the DC-link voltage has returned to the normal level.	**1, 2, 3, 4**	RW
326	**P9.29**	**OverCurrent Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25. **Note**: An IGBT temperature fault, Saturation Fault and Overcurrent Faults are included as part of this fault. 0 = No automatic restart after overcurrent fault trip >0 = Number of automatic restarts after an overcurrent trip, saturation trip or IGBT temperature fault.	**1, 2, 3, 4**	RW
327	**P9.30**	**4 mA Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25. 0 = No automatic restart after reference fault trip >0 = Number of automatic restarts after the analog current signal (4–20 mA) has returned to the normal level (>4 mA)	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
329	**P9.31**	**Motor Temp Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25. 0 = No automatic restart after Motor temperature fault trip >0 = Number of automatic restarts after the motor temperature has returned to its normal level	**1, 2, 3, 4**	RW
328	**P9.32**	**External Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25. 0 = No automatic restart after External fault trip >0 = Number of automatic restarts after External fault trip	**1, 2, 3, 4**	RW
336	**P9.33**	**Underload Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25. 0 = No automatic restart after an Underload fault trip >0 = Number of automatic restarts after an Underload fault trip	**1, 2, 3, 4**	RW
955	**P9.34**	**RTC Fault** RTC (Real Time Clock) fault protection ensures the real time display is correct, the interval and timer function can run normally. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
337	**P9.35**	**PT100 Fault Response** PT100 Thermistor protection used with motor PT100 thermistors input option board are used to fault frequency converter if motor has reached the set temperature fault level on the option card. If using PT100 thermistors P9.8 Motor Terminal Protection can be disabled. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
1256	**P9.36**	**Replace Battery Fault Response** Sets how the frequency converter responds to a low voltage on the Real Time Clock battery. If the voltage on the battery drops below 2V drive will display a warning by default. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
1257	**P9.37**	**Replace Fan Fault Response** Replace Fan Fault will show when the fan life is less than 2 months; remind user to replace the fan. The time is based off the power on time of the drive. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
1678	**P9.38**	**IP Address Confliction Resp** Indicates there is a conflict in the IP address assigned to the drive, typically meaning there are multiple devices with the same IP address assigned. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to P7.10 3 = Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2126	**P9.39**	**Cold Weather Mode** With this parameter, you are able to enable the cold weather function of the causing the frequency converter's under temp limit to drop from –10°C to –30°C.drive. This then enables a warmup feature when the frequency converter is between –30°C and –20°C. The motor, when given a run command, will turn on for the Cold Weather Timeout (ID2128) and output the Cold Weather Voltage (ID2127) at 0.5 Hz to allow the motor to warm up. If it does not warm up above –20°C, after that the time frequency converter will fault on Under temp fault. If the frequency converter does go above –20°C, output will begin to follow reference.	**1, 2, 3, 4**	RW
2127	**P9.40**	**Cold Weather Volt. Level** With this parameter, you are able to select the % of the motor voltage that is output to the motor when in the cold weather warmup period.	**1, 2, 3, 4**	RW
2128	**P9.41**	**Cold Weather Time Out** With this parameter, you are able to select the time limit that the frequency converter will run in the warmup period.	**1, 2, 3, 4**	RW
2129	**P9.42**	**Cold Weather Password** This password allows access to override the under temperature fault protection, this parameter is seen by pressing the left and right soft keys on the keypad. Password should be set to 32866, this value gets reset on cycle of power.	**1, 2, 3, 4**	RW
2130	**P9.43**	**Under Temp Fault Override** With the password set to the correct value this parameter is enabled and will give the ability to override the under temp fault. This function gets reset when power is cycled.	**1, 2, 3, 4**	RW
2158	**P9.44**	**Ground Fault Limit** Sets the level of the ground fault protection, this protection is based off the amount of leakage current that is seen to ground on the output of the drive.	**1, 2, 3, 4**	RW
2157	**P9.45**	**Keypad Comm Fault Response** This parameter defines the function of the keypad communication response in the case the keypad is removed. 0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast	**1, 2, 3, 4**	RW
2159	**P9.46**	**Preheat Mode** this parameter enables/disables the preheat function where this is used in the case depending on where the temperature is being read from the drive will turn on the output to allow current to flow to the motor if the temperature of the drive or PT100 sensor drops, this is typically used when the motor is not running. 0 = Disable 1 = Enable	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2160	P9.47	**Preheat Control Source** Selects the source of where the temperature is coming from, either the drive heat sink temperature which potentially could be at a different temperature or the PT100 sensor temperers. 0 = DigIN: NormallyOpen 1 = DigIN: NormallyClosed 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = SlotA PT100 Temp Channel 1 33 = SLot A PT100 Temp Channel 2 34 = SlotA PT100 Temp Channel 3 35 = SlotA Max PT100 Temp 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = SlotB Max PT100 Temp 40 = Slot A and SlotB Max PT100 Temp	**1, 2, 3, 4**	RW
2161	P9.48	**Preheat Enter Temp** Temperature when the preheat is enabled, drive goes into a run state to all the preheat voltage to flow through the motor an create some current.	**1, 2, 3, 4**	RW
2162	P9.49	**Preheat Quit Temp** Temperature when the preheat is disabled, drive goes into a stop state if the temperature is above this rating.	**1, 2, 3, 4**	RW
2163	P9.50	**Preheat Output Volt** Voltage level output to the motor when the drive is in the Preheat operation mode. This is a percentage of the motor nameplate voltage.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2401	**P9.51**	**PID Feedback AI Loss Response** PID Feedback AI loss Response This parameter defines the function of the PID Feedback Analog Input loss response, if the AI feedback is lost based off the programed AI feedback. 0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Frequency (P9.52) 4 = Warning: Analog -> Net	**2, 3, 4**	RW
2402	**P9.52**	**PID Feedback AI Loss Pre Freq** PID Feedback AI Loss Pre Freq This parameter defines the frequency the master would run to if a feedback is lost and P9.51 was set to option 3.	**2, 3, 4**	RW
2403	**P9.53**	**PID Feedback AI Loss Pipe Fill Loss Level** PIPID Feedback AI Prime Level Detects loss of prime in the pump based off the measured level. If the value drops below this level for the time in P3.54 and below the frequency in P3.52 "loss of Prime" occurs.	**2, 3, 4**	RW
2404	**P9.54**	**PID Feedback AI Loss PreFreq Timeout** PID Feedback AI Loss PreFreq Timeout When P9.51 is set to 3 or 4, when the Feedback signal is lost, the drive will run at the frequency in P9.52 for the time set here, after this time the drive will fault out on "Feedback Loss". The Time is disabled when set to 0sec.	**2, 3, 4**	RW
2405	**P9.55**	**PID Feedback AI Loss Attempts** PID Feedback AI Loss Attempts This parameter sets the amount of tries it will try to Auto restart the Feedback AI loss fault.	**2, 3, 4**	RW
2427	**P9.56**	**STO Fault Response** STO Fault Response defines the function of how the STO input will be seen on the keypad and how the drive functions to it. No Action = Drive will stop no indication shown, n reset required, have to cycle start command. Fault = drive will indicate fault/Require Reset to start again Warning = drive indicate warning/if STO clears drive will run without Reset.	**1, 2, 3, 4**	RW
2483	**P9.57**	**Fault Reset Start** Defines how the drive functions after a Fault Reset is given if the run command has to be cycled or if still present it will start again. 0 = Start/Stop After Fault Reset - run command has to be cycled to restart after fault reset. 1 = Restart After Fault Reset - run command is still active after fault the drive will restart without resending command.	**1, 2, 3, 4**	RW
2657	**P9.58**	**Warning Operation Mode** This parameter specifies warning set and store setting: 0 = No Action 1 = Warning, No Store; 2 = Warning, Store	**1, 2, 3, 4**	RW
2664	**P9.59**	**Fan Protection** This provides the ability to change the fan cooling protection parameter to warning or fault	**1, 2, 3, 4**	RW
2666	**P9.60**	**Under Voltage Trip Level** This sets the voltage level for the under voltage trip.	**1, 2, 3, 4**	RW
2803	**P9.61**	**OP Cont Interlock Attempts** The determines the number of auto restart attempts that will occur on an output contactor interlock fault.	**1, 2, 3, 4**	RW
2831	**P9.62**	**OP Cont Interlock Protection** This provides the ability to change the output contactor interlock protection to warning or fault	**1, 2, 3, 4**	RW
1294	**P10.1**	**PID1 Control Gain** Defines the gain of the PID Controller. It adjust the slope of the speed increase according to the initial of the load. If this value is set to 100% a change of 10% in the error value causes the controller output to change 10%.	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
1295	**P10.2**	**PID1 Control ITime** Defines the integration time of the PID Controller. Over the time the integral time contributes to the deviation between the reference and the feedback signal. If this value is set to 1.00 sec, a change of 10% in the error value causes the controller output to change by 10.00%/s. With value set to 0.0, frequency converter operates as PD controller.	**2, 3, 4**	RW
1296	**P10.3**	**PID1 Control DTime** Defines the derivation time of the PID Controller. This value will adjust the rate of change on the feedback signal. If this value is set to 1.00 sec, a change of %10 in error value during 1.00 sec causes the control output to change by %10.00. If value is set to 0.0, frequency converter operates as PI controller	**2, 3, 4**	RW
1297	**P10.4**	**PID1 Process Unit** Defines the unit type for PID Feedback unit.	**2, 3, 4**	RW
1298	**P10.5**	**PID1 Process Unit Min** Defines the minimum process unit Value	**2, 3, 4**	RW
1300	**P10.6**	**PID1 Process Unit Max** Defines the maximum process unit Value	**2, 3, 4**	RW
1302	**P10.7**	**PID1 Process Unit Decimal** Defines the amount of decimal places in process unit Value	**2, 3, 4**	RW
1303	**P10.8**	**PID1 Error Inversion** Defines the way the process value output reacts to the feedback signal. 0 = Normal, If feedback is less than set-point, PID controller output increases. 1 = Inverted, If feedback is less than set-point, PID controller output decreases.	**2, 3, 4**	RW
1304	**P10.9**	**PID1 Dead Band** PID Dead band around setpoint in process units. This is the band where no actions occur, to prevent oscillation or repeated activation/deactivation of controller. The PID output is locked if the feedback stays within the deadband area.	**2, 3, 4**	RW
1306	**P10.10**	**PID1 Dead Band Delay** If the PID process value goes out of the Dead Band area for the desired time delay at that point the controller will re-initialize and try to level out again.	**2, 3, 4**	RW
1307	**P10.11**	**PID1 Keypad Set Point 1** Keypad PID Reference value set point 1.	**2, 3, 4**	RW
1309	**P10.12**	**PID1 Keypad Set Point 2** Keypad PID Reference value set point 2.	**2, 3, 4**	RW
1311	**P10.13**	**PID1 Ramp Time** Defines the rising and falling ramp times for changes in the process value.	**2, 3, 4**	RW
1312	**P10.14**	**PID1 Set Point 1 Source** Defines source of the setpoint value the drive uses this can either be an internal preset value, keypad setpoint, analog signal or Fieldbus message.	**2, 3, 4**	RW
1313	**P10.15**	**PID1 Set Point 1 Min** Defines Minimum Value for the set point 1 source.	**2, 3, 4**	RW
1314	**P10.16**	**PID1 Set Point 1 Max** Defines Maximum Value for the set point 1 source.	**2, 3, 4**	RW
1315	**P10.17**	**PID1 Set Point 1 Sleep Enable** Enable PID Set Point Sleep mode. This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level.	**2, 3, 4**	RW
2396	**P10.18**	**PID1 Set Point 1 Sleep Unit Sel** Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run. 0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback	**2, 3, 4**	RW
2450	**P10.19**	**PID1 Set Point 1 Sleep Level** Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
1317	**P10.20**	**PID1 Set Point 1 Sleep Delay** This parameter sets the delay time after the Setpoint drops below the Sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the Sleep function to save motor run time.	**2, 3, 4**	RW
1318	**P10.21**	**PID1 Set Point 1 Wake Up Level** Defines the level for the PID feedback value to go above top enable the PID output to be re enabled. This value is based of the % of feedback which can be scaled based off the PID Unit Min/Max values P10.5 and P10.6.	**2, 3, 4**	RW
1320	**P10.22**	**PID1 Set Point 1 Boost** The setpoint can be boosted via a multiplier value.	**2, 3, 4**	RW
1321	**P10.23**	**PID1 Set Point 2 Source** Defines source of the setpoint value the drive uses this can either be an internal preset value, keypad setpoint, analog signal or Fieldbus message.	**2, 3, 4**	RW
1322	**P10.24**	**PID1 Set Point 2 Min** Defines Minimum Value for the set point 2 source.	**2, 3, 4**	RW
1323	**P10.25**	**PID1 Set Point 2 Max** Defines Maximum Value for the set point 2 source.	**2, 3, 4**	RW
1324	**P10.26**	**PID1 Set Point 2 Sleep Enable** Enable PID Set Point Sleep mode. This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level.	**2, 3, 4**	RW
2397	**P10.27**	**PID1 Set Point 2 Sleep Unit Sel** Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run. 0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback	**2, 3, 4**	RW
2452	**P10.28**	**PID1 Set Point 2 Sleep Level** Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.	**2, 3, 4**	RW
1326	**P10.29**	**PID1 Set Point 2 Sleep Delay** This parameter sets the delay time after the Setpoint drops below the Sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the Sleep function to save motor run time.	**2, 3, 4**	RW
1327	**P10.30**	**PID1 Set Point 2 Wake Up Level** Defines the level for the PID feedback value to go above top enable the PID output to be re enabled. This value is based of the % of feedback which can be scaled based off the PID Unit Min/Max values P10.5 and P10.6.	**2, 3, 4**	RW
1329	**P10.31**	**PID1 Set Point 2 Boost** The setpoint can be boosted via a multiplier value.	**2, 3, 4**	RW
1330	**P10.32**	**PID1 Feedback Function** Choose a single signal used as feedback, this parameter allows for doing math functions with 2 sources.	**2, 3, 4**	RW
1331	**P10.33**	**PID1 Feedback Gain** Define Gain associated with feedback signal from the measuring device.	**2, 3, 4**	RW
1332	**P10.34**	**PID1 Feedback 1 Source** Define where feedback signal is being fed into the drive, via analog or fieldbus data value.	**2, 3, 4**	RW
1333	**P10.35**	**PID1 Feedback 1 Min** Minimum Unit Value for the Feedback signal.	**2, 3, 4**	RW
1334	**P10.36**	**PID1 Feedback 1 Max** Maximum Unit Value for the Feedback signal.	**2, 3, 4**	RW
1335	**P10.37**	**PID1 Feedback 2 Source** Define where feedback signal is being fed into the drive, via analog or fieldbus data value.	**2, 3, 4**	RW
1336	**P10.38**	**PID1 Feedback 2 Min** Minimum Unit Value for the Feedback signal.	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
1337	P10.39	**PID1 Feedback 2 Max** Maximum Unit Value for the Feedback signal.	2, 3, 4	RW
1338	P10.40	**PID1 Feedforward Func** Choose a single signal used as feed forward command, this is used to account for major disturbances that the Processor does not see via the Feedback.	2, 3, 4	RW
1339	P10.41	**PID1 Feedforward Gain** Define feed forward gain control level.	2, 3, 4	RW
1340	P10.42	**PID1 Feedforward 1 Source** Define where feed forward signal is fed from, this can either be an analog signal or fieldbus process value.	2, 3, 4	RW
1341	P10.43	**PID1 Feedforward 1 Min** Define feed forward Minimum Value setting.	2, 3, 4	RW
1342	P10.44	**PID1 Feedforward 1 Max** Define feed forward Maximum Unit Value setting.	2, 3, 4	RW
1343	P10.45	**PID1 Feedforward 2 Source** Define where feed forward signal is fed from, this can either be an analog signal or fieldbus process value.	2, 3, 4	RW
1344	P10.46	**PID1 Feedforward 2 Min** Define feed forward Minimum Value setting.	2, 3, 4	RW
1345	P10.47	**PID1 Feedforward 2 Max** Define feed forward Maximum Unit Value setting.	2, 3, 4	RW
1352	P10.48	**PID1 Set Point 1 Comp Enable** Enables pressure loss compensation for setpoint 1 signal value.	2, 3, 4	RW
1353	P10.49	**PID1 Set Point 1 Comp Max** Value added proportionally to the frequency, setpoint compensation = comp max * (output freq–min freq)/(max freq–min freq).	2, 3, 4	RW
1354	P10.50	**PID1 Set Point 2 Comp Enable** Enables pressure loss compensation for setpoint 2 signal value.	2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
1355	**P10.51**	**PID1 Set Point 2 Comp Max**	**2, 3, 4**	RW

Value added proportionally to the frequency, setpoint compensation = comp max * (output freq–min freq)/(max freq–min freq).

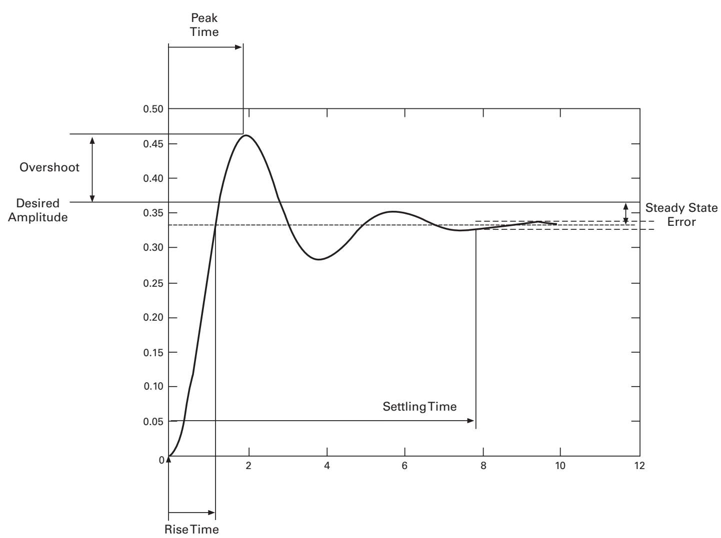
Procedure for setting up PID Application.

Initially set PID Gain(P10.1) to 0.0% and set the PID I Time (P10.2) to 20 sec. Start the frequency converter and verify if the setpoint is reached quickly while maintaining stable operation of the system. If not increase the PID Gain (P10.1) until the drive speed oscillates constantly. After this occurs reduce the PID Gain (P10.1) slightly to reduce the oscillation. From here take the value found for PID Gain (P10.1) to 0.5 times that value and reduce the PID I time (P10.2) until the feedback signal oscillates again. INcrease the PID I time (P10.2) until the oscillation stops, with that value take it times 1.2 and use that value for the PID I time (P10.2). If signal noise is seen at high frequency increase the filter time values to filter the signal. If further tuning is required refer to the table showing what is effected.

Figure 92. Setting up PID application

Response	Rise time	Overshoot	Settling time	Steady state error
Increase PID Gain	Decrease Rise	Increases Overshoot	Not Affected	Decreases Error
Increase PID1 Time	Decrease Rise	Increases Overshoot	Increases Setting	Eliminates Error
Increase PID0 Time	Not Affected	Decreases Overshoot	Decreases Setting	Not Affected

Rise Time—the time required for the output to rise 90% of the desired level for the first time.
Overshoot—the difference between the peak level and the steady state level.
Setting Time—time required for the system to converge to its steady state.
Steady State Error—the difference between the steady state level and the desired output level.



Modbus ID	Code	Parameters	Application	RO/RW
2466	**P10.52**	**PID1 Wake Up Action** This parameter defines the wakeup function action. 0 = Wakeup when below wakeup level P10.21/P10.30 1 = Wakeup when above walk-up level P10.21/P10.30 2 = Wakeup when below wakeup level % set in P10.21/P10.30 from PID setpoint 3 = Wakeup when above wakeup level % set in P10.21/P10.30 from PID setpoint	**2, 3, 4**	RW
2542	**P10.53**	**FB PID1 Set Point 1** PID set point 1 value from fieldbus	**2, 3, 4**	RW
2544	**P10.54**	**FB PID1 Set Point 2** PID set point 2 value from fieldbus	**2, 3, 4**	RW
2550	**P10.55**	**FB PID1 Feedback 1** PID feedback 1 value from fieldbus	**2, 3, 4**	RW
2551	**P10.56**	**FB PID1 Feedback 2** PID reference value feedback 2 from fieldbus	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2554	**P10.57**	**FB PID1 Feedforward 1** PID reference value feedforword 1 from fieldbus	**2, 3, 4**	RW
2555	**P10.58**	**FB PID1 Feedforward 2** PID reference value feedforword 2 from fieldbus	**2, 3, 4**	RW
2660	**P10.59**	**PID1 Sleep Boost level** PID1 Sleep boost level, range shall be [-9999,9999], unit shall be PID unit. Default value shall be 0.	**2, 3, 4**	RW
2661	**P10.60**	**PID1 Sleep Boost Max Time** PID1 Sleep boost maximum time, range shall be [1,300] seconds. Default value shall be 30s	**2, 3, 4**	RW
2811	**P10.61**	**PID1 Low Feedback Level** This parameter specifies low feedback level warning or fault will occur	**2, 3, 4**	RW
2812	**P10.62**	**PID1 Low Feedback Time** This parameter specifies the delay time for low feedback warning or fault.	**2, 3, 4**	RW
2813	**P10.63**	**PID1 Low Feedback Protection** This parameter specifies the drive response to a low feedback condition 0 No Action; 1 Warning; 2 Fault; 3 Fault, Coast	**2, 3, 4**	RW
2814	**P10.64**	**PID1 High Feedback Level** This parameter specifies high feedback level warning or fault will occur	**2, 3, 4**	RW
2815	**P10.65**	**PID1 High Feedback Time** This parameter specifies the delay time for high feedback warning or fault.	**2, 3, 4**	RW
2816	**P10.66**	**PID1 High Feedback Protection** This parameter specifies the drive response to a high feedback condition. 0 = No Action; 1 = Warning; 2 = Fault; 3 = Fault, Coast	**2, 3, 4**	RW
2817	**P10.67**	**PID1 Hysteresis Level** This parameter specifies the hysteresis Level used for low and high level detection.	**2, 3, 4**	RW
2825	**P10.68**	**PID1 Backup Feedback Source** This parameter specifies PID backup feedback selection has five options, default value is 0 0 Not Used; 1 AI1; 2 AI2; 3 Slot A: AI1; 4 Slot B: AI1;	**2, 3, 4**	RW
1356	**P11.1**	**PID2 Control Gain** Defines the gain of the PID Controller. It adjust the slope of the speed increase according to the initial of the load. If this value is set to 100% a change of 10% in the error value causes the controller output to change 10%.	**3, 4**	RW
1357	**P11.2**	**PID2 Control I Time** Defines the integration time of the PID Controller. Over the time the integral time contributes to the deviation between the reference and the feedback signal. If this value is set to 1.00 sec, a change of 10% in the error value causes the controller output to change by 10.00%/s. With value set to 0.0, frequency converter operates as PD controller.	**3, 4**	RW
1358	**P11.3**	**PID2 Control D Time** Defines the derivation time of the PID Controller. This value will adjust the rate of change on the feedback signal. If this value is set to 1.00 sec, a change of %10 in error value during 1.00 sec causes the control output to change by %10.00. If value is set to 0.0, frequency converter operates as PI controller	**3, 4**	RW
1359	**P11.4**	**PID2 Process Unit** Defines the unit type for PID Feedback unit.	**3, 4**	RW
1360	**P11.5**	**PID2 Process Unit Min** Defines the minimum process unit Value	**3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
1362	**P11.6**	**PID2 Process Unit Max** Defines the maximum process unit Value	**3, 4**	RW
1364	**P11.7**	**PID2 Process Unit Decimal** Defines the amount of decimal places in process unit Value	**3, 4**	RW
1365	**P11.8**	**PID2 Error Inversion** Defines the way the process value output reacts to the feedback signal. 0 = Normal, If feedback is less than set-point, PID controller output increases. 1 = Inverted, If feedback is less than set-point, PID controller output decreases.	**3, 4**	RW
1366	**P11.9**	**PID2 Dead Band** PID Dead band around setpoint in process units. This is the band where no actions occur, to prevent oscillation or repeated activation/deactivation of controller. The PID output is locked if the feedback stays within the deadband area.	**3, 4**	RW
1368	**P11.10**	**PID2 Dead Band Delay** If the PID process value goes out of the Dead Band area for the desired time delay at that point the controller will re-initialize and try to level out again.	**3, 4**	RW
1369	**P11.11**	**PID2 Keypad Set Point 1** Keypad PID Reference value set point 1.	**3, 4**	RW
1371	**P11.12**	**PID2 Keypad Set Point 2** Keypad PID Reference value set point 2.	**3, 4**	RW
1373	**P11.13**	**PID2 Ramp Time** Defines the rising and falling ramp times for changes in the process value.	**3, 4**	RW
1374	**P11.14**	**PID2 Set Point 1 Source** Defines source of the setpoint value the drive uses this can either be an internal preset value, keypad setpoint, analog signal or Fieldbus message.	**3, 4**	RW
1375	**P11.15**	**PID2 Set Point 1 Min** Defines Minimum Value for the set point 1 source.	**3, 4**	RW
1376	**P11.16**	**PID2 Set Point 1 Max** Defines Maximum Value for the set point 1 source.	**3, 4**	RW
1377	**P11.17**	**PID2 Set Point 1 Sleep Enable** Enable PID Set Point Sleep mode. This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level.	**3, 4**	RW
2398	**P11.18**	**PID2 Set Point 1 Sleep Unit Sel** PID2 Setpoint 1 Sleep Unit Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run. 0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback	**3, 4**	RW
2454	**P11.19**	**PID2 Set Point 1 Sleep Level** Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.	**3, 4**	RW
1379	**P11.20**	**PID2 Set Point 1 Sleep Delay** This parameter sets the delay time after the Setpoint drops below the Sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the Sleep function to save motor run time.	**3, 4**	RW
1380	**P11.21**	**PID2 Set Point 1 WakeUp Level** Defines the level for the PID feedback value to go above top enable the PID output to be re enabled. This value is based of the % of feedback which can be scaled based off the PID Unit Min/Max values P11.5 and P114.6.	**3, 4**	RW
1382	**P11.22**	**PID2 Set Point 1 Boost** The setpoint can be boosted via a multiplier value.	**3, 4**	RW
1383	**P11.23**	**PID2 Set Point 2 Source** Defines source of the setpoint value the drive uses this can either be an internal preset value, keypad setpoint, analog signal or Fieldbus message.	**3, 4**	RW

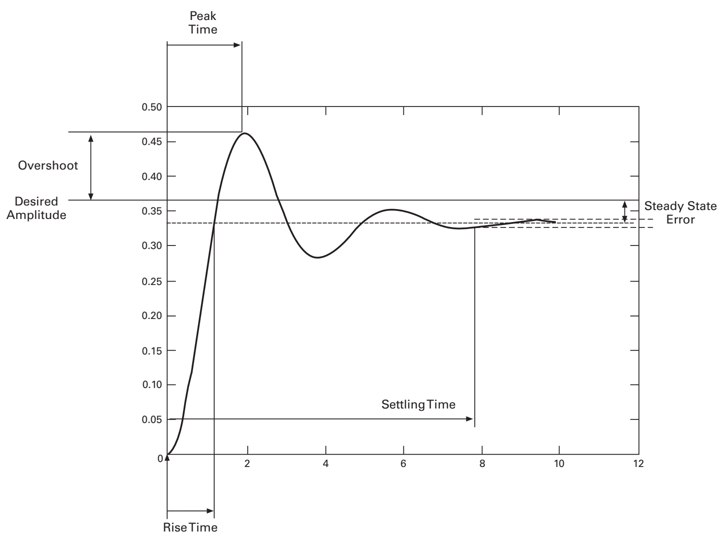
Modbus ID	Code	Parameters	Application	RO/RW
1384	**P11.24**	**PID2 Set Point 2 Min** Defines Minimum Value for the set point 2 source.	**3, 4**	RW
1385	**P11.25**	**PID2 Set Point 2 Max** Defines Maximum Value for the set point 2 source.	**3, 4**	RW
1386	**P11.26**	**PID2 Set Point 2 Sleep Enable** Enable PID Set Point Sleep mode. This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level.	**3, 4**	RW
2399	**P11.27**	**PID2 Set Point 2 Sleep Unit Sel** Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run. 0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback	**3, 4**	RW
2456	**P11.28**	**PID2 Set Point 2 Sleep Level** Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.	**3, 4**	RW
1388	**P11.29**	**PID2 Set Point 2 Sleep Delay** This parameter sets the delay time after the Setpoint drops below the Sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the Sleep function to save motor run time.	**3, 4**	RW
1389	**P11.30**	**PID2 Set Point 2 WakeUp Level** Defines the level for the PID feedback value to go above top enable the PID output to be re enabled. This value is based of the % of feedback which can be scaled based off the PID Unit Min/Max values P11.5 and P11.6.	**3, 4**	RW
1391	**P11.31**	**PID2 Set Point 2 Boost** The setpoint can be boosted via a multiplier value.	**3, 4**	RW
1392	**P11.32**	**PID2 Feedback Func** Choose a single signal used as feedback, this parameter allows for doing math functions with 2 sources.	**3, 4**	RW
1393	**P11.33**	**PID2 Feedback Gain** Define Gain associated with feedback signal from the measuring device.	**3, 4**	RW
1394	**P11.34**	**PID2 Feedback 1 Source** Define where feedback signal is being fed into the drive, via analog or fieldbus data value.	**3, 4**	RW
1395	**P11.35**	**PID2 Feedback 1 Min** Minimum Unit Value for the Feedback signal.	**3, 4**	RW
1396	**P11.36**	**PID2 Feedback 1 Max** Maximum Unit Value for the Feedback signal.	**3, 4**	RW
1397	**P11.37**	**PID2 Feedback 2 Source** Define where feedback signal is being fed into the drive, via analog or fieldbus data value.	**3, 4**	RW
1398	**P11.38**	**PID2 Feedback 2 Min** Minimum Unit Value for the Feedback signal.	**3, 4**	RW
1399	**P11.39**	**PID2 Feedback 2 Max** Maximum Unit Value for the Feedback signal.	**3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
1400	P11.40	**PID2 Feedforward Func** Choose a single signal used as feed forward command, this is used to account for major disturbances that the Processor does not see via the Feedback.	3, 4	RW
1401	P11.41	**PID2 Feedforward Gain** Define feed forward gain control level.	3, 4	RW
1402	P11.42	**PID2 Feedforward 1 Source** Define where feed forward signal is fed from, this can either be an analog signal or fieldbus process value.	3, 4	RW
1403	P11.43	**PID2 Feedforward 1 Min** Define feed forward Minimum Value setting.	3, 4	RW
1404	P11.44	**PID2 Feedforward 1 Max** Define feed forward Maximum Unit Value setting.	3, 4	RW
1405	P11.45	**PID2 Feedforward 2 Source** Define where feed forward signal is fed from, this can either be an analog signal or fieldbus process value.	3, 4	RW
1406	P11.46	**PID2 Feedforward 2 Min** Define feed forward Minimum Value setting.	3, 4	RW
1407	P11.47	**PID2 Feedforward 2 Max** Define feed forward Maximum Unit Value setting.	3, 4	RW
1414	P11.48	**PID2 Set Point1 Comp Enable** Enables pressure loss compensation for setpoint 1 signal value.	3, 4	RW
1415	P11.49	**PID2 Set Point1 Comp Max** Value added proportionally to the frequency, setpoint compensation = comp max * (output freq–min freq)/(max freq–min freq).	3, 4	RW
1416	P11.50	**PID2 Set Point 2 Comp Enable** Enables pressure loss compensation for setpoint 2 signal value.	3, 4	RW
1417	P11.51	**PID2 Set Point 2 Comp Max** Value added proportionally to the frequency, setpoint compensation = comp max * (output freq–min freq)/(max freq–min freq). Procedure for setting up PID Application. Initially set PID Gain(P11.1) to 0.0% and set the PID I Time (P11.2) to 20 sec. Start the frequency converter and verify if the setpoint is reached quickly while maintaining stable operation of the system. If not increase the PID Gain (P11.1) until the drive speed oscillates constantly. After this occurs reduce the PID Gain (P11.1) slightly to reduce the oscillation. From here take the value found for PID Gain (P11.1) to 0.5 times that value and reduce the PID I time (P11.2) until the feedback signal oscillates again. INcrease the PID I time (P11.2) until the oscillation stops, with that value take it times 1.2 and use that value for the PID I time (P11.2). If signal noise is seen at high frequency increase the filter time values to filter the signal. If further tuning is required refer to the table showing what is effected.	3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
2467	**P11.52**	**PID2 Wake Up Action** This parameter defines the wakeup function action. 0 = Wakeup when below wakeup level P11.21/P11.30 1 = Wakeup when above walk-up level P11.21/P11.30 2 = Wakeup when below wakeup level % set in P11.21/P11.30 from PID setpoint 3 = Wakeup when above wakeup level % set in P11.21/P11.30 from PID setpoint	**3, 4**	RW

Response	Rise time	Overshoot	Settling time	Steady state error
Increase PID Gain	Decrease Rise	Increases Overshoot	Not Affected	Decreases Error
Increase PID1 Time	Decrease Rise	Increases Overshoot	Increases Setting	Eliminates Error
Increase PID0 Time	Not Affected	Decreases Overshoot	Decreases Setting	Not Affected

Rise Time—the time required for the output to rise 90% of the desired level for the first time.
Overshoot—the difference between the peak level and the steady state level. Setting Time—time required for the system to converge to its steady state.
Steady State Error—the difference between the steady state level and the desired output level.



Modbus ID	Code	Parameters	Application	RO/RW
2546	**P11.53**	**FB PID2 Set Point 1** PID set point 1 value from fieldbus	**3, 4**	RW
2548	**P11.54**	**FB PID2 Set Point 2** PID set point 2 value from fieldbus	**3, 4**	RW
2552	**P11.55**	**FB PID2 Feedback 1** PID feedback 1 value from fieldbus	**3, 4**	RW
2553	**P11.56**	**FB PID2 Feedback 2** PID reference value feedback 2 from fieldbus	**3, 4**	RW
2556	**P11.57**	**FB PID2 Feedforward 1** PID reference value feedforword 1 from fieldbus	**3, 4**	RW
2557	**P11.58**	**FB PID2 Feedforward 2** PID reference value feedforword 2 from fieldbus	**3, 4**	RW
2662	**P11.59**	**PID2 Sleep Boost level** PID2 Sleep boost level, range shall be [-9999,9999], unit shall be PID unit. Default value shall be 0.	**3, 4**	RW
2663	**P11.60**	**PID2 Sleep Boost Max Time** PID2 Sleep boost maximum time, range shall be [1,300] seconds. Default value shall be 30s	**3, 4**	RW
2818	**P11.61**	**PID2 Low Feedback Level** This parameter specifies low feedback level warning or fault will occur	**3, 4**	RW
2819	**P11.62**	**PID2 Low Feedback Time** This parameter specifies the delay time for low feedback warning or fault.	**3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2820	**P11.63**	**PID2 Low Feedback Protection** This parameter specifies the drive response to a low feedback condition, there are four options, default value is 0, 0 No Action; 1 Warning; 2 Fault; 3 Fault, Coast	**3, 4**	RW
2821	**P11.64**	**PID2 High Feedback Level** This parameter specifies the level at which a high feedback warning or fault will occur	**3, 4**	RW
2822	**P11.65**	**PID2 High Feedback Time** This parameter specifies the delay time for high feedback warning or fault.	**3, 4**	RW
2823	**P11.66**	**PID2 High Feedback Protection** This parameter specifies the drive response to a high feedback condition, there are four options, default value is 0, 0 = No Action; 1 = Warning; 2 = Fault; 3 = Fault, Coast	**3, 4**	RW
2824	**P11.67**	**PID2 Hysteresis Level** This parameter specifies the hysteresis Level used for low and high level detection.	**3, 4**	RW
2826	**P11.68**	**PID2 Backup Feedback Source** This parameter specifies PID backup feedback selection. 0 = Not Used; 1 = AI1; 2 = AI2; 3 = Slot A: AI1; 4 = Slot B: AI1;	**3, 4**	RW
105	**P12.1**	**Preset Speed 1** Parameter values are automatically limited between the minimum and maximum frequencies (P1.1, P1.2). Sets the desired frequency as the reference when input is applied.	**1, 2, 3, 4**	RW
106	**P12.2**	**Preset Speed 2** Parameter values are automatically limited between the minimum and maximum frequencies (P1.1, P1.2). Sets the desired frequency as the reference when input is applied.	**1, 2, 3, 4**	RW
118	**P12.3**	**Preset Speed 3** These parameter values define the Multi-step speeds selected. These parameter values are automatically limited between minimum and maximum frequency (P1.1 and P1.2).	**1, 2, 3, 4**	RW
119	**P12.4**	**Preset Speed 4** These parameter values define the Multi-step speeds selected. These parameter values are automatically limited between minimum and maximum frequency (P1.1 and P1.2).	**1, 2, 3, 4**	RW
120	**P12.5**	**Preset Speed 5** These parameter values define the Multi-step speeds selected. These parameter values are automatically limited between minimum and maximum frequency (P1.1 and P1.2).	**1, 2, 3, 4**	RW
121	**P12.6**	**Preset Speed 6** These parameter values define the Multi-step speeds selected. These parameter values are automatically limited between minimum and maximum frequency (P1.1 and P1.2).	**1, 2, 3, 4**	RW
122	**P12.7**	**Preset Speed 7** These parameter values define the Multi-step speeds selected. These parameter values are automatically limited between minimum and maximum frequency (P1.1 and P1.2).	**1, 2, 3, 4**	RW
295	**P13.1**	**Torque Limit** With this parameter you can set the torque limit control limit between 0.0–400.0% when in open loop torque control.	**4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
303	P13.2	**Torque Ref Select** Defines the source for torque reference. 0 = Not used 1 = AI1 2 = AI2 3 = SlotA:AI1 4 = SlotB:AI1 5 = AI1 joystick 6 = AI2 joystick 7 = Keypad Torque Ref 8 = Fieldbus Ref	4	RW
782	P13.3	**Keypad Torque Ref** Keypad Torque speed reference.	4	RW
304	P13.4	**Torque Ref Max** Scales the minimum and maximum level for the torque ref to be between –300.0 to 300.0%.	4	RW
305	P13.5	**Torque Ref Min** Scales the minimum and maximum level for the torque ref to be between –300.0 to 300.0%.	4	RW
1666	P13.6	**Speed Limiter Mode** Defines the Speed limit control which the frequency converter operates in the open loop torque control mode. 0 = NegFreqMax…PosFreqMax 1 = -|FreqRampOut|…+|FreqRampOut| 2 = NegFreqMax…FreqRampout(MIN) 3 = FreqRampOut...PosFreqMax(MAX) 4 = FreqRampOut+-WindowPos/NegWidth 5 = 0…FreqRampOUt(pos or neg direction) 6 = FreqRamp+-WindowPos/Neg/PosOff/NegOff	4	RW
1636	P13.7	**Window Pos Width** Frequency in positive direction when drive goes into Speed control from Torque Control mode. This references back to P13.6 setting for the Frequency Max setpoint option 4 or 6.	4	RW
1637	P13.8	**Window Neg Width** Frequency in negative direction when drive goes into Speed control from Torque Control mode. This references back to P13.6 setting for the Frequency Max setpoint option 4 or 6.	4	RW
1638	P13.9	**Window Pos Off Limit** Frequency in positive direction when drive comes out of Speed control from Torque Control mode. This references back to P13.6 setting for the Frequency Max setpoint option 6.	4	RW
1639	P13.10	**Window Neg Off Limit** Frequency in negative direction when drive comes out of Speed control from Torque Control mode. This references back to P13.6 setting for the Frequency Max setpoint option 6.	4	RW
1640	P13.11	**Torque Reference Filter TC** Torque reference filter time	4	RW
1606	P13.12	**Pull Out Torque** Start up torque level in percentage.	4	RW
1684	P13.13	**Stop State Magnetization Time** Engine stop-Magnetization time at the stop in the open-loop torque control mode.	4	RW
2541	P13.14	**FB Torque Ref** Torque reference from fieldbus	4	RW
254	P14.1	**DC-Brake Current** Defines the current level injected into the motor during DC-braking.	1, 2, 3, 4	RW
263	P14.2	**Start DC-Brake Time** DC-brake is activated when the start command is given. This parameter defines the time the drive injects DC into the motor before ramping to reference level. This is to stop motors that are potentially spinning before a run command is given.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
262	**P14.3**	**Stop DC-Brake Frequency** The output frequency at which the DC-braking is applied on stopping. See Figure 66 of DG1 Application Manual.	**1, 2, 3, 4**	RW
255	**P14.4**	**Stop DC-Brake Time**	**1, 2, 3, 4**	RW

Determines the length of DC braking when stopping. The function of the DC-brake depends on the stop function, P7.10, used when Ramping. When frequency drops below P14.3 it enables DC injection braking to stop motor.

0.0 = DC-brake is not used

>0.0 = DC-brake is in use and its function depends on the Stop function, (P7.10). The DC-braking time is determined with this parameter.

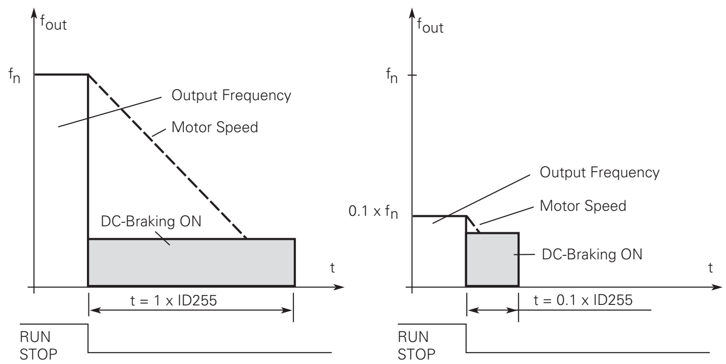
Par. P7.10 = 0; Stop function =Coasting:

After the stop command, the motor coasts to a stop without control of the frequency converter.

With DC-injection, the motor can be electrically stopped in the shortest possible time, without using an optional external braking resistor.

The braking time is scaled according to the frequency when the DC-braking starts. If the frequency is ≥ the nominal frequency of the motor, the set value of parameter P14.4 determines the braking time. When the frequency is ≤10% of the nominal, the braking time is 10% of the set value of P14.4.

Figure 93. DC-Braking time when stop mode = coasting

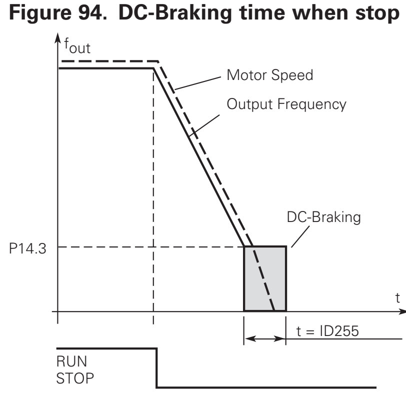


Par. P7.10 = 1; Stop function = Ramp:

After the Stop command, the speed of the motor is reduced according to the set deceleration parameters, as fast as possible, to the speed defined with P14.3, where the DC-braking starts.

The braking time is defined with P14.4. If high inertia exists, it is recommended to use an external braking resistor for faster deceleration. See Figure 67 in the DG1 Application Manual.

Figure 94. DC-Braking time when stop mode = ramp



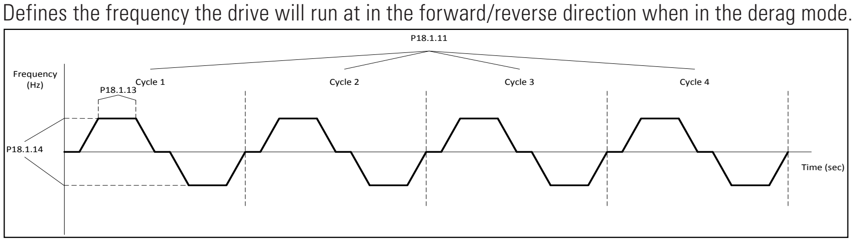
Modbus ID	Code	Parameters	Application	RO/RW
251	P14.5	**Brake Chopper Mode** When the frequency converter is decelerating the motor, the inertia of the motor and the load is fed into an external brake resistor. This enables the frequency converter to decelerate the load with a torque equal to that of acceleration (provided that the correct brake resistor has been selected). 0 = No brake chopper used 1 = Brake chopper in use and tested when running. Can be tested also in READY state 2 = External brake chopper (no testing) 3 = Used and tested in READY state and when running 4 = Used when running (no testing)	1, 2, 3, 4	RW
266	P14.6	**Flux Brake** Instead of DC braking, flux braking is a useful form of braking for motors ≤15 kW. When braking is needed, the frequency is reduced and the flux in the motor is increased, which in turn increases the motor's capability to brake. Unlike DC braking, the motor speed remains controlled during braking. The flux braking can be set ON or OFF. 0 = Flux braking OFF 1 = Flux braking ON **Note**: Flux braking converts the energy into heat in the motor, and should be used intermittently to avoid motor damage.	1, 2, 3, 4	RW
265	P14.7	**Flux Brake Current** Defines the flux braking current value output when Flux Brake is enabled.	1, 2, 3, 4	RW
535	P15.1	**Fire Mode Function** This parameter determines whether the fire mode function is determined by a contact closure or contact opening on the desired digital input P3.28. 0 = Closing contact initiates fire mode function 1 = Opening contact initiates fire mode function **Note**: When Fire mode is enabled, this causes the drive to ignore any fault and run till its death. Warranty will be non valid in the case this is enabled and the drive causes issues to the system.	2, 3, 4	RW
536	P15.2	**Fire Mode Ref Select Function** This parameter allows for setting the reference location for when the fire mode is enabled. 0 = Fire Mode Min Frequency (P15.3) 1 = Fire Mode Ref - follows P15.4 and P15.5 with the use of an digital input to select. 2 = Fieldbus Ref - Reference from fieldbus process in 3 = AI1 - Analog input 1 4 = AI2 - Analog input 2 5 = AI1 + AI2 - Analog input 1 added to Analog input 2 6 = PID1 Control - follows the PID control algorithm settings	2, 3, 4	RW
537	P15.3	**Fire Mode Frequency** This parameter sets the minimum output frequency for fire mode. This can be used as a selection for reference command.	2, 3, 4	RW
565	P15.4	**Fire Mode % Speed Ref 1** This parameter sets the drive operating percentage based off the 0% being Min Frequency(P1.1) and 100% being Max Frequency (P1.2) for fire mode reference 1.	2, 3, 4	RW
564	P15.5	**Fire Mode % Speed Ref 2** This parameter sets the drive operating percentage based off the 0% being Min Frequency(P1.1) and 100% being Max Frequency (P1.2) for fire mode reference 2.	2, 3, 4	RW
554	P15.6	**Smoke Purge Frequency** Frequency setting for Smoke Purge. Preset Speed used for a digital input selection. The percentage is based off the 0% being Min Frequency(P1.1) and 100% being Max Frequency (P1.2)	2, 3, 4	RW
2443	P15.7	**Fire Mode Test Enable** This parameter allows for testing the Fire Mode feature, with the parameter set to Enable and Fire Mode input enabled, the drive will run at the Fire Mode speed desired but all faults are enabled.	2, 3, 4	RW
577	P16.1	**Motor Nom Current 2** The second motor set name plate Current.Selected based off of a digital input.	2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
578	**P16.2**	**Motor Nom Speed 2** The second motor set name plate RPM. Selected based off of a digital input.	**2, 3, 4**	RW
579	**P16.3**	**Motor PF 2** The second motor set name plate Power Factor. Selected based off of a digital input.	**2, 3, 4**	RW
580	**P16.4**	**Motor Nom Volt 2** The second motor set name plate Voltage. Selected based off of a digital input.	**2, 3, 4**	RW
581	**P16.5**	**Motor Nom Freq 2** The second motor set name plate Frequency. Selected based off of a digital input.	**2, 3, 4**	RW
1419	**P16.6**	**Stator Resistor 2** The second set of motor stator resistor real values for 2nd motor set.	**4**	RW
1420	**P16.7**	**Rotor Resistor 2** The second set of motor rotor resistor real value for 2nd motor set.	**4**	RW
1421	**P16.8**	**Leak Inductance 2** The second set of motor leakage inductance real value for 2nd motor set.	**4**	RW
1422	**P16.9**	**Mutual Inductance 2** The second set of motor mutual inductance real value for 2nd motor set.	**4**	RW
1423	**P16.10**	**Excitation Current 2** The second set of motor no-load current real value for 2nd motor set.	**4**	RW
2838	**P16.11**	**Motor Inertia2** This parameter specifies inertia of a complete system. It is recommended to run “Identification Only Inertia” to get better reaction and dynamics.	**4**	RW
1418	**P17.1.1**	**Bypass Enable** This parameter identifies whether enter into bypass mode is enabled. Once enabled the “Bypass” soft key on keypad will show to start bypass.	**2, 3, 4**	RW
544	**P17.1.2**	**Bypass Start Delay** This parameter specifies the time delay between when the Bypass Signal is applied via I/O, Fieldbus or keypad, to when the motor starts and once bypass is removed the time to switch back to drive.	**2, 3, 4**	RW
542	**P17.1.3**	**Auto Bypass** This parameter specifies whether an automatic switch to bypass will occur based on Overvoltage Fault condition, is enabled based off a specific fault condition of Auto Bypass P10.5 through Undervoltage Fault Auto Bypass P10.9 parameters below. 0 = Auto Bypass disabled 1 = Auto Bypass enabled	**2, 3, 4**	RW
543	**P17.1.4**	**Auto Bypass Delay** This parameter specifies the time delay before an automatic switch to bypass, as determined by Overvoltage Fault Auto Bypass P10.5 through Undervoltage Fault Auto Bypass P10.9 parameters, will occur.	**2, 3, 4**	RW
547	**P17.1.5**	**OverCurrent Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the overcurrent fault auto-restart tries have been exceeded. 0 = Auto bypass on overcurrent fault tries exceeded disabled, bypass once fault happens. 1 = Auto bypass on overcurrent fault tries exceeded enabled, bypass after tries exceed.	**2, 3, 4**	RW
546	**P17.1.6**	**IGBT Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the IGBT fault auto-restart tries have been exceeded. 0 = Auto bypass on IGBT fault tries exceeded disabled 1 = Auto bypass on IGBT fault tries exceeded enabled	**2, 3, 4**	RW
548	**P17.1.7**	**4 mA Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the loss of reference fault and auto-restart tries have been exceeded. 0 = Auto bypass on loss of reference fault tries exceeded disabled 1 = Auto bypass on loss of reference fault tries exceeded enabled **Note**: P1.7.1 (4 mA (Reference) Fault Auto Bypass) must be set to 4 or 5 (Fault).	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
545	**P17.1.8**	**UnderVoltage Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the undervoltage fault auto-restart tries have been exceeded. 0 = Auto bypass on undervoltage fault tries exceeded disabled 1 = Auto bypass on undervoltage fault tries exceeded enabled	**2, 3, 4**	RW
549	**P17.1.9**	**OverVoltage Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the overvoltage fault auto-restart tries have been exceeded. 0 = Auto bypass on overvoltage fault tries exceeded disabled 1 = Auto bypass on overvoltage fault tries exceeded enabled	**2, 3, 4**	RW
1698	**P17.1.10**	**Motor OverTemp Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the Motor OverTemp fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1699	**P17.1.11**	**UnderLoad Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the UnderLoad fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1700	**P17.1.12**	**External Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the External fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1701	**P17.1.13**	**Charge Switch Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the Charge Switch Fault fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1702	**P17.1.14**	**Saturation Trip Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the Saturation Trip fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1703	**P17.1.15**	**Under Temp Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the Under Temp Fault fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1704	**P17.1.16**	**EEPROM Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the EEPROM fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1705	**P17.1.17**	**FRAM Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the FRAM fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1706	**P17.1.18**	**Watchdog Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the Watchdog fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
1707	**P17.1.19**	**Fan Cooling Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the Fan Cooling fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1708	**P17.1.20**	**Keypad Com Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the Keypad Communication fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1709	**P17.1.21**	**Option Card Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the Option Card fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1710	**P17.1.22**	**RTC Clock Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the RTC Clock fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1711	**P17.1.23**	**Ctrl Board OverTemp Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the Ctrl Board OverTemp fault. 0 = Auto bypass disabled 1 = Auto bypass enabled	**2, 3, 4**	RW
1713	**P17.1.24**	**Fieldbus Fault Bypass Enable** This parameter enables a fieldbus fault to run in bypass	**2, 3, 4**	RW
2832	**P17.1.25**	**Op Cont Interlock Fault Bypass Enable** This parameter enables a output contactor interlock fault to run in bypass	**2, 3, 4**	RW
2476	**P17.2.1**	**Redundant Drive Enable** This parameter will allow for enabling the Redundant drive setup were multiple drives can be connected via modbus communications to start if the main drive fails or runtime settings below expires.	**2, 3, 4**	RW
2278	**P17.2.2**	**Drive ID** This parameter defines the drive address when using multi drive pump mode, based off this id the drive enables in the desired sequence and can be monitored at this drive ID value in the monitor screen.	**2, 3, 4**	RW
2477	**P17.2.3**	**Redundant Run Time Enable** This parameter enables the Run time limit on the Redundant drive so that drives will be cycled based off the Run time limit value.	**2, 3, 4**	RW
2478	**P17.2.4**	**Redundant Run Time Reset** This parameter will Reset the Redundant Drive Run timer value.	**2, 3, 4**	RW
2479	**P17.2.5**	**Redundant RunTime Limit** Sets the time limit for the Run time of one drive when enabled for the Redundant drive scheme.	**2, 3, 4**	RW
2279	**P18.1.1**	**Multi-pump Mode** Determines the number of drives being used in the Multi-pump configuration. 0 = Single Drive - single drive for main motor, contactors used on other motors 1 = Multi Drive - multi-follower sequence with multiple drives.	**2, 3, 4**	RW
2278	**P17.2.2**	**Drive ID** This parameter defines the drive address when using multi drive pump mode, based off this id the drive enables in the desired sequence and can be monitored at this drive ID value in the monitor screen.	**2, 3, 4**	RW
2458	**P18.1.3**	**PID Bandwidth** Percentage based off the setpoint above and below which defines when the aux motor will come online or offline.	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2315	P18.1.4	**Staging Frequency** With feedback outside the bandwidth, this time must pass before motors/pumps are added or removed from the system.	2, 3, 4	RW
2316	P18.1.5	**De-Staging Frequency** This parameter enables the drive to look at the digital input interlocks to tell which motor is available for running or if they were brought offline. When in Multi drive mode only looks at interlock 1.	2, 3, 4	RW
344	P18.1.6	**Add/Remove Delay** With feedback outside the bandwidth, this time must pass before motors/pumps are added or removed from the system.	2, 3, 4	RW
350	P18.1.7	**Interlock Enable** This parameter enables the drive to look at the digital input interlocks to tell which motor is available for running or if they were brought offline.	2, 3, 4	RW
483	P18.1.8	**Damper Start** This parameter determines the function of damper. 0 = Start—standard start 1 = Interlocked Start—To use this, a relay output, RO1–RO3, needs to be programmed for selections 35 “Damper Control,” and a digital input DIN must be programmed for selection “RunEn/INTLK.” The relay output is used to energize an element of the driven system, such as a damper, seal water solenoid, or a pre-lube pump. Upon a return acknowledgment contact closure to the programmed digital input, the frequency converter will start. 2 = Interlock Time Start—This functions the same as the Interlocked Start, except that if the return acknowledgment contact is not received within the Interlock Timeout, a “prevent-up start” fault is displayed in keypad and the start sequence will need to be restarted. 3 = Delay Start—This start is similar to the Interlocked Start, except that a return contact is not used. After the “Delay Time” following the relay output closure, the frequency converter starts.	2, 3, 4	RW
484	P18.1.9	**Damper Time Out** The timeout time used for an Interlocked Time Start, after which the start sequence must be restarted if no acknowledgment contact is received.	2, 3, 4	RW
485	P18.1.10	**Damper Delay** The delay time following a Delay Start, after which the frequency converter will be started.	2, 3, 4	RW
2468	P18.1.11	**Derag Cycles** This parameter defines the number of cycles in the forward/Reverse direction for removing any debris in system.	2, 3, 4	RW
2469	P18.1.12	**Derag at Start/Stop** Defines how the derag function will become activated; start, stop, both or based off the digital input.	2, 3, 4	RW
2470	P18.1.13	**Deragging Run Time** Defines the length of time the drive will run at the Derag speed in the forward and reverse direction.	2, 3, 4	RW
2471	P18.1.14	**Derag Speed** Defines the frequency the drive will run at in the forward/reverse direction when in the derag mode.	2, 3, 4	RW



Modbus ID	Code	Parameters	Application	RO/RW
2472	P18.1.15	**Derag Off Delay** Defines the length of time the drive will run the derag function when enabled at stop.	2, 3, 4	RW
2659	P18.1.16	**Multi-pump Mode 2** This parameter specifies multi-pump mode 2 0 = Disabled 1 = Single Drive Control 2 = Multi Drive Network	2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO

Modbus ID	Code	Parameters	Application	RO/RW
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO

Modbus ID	Code	Parameters	Application	RO/RW
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO

Modbus ID	Code	Parameters	Application	RO/RW
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO

Modbus ID	Code	Parameters	Application	RO/RW
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO

Modbus ID	Code	Parameters	Application	RO/RW
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2218	**P18.2.1.1**	**Drive 1** This parameter gives the status of Drive 1 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2230	**P18.2.1.2**	**Drive 2** This parameter gives the status of Drive 2 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2242	**P18.2.1.3**	**Drive 3** This parameter gives the status of Drive 3 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
2254	**P18.2.1.4**	**Drive 4** This parameter gives the status of Drive 4 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO

Modbus ID	Code	Parameters	Application	RO/RW
2266	**P18.2.1.5**	**Drive 5** This parameter gives the status of Drive 5 when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Offline - when in single drive mode or slave drive which lost master in multi drive mode 1 = Slave Drive - Operates as an auxiliary drive in multi-drive mode 2 = Master Drive - Operates as the regulating drive of the multi-drive mode	**2, 3, 4**	RO
342	**P18.4.1**	**Number of Pumps** Total number of auxiliary motors/pumps to be used with the Multi-Pump System. When in single drive mode, this functions as the amount of motors on a single drive. When in multi drive mode, this functions as the most drives active at one time.	**2, 3, 4**	RW
346	**P18.4.2**	**Include Freq Converter** When enable this tells the drive if the motor/pump connected to frequency converter is included in the auto change sequence when using auxiliary contacts. Not available in multi-drive mode.	**2, 3, 4**	RW
345	**P18.4.3**	**Auto-Change Enable** Autochange will rotate the starting order/priority of the motors in the system to get equal run time on all the motors. Not available in multi-drive mode.	**2, 3, 4**	RW
347	**P18.4.4**	**Auto-Change Interval** Defines how often to rotate starting order of motors/pumps. Not available in multi-drive mode.	**2, 3, 4**	RW
349	**P18.4.5**	**Auto-Change Freq Limit** An autochange is done when the autochange interval has elapsed and the drive is running below autochange frequency limit. Not available in multi-drive mode.	**2, 3, 4**	RW
348	**P18.4.6**	**Auto-Change Pump Limit** An auto change is done when the auto change interval has elapsed and the number of running aux motors is less than auto change motor limit. Not available in multi-drive mode.	**2, 3, 4**	RW
2439	**P18.4.7**	**Pipe Fill Aux Pump Select** Pipe Fill Aux Pump Select	**2, 3, 4**	RW
2440	**P18.4.8**	**Pipe Fill Aux Pump Run Time** Pipe Fill Aux Pump Run Time	**2, 3, 4**	RW
2441	**P18.4.9**	**Pipe Fill Aux Pump Operation** Pipe Fill Aux Pump Operation	**2, 3, 4**	RW
2442	**P18.4.10**	**Pipe Fill Aux Pump Delay** Pipe Fill Aux Pump Delay	**2, 3, 4**	RW
2449	**P18.5.1**	**Number of Drives** This defines the number of drives active when doing the Multi-Drive Pump and fan scheme. By default there will be always 1 drive active at 1 time by setting value to above 1 it allows to bring in additional drives to maintain the stem.	**2, 3, 4**	RW
2284	**P18.5.2**	**Regulation Source** For drives that have been connected with both start/stop signal and PID feedback can be set up as "Feedback", so they will have ability to be master. 0 = Network 1 = Feedback	**2, 3, 4**	RW
2285	**P18.5.3**	**Recovery Method** This parameter is for the slave when multi-drive system lost master, slave drive can continue run if it set to be "Automatic", however slave drive will stop immediately if it is set to be "Stop". 0 = Automatic 1 = Stop	**2, 3, 4**	RW
2286	**P18.5.4**	**Callback Source** Sometimes some information needs to be callback from slave to master and affect whole system; if slave drive has a callback source as STO, when it suffers STO fault, master drive will answer this callback and shutdown whole system. 0 = No Action 1 = Safety Torque Off	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2311	P18.5.5	**Add/Remove Drive Selection** In default, MPFC system will add/remove pump according to their drive ID, from small to large; and the order can also depend on each slave drive's running time: add the drive has shortest running time and remove the drive has longest running time first. 0 = Drive ID 1 = Run Time	2, 3, 4	RW
2280	P18.5.6	**Run Time Enable** The run time counter will start counting only if this parameter is enabled. 0 = Disable 1 = Enable	2, 3, 4	RW
2281	P18.5.7	**Run Time Limit** If drive run time is over this limit, its network status will be "Need Alternation". Limit equals 0 means run time counter disabled.	2, 3, 4	RW
2283	P18.5.8	**Run Time Reset** One-time parameter, set to be 1 will clear run time counter.	2, 3, 4	RW
2473	P18.5.9	**Master Drive Mode** Defines how the Master drive will maintain the frequency control when slaves are brought in; follow PID, Fixed speed, or Turn itself off.	2, 3, 4	RW
2474	P18.5.10	**Master Fixed Speed** Defines the fixed speed frequency when the Master Drive mode is set for Fixed Speed control when slaves are brought in.	2, 3, 4	RW
2475	P18.5.11	**Master Fixed Speed Delay** Defines the delay time before the master drive begins running at the fixed speed or turns off if the Master Mode is set for Fixed Speed or Turn Off.	2, 3, 4	RW
2406	P18.6.1	**Pipe Fill Loss Detection Method** Defines the value for looking at a loss of prime 0 = Motor Current 1 = Motor Power (%) 2 = Motor Torque (%)	2, 3, 4	RW
2407	P18.6.2	**Pipe Fill Loss Level** Selects the level at which to look at a condition of Loss of Prime. When the measured value defined in the Detection Method drops below this level for the Prime Loss Time and is above the Prime Loss Frequency level, the drive will respond based off the	2, 3, 4	RW
2408	P18.6.3	**Pipe Fill Loss Time** Defines the delay time before a "Loss of Prime" condition will occur based of the Detection Method and Prime Loss Level.	2, 3, 4	RW
2409	P18.6.4	**Pipe Fill Loss Frequency** Defines the frequency point at which the drive needs to be above to enabled the "Loss of Prime" feature. When set to 0 Hz protection is disabled.	2, 3, 4	RW
2410	P18.6.5	**Pipe Fill Loss Response** Defines the response method when a "Loss of Prime" condition occurs	2, 3, 4	RW
2411	P18.6.6	**Pipe Fill Loss Attempts** Defines the amount of temps to auto restart the drive on an "Prime Loss" condition.	2, 3, 4	RW
2428	P18.6.7	**Prime Pump Enable** This will enable or disabled the Pre-Charge function to allow for pre filling a system before going into PID control mode.	2, 3, 4	RW
2429	P18.6.8	**Prime Pump Level** This defines the level at which the Pre Charge function will drop out, If the feedback level rise above this value Pre charge becomes deactivated, if the level is not reach it will switch after the delay time.	2, 3, 4	RW
2431	P18.6.9	**Prime Pump Frequency** Frequency at which the Pre-Charge function will operate when enabled.	2, 3, 4	RW
2432	P18.6.10	**Prime Pump Delay Time** This is the time that the drive will run the Pre charge function on start up. When set to "0 Hz" this function is not enabled. When set to "0 Hz" this function is not enabled.	2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
2433	**P18.6.11**	**Prime Pump Loss of Prime Level** Selects the limit to indicate a loss of Prime in pump. If the measured current drops below the determined value for the value assigned in the Prime Loss of Time setting the drive will display a Precharge Loss of Prime.	**2, 3, 4**	RW
2434	**P18.6.12**	**Prime Pump Level 2** This defines the level at which the Pre Charge function will drop out, If the feedback level rises above this value Precharge becomes deactivated, if the level is not reach it will switch after the delay time.	**2, 3, 4**	RW
2436	**P18.6.13**	**Prime Pump Frequency 2** Frequency at which the Pre-Charge level 2 will operate at when enabled.	**2, 3, 4**	RW
2437	**P18.6.14**	**Prime Pump Delay Time 2** This is the time that the drive will run at the 2nd Level Pre Charge function level. When set to "0 Hz" this function is not enabled.	**2, 3, 4**	RW
2438	**P18.6.15**	**Prime Pump Loss of Prime Level 2** Selects the limit to indicate a loss of Prime in pump. If the measured current drops below the determined value for the value assigned in the Prime Loss of Time setting the drive will display a Precharge Loss of Prime.	**2, 3, 4**	RW
1853	**P18.6.16**	**Broken Pipe Fault Response** This parameter specifies broken pipe fault protection 0 = No Action 1 = Warning 2 = Fault 3 = Fault,Coast	**2, 3, 4**	RW
1854	**P18.6.17**	**Broken Pipe Level** This parameter specifies broken pipe fault level	**2, 3, 4**	RW
1855	**P18.6.18**	**Broken Pipe Delay** This parameter specifies broken pipe fault delay time	**2, 3, 4**	RW
1856	**P18.6.19**	**Broken Pipe Frequency** This parameter specifies broken pipe fault frequency	**2, 3, 4**	RW
2804	**P18.6.20**	**Jockey Pump Enable** This parameter specifies jockey pump function selection 0 = Not Used 1 = PID Sleep 2 = PID Sleep (Level)	**2, 3, 4**	RW
2805	**P18.6.21**	**Jockey Start Level** This parameter specifies jockey start level for PID Sleep (Level), according PID process unit	**2, 3, 4**	RW
2807	**P18.6.22**	**Jockey Stop Level** This parameter specifies jockey stop level for PID Sleep (Level), according PID process unit	**2, 3, 4**	RW
2809	**P18.6.23**	**Lube Pump Enable** This parameter specifies lube pump function enable 0 = Disabled 1 = Enabled	**2, 3, 4**	RW
2810	**P18.6.24**	**Lube Pump Time** This parameter specifies lube time, which delay the drive output and to active the digital output before the drive is allowed to run, if this parameter is set to 0, it will disable the function.	**2, 3, 4**	RW
491	**P19.1**	**Interval 1 On Time** On time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2, 3, 4**	RW
493	**P19.2**	**Interval 1 Off Time** Off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
517	**P19.3**	**Interval 1 From Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2, 3, 4**	RW
518	**P19.4**	**Interval 1 To Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2, 3, 4**	RW
519	**P19.5**	**Interval 1 Channel** Select affected time channel to store the interval time. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2, 3, 4**	RW
495	**P19.6**	**Interval 2 On Time** On time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2, 3, 4**	RW
497	**P19.7**	**Interval 2 Off Time** Off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2, 3, 4**	RW
520	**P19.8**	**Interval 2 From Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2, 3, 4**	RW
521	**P19.9**	**Interval 2 To Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
522	P19.10	**Interval 2 Channel** Select affected time channel to store the interval time. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	2, 3, 4	RW
499	P19.11	**Interval 3 On Time** On time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	2, 3, 4	RW
501	P19.12	**Interval 3 Off Time** Off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	2, 3, 4	RW
523	P19.13	**Interval 3 From Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	2, 3, 4	RW
524	P19.14	**Interval 3 To Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	2, 3, 4	RW
525	P19.15	**Interval 3 Channel** Select affected time channel to store the interval time. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	2, 3, 4	RW
503	P19.16	**Interval 4 On Time** On time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	2, 3, 4	RW
505	P19.17	**Interval 4 Off Time** Off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	2, 3, 4	RW
526	P19.18	**Interval 4 From Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
527	**P19.19**	**Interval 4 To Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2, 3, 4**	RW
528	**P19.20**	**Interval 4 Channel** Select affected time channel to store the interval time. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2, 3, 4**	RW
507	**P19.21**	**Interval 5 On Time** On time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2, 3, 4**	RW
509	**P19.22**	**Interval 5 Off Time** Off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2, 3, 4**	RW
529	**P19.23**	**Interval 5 From Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2, 3, 4**	RW
530	**P19.24**	**Interval 5 To Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2, 3, 4**	RW
531	**P19.25**	**Interval 5 Channel** Select affected time channel to store the interval time. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2, 3, 4**	RW
511	**P19.26**	**Timer 1 Duration** The timer will run when activated. (Activated by DI)	**2, 3, 4**	RW
532	**P19.27**	**Timer 1 Channel** Select affected time channel. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
513	**P19.28**	**Timer 2 Duration** The timer will run when activated. (Activated by DI)	**2, 3, 4**	RW
533	**P19.29**	**Timer 2 Channel** Select affected time channel. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2, 3, 4**	RW
515	**P19.30**	**Timer 3 Duration** The timer will run when activated. (Activated by DI)	**2, 3, 4**	RW
534	**P19.31**	**Timer 3 Channel** Select affected time channel. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2, 3, 4**	RW
2487	**P19.32**	**Interval 1 Setting** Defines the Interval time setting for interval 1; to be Weekly or Daily. 0 = Weekly - would setup the timer for the week long. 1 = Daily - would setup the timer for the defined day.	**2, 3, 4**	RW
2488	**P19.33**	**Interval 2 Setting** Defines the Interval time setting for interval 1; to be Weekly or Daily. 0 = Weekly - would setup the timer for the week long. 1 = Daily - would setup the timer for the defined day.	**2, 3, 4**	RW
2489	**P19.34**	**Interval 3 Setting** Defines the Interval time setting for interval 1; to be Weekly or Daily. 0 = Weekly - would setup the timer for the week long. 1 = Daily - would setup the timer for the defined day.	**2, 3, 4**	RW
2490	**P19.35**	**Interval 4 Setting** Defines the Interval time setting for interval 1; to be Weekly or Daily. 0 = Weekly - would setup the timer for the week long. 1 = Daily - would setup the timer for the defined day.	**2, 3, 4**	RW
2491	**P19.36**	**Interval 5 Setting** Defines the Interval time setting for interval 1; to be Weekly or Daily. 0 = Weekly - would setup the timer for the week long. 1 = Daily - would setup the timer for the defined day.	**2, 3, 4**	RW
2533	**P20.1.1**	**FB Process Data Input 1 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2534	**P20.1.2**	**FB Process Data Input 2 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW
2535	**P20.1.3**	**FB Process Data Input 3 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW
2536	**P20.1.4**	**FB Process Data Input 4 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2537	**P20.1.5**	**FB Process Data Input 5 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW
2538	**P20.1.6**	**FB Process Data Input 6 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW
2539	**P20.1.7**	**FB Process Data Input 7 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
2540	**P20.1.8**	**FB Process Data Input 8 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW
1556	**P20.2.1**	**FB Process Data Output 1 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW
1557	**P20.2.2**	**FB Process Data Output 2 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW
1558	**P20.2.3**	**FB Process Data Output 3 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
1559	P20.2.4	**FB Process Data Output 4 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	1, 2, 3, 4	RW
1560	P20.2.5	**FB Process Data Output 5 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	1, 2, 3, 4	RW
1561	P20.2.6	**FB Process Data Output 6 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	1, 2, 3, 4	RW
1562	P20.2.7	**FB Process Data Output 7 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	1, 2, 3, 4	RW

Modbus ID	Code	Parameters	Application	RO/RW
1563	**P20.2.8**	**FB Process Data Output 8 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 2 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 See Communication Manual MN040010EN for more details.	**1, 2, 3, 4**	RW
2415	**P20.2.9**	**Standard Status Word Bit0 Function Select** Standard Status Word Bit0 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	**1, 2, 3, 4**	RW
2416	**P20.2.10**	**Standard Status Word Bit1 Function Select** Standard Status Word Bit1 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	**1, 2, 3, 4**	RW
2417	**P20.2.11**	**Standard Status Word Bit2 Function Select** Standard Status Word Bit2 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	**1, 2, 3, 4**	RW
2418	**P20.2.12**	**Standard Status Word Bit3 Function Select** Standard Status Word Bit3 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	**1, 2, 3, 4**	RW
2419	**P20.2.13**	**Standard Status Word Bit4 Function Select** Standard Status Word Bit4 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	**1, 2, 3, 4**	RW
2420	**P20.2.14**	**Standard Status Word Bit5 Function Select** Standard Status Word Bit5 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	**1, 2, 3, 4**	RW
2421	**P20.2.15**	**Standard Status Word Bit6 Function Select** Standard Status Word Bit6 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	**1, 2, 3, 4**	RW
2422	**P20.2.16**	**Standard Status Word Bit7 Function Select** Standard Status Word Bit7 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	**1, 2, 3, 4**	RW

Modbus ID	Code	Parameters	Application	RO/RW
586	**P20.3.1.1**	**RS485 Comm Set** This parameter defines the communication protocol for RS-485. 0 = Modbus RTU 1 = BACnet MS/TP	**1, 2, 3, 4**	RW
587	**P20.3.2.1**	**Slave Address** This parameter defines the slave address for RS-485 communication	**1, 2, 3, 4**	RW
584	**P20.3.2.2**	**Baud Rate** This parameter defines communication speed for RS-485 communication.	**1, 2, 3, 4**	RW
585	**P20.3.2.3**	**Parity Type** This parameter defines parity type for RS-485 communication.	**1, 2, 3, 4**	RW
588	**P20.3.2.4**	**Modbus RTU Protocol Status** This parameter shows the protocol status for RS-485 communication. 0 = Initial 1 = Stopped 2 = Operational 3 = Faulted	**1, 2, 3, 4**	RO
593	**P20.3.2.5**	**Comm Timeout Modbus RTU** Selects the time it waits before a communication fault occurs over Modbus RTU if a message isn't received.	**1, 2, 3, 4**	RW
2516	**P20.3.2.6**	**Modbus RTU Fault Response** Defines the Fieldbus Fault condition for Modbus RTU Communication. 0 = Only in Fieldbus Control Mode - when fieldbus is the control place and Fieldbus fault is active drive will fault on loss of coms, if not in Fieldbus Control place will not fault. 1 = In all Control Modes - no matter the control place setting if communication is lost Fieldbus fault response will occur.	**1, 2, 3, 4**	RW
594	**P20.3.3.1**	**MSTP Baud Rate** Communication speed of BACnet.	**1, 2, 3, 4**	RW
595	**P20.3.3.2**	**MSTP MS/TP Device Address** Selects the BACnet Address that the drive will be located at on Instance node.	**1, 2, 3, 4**	RW
596	**P20.3.3.3**	**MSTP Instance Number** Selects the BACnet Instance value.	**1, 2, 3, 4**	RW
598	**P20.3.3.4**	**MSTP Comm Timeout MSTP** Selects the time it waits before a communication fault occurs over BACnet.	**1, 2, 3, 4**	RW
599	**P20.3.3.5**	**MSTP Protocol Status** Shows the status of the BACnet Protocol.	**1, 2, 3, 4**	RO
600	**P20.3.3.6**	**MSTP Fault Code** BACnet Protocol faults 0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 3 = Baud rate fault	**1, 2, 3, 4**	RO
2526	**P20.3.3.7**	**MSTP Fault Response** Defines the Fieldbus Fault condition for Modbus RTU and BacNet Communication. 0 = Only in Fieldbus Control Mode - when fieldbus is the control place and Fieldbus fault is active drive will fault on loss of coms, if not in Fieldbus Control place will not fault. 1 = In all Control Modes - no matter the control place setting if communication is lost Fieldbus fault response will occur.	**1, 2, 3, 4**	RW
1537	**P20.3.3.8**	**MSTP Max Master** This parameter specifies max master number of MSTP	**1, 2, 3, 4**	RW

Appendix B—Fault Log

Under this menu, you can find Active faults, History faults and Fault codes.

Table 202. Active Faults

Menu	Function	Note
Active Faults	When a fault/faults appear(s), the display with the name and fault time of the fault will be pop. Press DETAIL to see the fault data. The Active Faults submenu shows the list of faults. Select the fault and push DETAIL to see the fault data.	The fault remains active until it is cleared with the Reset button (push for 2s) or with a reset signal from the I/O terminal or Fieldbus. The memory of active faults can store the maximum of 10 faults in the order of appearance.

Table 203. History faults

Menu	Function	Note
History Faults	10 latest faults are stored in the Fault history, Select the fault and push DETAIL to see the fault data.	The history fault will be stored until it is cleared with the OK button (push for 5s). The memory of active faults can store the maximum of 10 faults in the order of appearance.

Fault codes and descriptions

Configurable 1 = The fault type of this fault is configurable, fault type can be configured as
0 = No Action; 1 = Warning; 2 = Fault; 3= Fault, Coast

Fault code	Fault name	Fault type	Default fault type	Possible cause	Remedy	Realization
1	Over Current	Fault		AC drive has detected too high a current (>4*IH) in the motor cable: • Sudden heavy load increase • Short circuit in motor cables • Unsuitable motor	• Check loading • Check motor • Check cables and connections • Make identification run • Check ramp times	DSP
2	Over Voltage	Fault		The DC-link voltage has exceeded the limits defined: • Too short a deceleration time • Brake chopper is disabled • High overvoltage spikes in supply • Start/Stop sequence too fast	• Make deceleration time longer • Use brake chopper or brake resistor (available as options) • Activate overvoltage controller • Check input voltage	DSP
3	Earth Fault	Configurable	Fault	Current measurement has detected that the sum of motor phase current is not zero: • Insulation failure in cables or motor	Check motor cables and motor	DSP
5	Charging Switch	Fault		The charging switch is open, when the START command has been given: • Faulty operation • Component failure	• Reset the fault and restart • Should the fault re-occur, contact the distributor near to you	DSP
9	UnderVoltage	Configurable	Fault	DC link voltage is under the voltage limits defined: • Most probable cause: Too low a supply voltage • AC drive internal fault • Defect input fuse • External charge switch not closed **Note**: This fault is activated only if the drive is in Run state.	In case of temporary supply voltage break reset the fault and restart the AC drive Check the supply voltage. If it is adequate, an internal failure has occurred. Contact the distributor near you	DSP
10	Input Phase Superv	Configurable	Fault	Input line phase is missing	Check supply voltage, fuses and cable	DSP
11	Output Phase Superv	Configurable	Fault	Current measurement has detected that there is no current in one motor phase	Check motor cable and motor	DSP
12	Brake Chopper Superv	Fault		• No brake resistor installed • Brake resistor is broken • Brake chopper failure	Check brake resistor and cabling. If these are OK, the chopper is faulty. Contact the distributor near you	DSP

Fault code	Fault name	Fault type	Default fault type	Possible cause	Remedy	Realization
13	Drive UnderTemp	Configurable	Warning	Too low temperature measured in power unit's heat sink or board. Heat sink temperature is under –10°C.		DSP
14	Drive OverTemp	Fault		Too high temperature measured in power unit's heat sink or board. Heat sink temperature is over 90°C.	• Check the correct amount and flow of cooling air • Check the heat sink for dust • Check the ambient temperature • Make sure that the switching frequency is not too high in relation to ambient temperature and motor load	DSP
15	Motor Stalled	Configurable	No Action	Motor is stalled.	Check motor and load	DSP
16	Motor Over Temp	Configurable	No Action	Motor is too hot, based on either the drive's estimate or on temperature feedback.	Decrease motor load. If no motor overload exists, check the temperature model parameters	DSP
17	Motor Under Load	Configurable	No Action	Condition defined by parameter P1.9.15~P1.9.17 have been valid longer than the time defined by P1.9.18.	Check load	DSP
18	IP Address Conflict	Configurable	Warning	IP setting issue.	Check settings for IP address, verify no duplicates are on the network.	MCU
19	Power Board EEPROM Fault	Fault		Power board EEPROM fault, memory lost in EEPROM.	Cycle power to drive. Try updating software, if issue continues contact Distributor near you.	MCU
20	FRAM Fault	Fault		FRAM data error in FRAM memory.	Cycle power to drive. Try updating software, if issue continues contact a Distributor near you.	MCU
21	S-Flash Fault	warning		Serial flash error, serial flash memory failed.	Cycle power to drive. Try updating software, if issue continues contact a Distributor near you.	MCU
25	MCU WatchDog Fault	Fault		Watchdog register overflows in MCU.	Cycle power to drive. Try updating software, if issue continues contact a Distributor near you.	MCU
26	Start-up Prevent	Fault		The time when Interlock signal activates is over setting time.	Stop drive and resend start command.	MCU
29	Thermistor Fault	Configurable	Fault	Option board or control board thermistor resistor lager than 4.7K	Thermistor open or short, over temperature	MCU
32	Fan Cooling	Fault		Fan is damaged or stalled.	Check fan and fan connected wires, verify 24 Vdc is supplied to fan.	DSP
36	Compatibility Fault	Fault		The control board isn't match with the power board.	Cycle power to drive. Try updating software, if issue continues contact a Distributor near you.	MCU
37	Device Change	Warning		Power board or option card change.	Alarm will reset	MCU
38	Device Added	Warning		Power board or option board added.	Device is ready for use Old parameter settings will be used	MCU
39	Device Removed	Fault		Optional board removed from slot, or power board removed from control board.	Device no longer available in drive.	MCU
40	Device Unknown	Fault			"Check EEPROM connection. Check board connection on slot A/B Power cycle to drive."	MCU
41	IGBT Over Temp	Fault		IGBT temperature is too high.	• Check output loading • Check motor size • Decrease switching frequency	DSP
50	AI < 4 mA (4 to 20 mA)	Configurable	No Action	Loss in analog input signal, dropped below 4 mA.	Verify analog input current reference value on either AI1 or AI2, check cabling.	MCU
51	External Fault	Configurable	Fault	Digital input is activated for external fault input. • The real time isn't normal	Check digital input settings and verify input level, could be an external device causing fault.	MCU

Fault code	Fault name	Fault type	Default fault type	Possible cause	Remedy	Realization
56	PT100 Fault	Configurable	Fault	Temperature is beyond the limit of sensing capacity of PT100.	PT100 short, open or over temperature, check PT100 temperature probe.	MCU
57	Motor ID fault	Fault		The Motor parameters Identification running was not completed successfully.	Check motor size. Verify the input and output wiring is connected properly.	DSP
58	Current Measure Fault	Fault		Current measurement is out of range.	Restart the drive again. Should the fault re-occur, contact the distributor near to you.	DSP
59	Power Wiring Error	Fault		Power wiring connected to output of drive.	Verify power input wiring is connected to L1, L2 and L3 terminals and they are properly torqued.	DSP
60	Control Board OverTemp	Fault		Control board is over +85 degrees or under –30 degrees.	Check NTC resistor. Check control board temperature.	MCU
61	Internal Control Supply	Fault		+24V port voltage is over 27V or under 17V.	Check voltage range of +24V on terminals 12 to 13. If voltage is out of range contact distributor near you.	MCU
62	Speed Search Fault	Fault		Speed searching failed when performing flying start.	Check motor parameters' setting and motor connections.	DSP
64	Replace Battery	Configurable	Warning	RTC Battery voltage is too low.	Check the RTC battery voltage, contact distributor near you for replacement battery.	MCU
65	Replace Fan	Configurable	Warning	Fan life is less than 2 months.	Check the fan, clean out any contamination, contact distributor near you for replacement fan.	MCU
66	Safe Torque Off	Fault		STO Triggered, STO input is open.	Reset STO Trigger and verify wiring. Reset fault after input is enabled.	DSP
67	Current Limit Control	Warning		The output current has reached the current limit value.	Check the load. Set the acceleration time longer.	DSP
68	Over Voltage Control	Warning		The DC link voltage has reached its voltage limit value.	Check the input voltage. Set the acceleration/deceleration time longer.	DSP
69	System Fault	Fault		Thermistor spi communication error.	Check thermistor chip.	MCU
70	System Fault	Fault		MCU send wrong parameters to DSP.	Restart the drive again. Should the fault re-occur, contact the distributor near to you.	DSP
72	Power Board EEPROM Fault	Fault		Power board EEPROM fault, memory lost in EEPROM when initial drive.	Cycle power to drive. Try updating software, if issue continues contact Distributor near you.	MCU
73	FRAM Fault	Fault		FRAM chip is broken.	Contact Distributor near you.	MCU
74	FRAM Fault	Fault		CRC check fault when access FRAM data.	Try recovery factory default setting if issue continues contact Distributor near you.	MCU
75	Power Board EEPROM Fault	Fault		EEPROM chipor I2c circuit is broken.	Contact Distributor near you.	MCU
76	Power Board EEPROM Fault	Fault		CRC check fault when access EEPROM data.	Try recovery factory default setting if issue continues contact Distributor near you.	MCU
77	S-Flash Fault	Warning		External serial flash chip is broken.	Contact Distributor near you.	MCU
80	Fieldbus Fault	Configurable	Fault	Loss of communication with BACnet MSTP, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place.	Check BACnet MSTP communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.	MCU
82	Bypass Overload	Fault		Over load when motor is in bypass mode	Check motor connection situation.	MCU
83	Fieldbus Fault	Configurable	Fault	Loss of communication with Modbus RTU, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place.	Check RS-485 communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.	MCU

Fault code	Fault name	Fault type	Default fault type	Possible cause	Remedy	Realization
84	Fieldbus Fault	Configurable	Fault	Loss of communication with Modbus TCP, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place.	Check Ethernet communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.	MCU
85	Fieldbus Fault	Configurable	Fault	Loss of communication with BACnet, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place, and the fault protection is not "NO action".	Check RS-485 communication wiring. Verify drive parameter are set correctly. Check BACnet master configuration programming to verify proper addressing.	MCU
86	Fieldbus Fault	Configurable	Fault	Loss of communication with EtherNet/IP, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place, and the fault protection is not "NO action".	Check Ethernet communication wiring. Verify drive parameter are set correctly. Check EIP master configuration programming to verify proper addressing.	MCU
87	Fieldbus Fault	Configurable	Fault	Loss of communication with Profibus/Canopen/Devicenet master on Slot A, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place, and the fault protection is not "NO action".	Check Profibus/Canopen/Devicenet communication wiring. Verify drive parameter are set correctly. Check Profibus/Canopen/Devicenet master configuration programming to verify proper addressing.	MCU
88	Fieldbus Fault	Configurable	Fault	Loss of communication with Profibus/Canopen/Devicenet master on Slot B, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place, and the fault protection is not "NO action".	Check Profibus/Canopen/Devicenet communication wiring. Verify drive parameter are set correctly. Check Profibus/Canopen/Devicenet master configuration programming to verify proper addressing.	MCU
89	Under Voltage Stop	Fault		The DC link voltage has reached the Drive under voltage stop limit value.	Check the input voltage.	DSP
90	Drive Under Temp	Warning/Fault		• Cold weather mode is not enabled, and unit temperature is less than -10 degree • Cold weather mode is enabled and Under Temp Fault Override is not set, unit temperature is less than -30 degree • Cold weather mode is enabled and Under Temp Fault Override is not set, unit temperature is -20~ -30 degree. The temp <-20 degree when cold weather start time out	If unit temp -20 ~ -10 degree, start motor in cold weather mode. If unit temp <-20 degree, Warm up unit above -20 deg C for proper operation using cold weather mode. If still < -20 degree when cold weather mode time out, try higher output voltage in cold weather mode.	DSP
91	Option Card Fault	Configurable	Fault	External supply on the DeviceNet communication connector is not present.	Check voltage and wiring of power supply of the DeviceNet communication.	MCU
92	External Fault 2	Configurable	Fault	Digital input is activated for external fault input.	Check digital input settings and verify input level, could be an external device causing fault.	MCU
93	External Fault 3	Configurable	Fault	Digital input is activated for external fault input.	Check digital input settings and verify input level, could be an external device causing fault.	MCU
103	Drive OverTemp Warning	Warning		Drive is 10 degrees away from trip point of 90 deg C.	Check the drive degree.	DSP
104	Compatibility Fault	Warning		DSP firmware is not compatible with MCB firmware.	Check the DSP firmware revision.	MCU
105	Compatibility Fault	Warning		Keypad firmware is not compatible with MCB firmware.	Check the keypad firmware revision.	MCU

Fault code	Fault name	Fault type	Default fault type	Possible cause	Remedy	Realization
106	Compatibility Fault	Warning		IO1 card firmware is not compatible with MCB firmware	Check the IO1 card firmware revision	MCU
107	Compatibility Fault	Warning		IO2 card firmware is not compatible with MCB firmware	Check the IO2 card firmware revision	MCU
108	Compatibility Fault	Warning		IO3 card firmware is not compatible with MCB firmware	Check the IO3 card firmware revision	MCU
109	Compatibility Fault	Warning		IO4 card firmware is not compatible with MCB firmware	Check the IO4 card firmware revision	MCU
110	Compatibility Fault	Warning		IO5 card firmware is not compatible with MCB firmware	Check the IO5 card firmware revision	MCU
111	Compatibility Fault	Warning		Profibus card firmware is not compatible with MCB firmware	Check the Profibus card firmware revision	MCU

Appendix C—PowerXL Recommended Secure Hardening Guidelines

Introduction

This section "secure configuration" or "hardening" guidelines provide information to the users to securely deploy and maintain this product to adequately minimize the cybersecurity risks to their system.

Eaton is committed to minimizing the Cybersecurity risk in its products and deploys cybersecurity best practices and latest cybersecurity technologies in its products and solutions; making them more secure, reliable and competitive for our customers. Eaton also offers Cybersecurity Best Practices whitepapers to its customers that can be referenced at www.eaton.com/cybersecurity

PowerXL - SECURE CONFIGURATION GUIDELINES

Category	Description
Asset identification and Inventory	Keeping track of all the devices in the system is a pre-requisite for effective management of Cybersecurity of a system. Ensure you maintain an inventory of all the components in your system in a manner in which you uniquely identify each component. To facilitate this PowerXL Series VFD supports the following identifying information - manufacturer, type, serial number, f/w version number, and location. Customers/users can read following information from product label • Model Number • Serial Number • Device Name Information specific to communication protocols is available form parameter menu as below • IP Address Mode • Active IP Address • MAC Address See application manual for these parameter locations.

Restrict Physical access	Industrial Control Protocols don't offer cryptographic protections at protocol level leaving them exposed to Cybersecurity risk. Physical security is an important layer of defense in such cases. PowerXL Series VFD is designed with the consideration that it would be deployed and operated in a physically secure location.
	• Eaton suggests that physical access to cabinets and/or enclosures containing PowerXL Series VFD and the associated system should be restricted, monitored and logged at all times.
	• Physical access to the communication lines should be restricted to prevent any attempts of wiretapping, sabotage. It's a best practice to use metal conduits for the communication lines running between one cabinet to another cabinet.
	• Attacker with unauthorized physical access to the device could cause serious disruption of the device functionality. A combination of physical access controls to the location should be used, such as locks, card readers, and/or guards etc.
	• PowerXL Series VFD supports the following physical access ports,
	  • RJ45 connector for removable keypad as well as Modbus RTU communications
	  • RJ45 for EtherNet IP/Modbus TCP communications
	  • Terminal block for Modbus RTU and other Digital IOs
	Eaton suggests access to above physical ports need to be restricted.

Category	Description
Restrict Logical access to PowerXL Series Drive	It is extremely important to securely configure the logical access mechanisms provided in PowerXL Series VFD to safeguard the device from unauthorized access. PowerXL Series VFD provides various types of administrative, operational, configuration privilege levels. Eaton recommends that the available access control mechanisms be used properly to ensure that access to the system is restricted to legitimate users only. And, such users are restricted to only the privilege levels necessary to complete their job roles/functions. Eaton recommends below best practices to be followed to ensure adequate cybersecurity of the setup/system • Default credentials are changed upon first login. PowerXL Series VFD should not be commissioned for production with Default credentials, it's a serious Cybersecurity flaw as the default credentials are published in the manuals. Restrict administrative privileges - Threat actors are increasingly focused on gaining control of legitimate credentials, especially those associated with highly privileged accounts. Limit privileges to only those needed for a user's duties. Make sure that the password used in the device is only available to authorized users like Configuring Engineers and not shared among all operational users. • Perform periodic account maintenance to make sure that password is changed whenever there is personnel change. • Change passwords and other system access credentials as appropriate • PowerXL Series VFD is provided with data/access protection mechanism on keypad, follow below steps to utilize it PowerXL Series VFD provides four levels of data protection for users to ensure the security: 1. Lock parameters on keypad. User can lock the parameters through DI or disable change, in which way all the parameters cannot be edited. 2. Lock parameters while motor running. Motor control parameters can only be modified when motor is in stop mode. In which way to enhance the motor security. The parameters are listed in the application manual. 3. Through Power Xpert inControl tool, facility to hide parameters on keypad is available. User can hide the parameters he/she thinks are significant for himself/herself. Such as IP address and so on. 4. Password on keypad. • 0000 means no password, which is the default. • Password range is 0001 ~ 9999. • With password, user can monitor parameters value but need enter password if he/she wants to edit parameters. • User needs to re-enter the password if there is no key operation in 1 min after enter the password. • User needs to enter the old password if he/she wants to change to a new one.
Restrict Network Access	PowerXL Series VFD provides network access to facilitate communication with other devices in the systems and configuration. But this capability could open up a big security hole if it's not configured securely. Eaton recommends segmentation of networks into logical enclaves and restrict the communication to host-to-host paths. This helps protect sensitive information and critical services and limits damage from network perimeter breaches. At a minimum, a utility Industrial Control Systems network should be segmented into a three-tiered architecture (as recommended by NIST SP800-82[R3]) for better security control. Deploy adequate network protection devices like Firewalls, Intrusion Detection / Protection devices, Below are the protocols and their port details available on PowerXL Series VFD. Use below information for configuring the firewalls. PowerXL Series VFD provides below communication protocols – • EtherNet IP protocols on RJ45 connector – enabled by default on port 44818 and 2222 • Modbus TCP protocol on RJ45 connector – enabled by default on port 502 • Modbus RTU on RS485 physical layer – enabled by default • BACnet MS/TP on RS485 physical layer – disabled by default, when this is enabled, Modbus RTU is disabled. All the protocols have dedicated menu structure, and details are described in User's Manual for how to activate or configure them. • Eaton has published detailed information about various Network level protection strategies in Eaton Cybersecurity Considerations for Electrical Distribution Systems [R1].

Category	Description
Logging and Event Management	**Best Practices** • PowerXL Series VFD provides parameters change log and fault log functions for user, to help diagnose the drive 1. Parameters change log: • PowerXL Series VFD will log the parameter information in FRAM when the parameter changes. The max number of 66 items can be logged. New log will rewrite the old one. User cannot clear this fault information. 2. Fault log: • PowerXL Series VFD will log the drive information in FRAM when fault occurs. The max number of 10 items can be logged. New log will rewrite the old one. User can clear the history fault by pressing OK key more than 5 Sec. • PowerXL Series VFD will log the fault information in FRAM when fault occurs. The max number of 50 items can be logged. New log will rewrite the old one. User cannot clear this fault information.
Secure Maintenance	**Best Practices** **Apply Firmware updates and patches regularly** Due to rapidly increasing Cyber Threats in Industrial Control Systems, Eaton implements a comprehensive patch and update process for its products. Users are encouraged to maintain a consistent process to promptly monitor for fresh firmware updates and apply the update whenever required. • The latest firmware can be acquired from the www.eaton.com/drives website. There will be separate link for PowerXL Series VFD FR0 to FR6 and PowerXL Series VFD FR7 & FR8 • Users can also sign up on our website to get emails when new material is released to the site if desired. • Using the PC Tool or verifying on the keypad the current version of firmware can be verified. • For additional information or technical support on Eaton's Variable frequency drive products contact us at TRCDrives@eaton.com or by phone at 800-386-2273 for US customers. For European customers contact us at AfterSalesEGBonn@eaton.com or by phone at +49 (0) 228602-3640 Eaton also has a robust vulnerability response process. In the event of any security vulnerability getting discovered in its products, Eaton patches the vulnerability and releases information bulletin through its cybersecurity website - http://www.eaton.com/cybersecurity and patches through www.eaton.com/drives.

References

[R1] Cybersecurity Considerations for Electrical Distribution Systems (WP152002EN):

http://www.eaton.com/ecm/groups/public/@pub/@eaton/@corp/documents/content/pct_1603172.pdf

[R2] Cybersecurity Best Practices Checklist Reminder (WP910003EN):

http://www.cooperindustries.com/content/dam/public/powersystems/resources/library/1100_EAS/WP910003EN.pdf

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