

PowerXL DG1 Series VFD

Application Manual

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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/BACnet/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 DG1 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 DG1 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 DG1. 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 DG1 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 DG1 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 mm² Cu or 16 mm² Al, through its total run.
- b) Where the protective conductor has a cross-sectional area of less than 10 mm² Cu or 16 mm² 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 mm² Cu or 16 mm² 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:
 - 2.5 mm² if mechanical protection is provided or
 - 4 mm² 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 DG1. 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 capacitatives 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 mm² 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 DG1 Series Overview

This chapter describes the purpose and contents of this manual, the receiving inspection recommendations and the DG1 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 DG1 Series adjustable frequency drive (AFD). 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 DG1 Series AFD. Keep this operating manual handy and distribute to all users, technicians and maintenance personnel for reference.

Receiving and Inspection

The DG1 Series AFD 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 DG1 Series AFD, please check for the following:

Check to make sure that the package includes the Instruction Leaflet (IL040016EN), Quick Start Guide (MN040006EN), User Manual CD (CD040002EN) 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 DG1 AFD on the wall or in a cabinet.

Real Time Clock Battery Activation

To activate the real time clock (RTC) functionality in the PowerXL DG1 Series AFD, 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

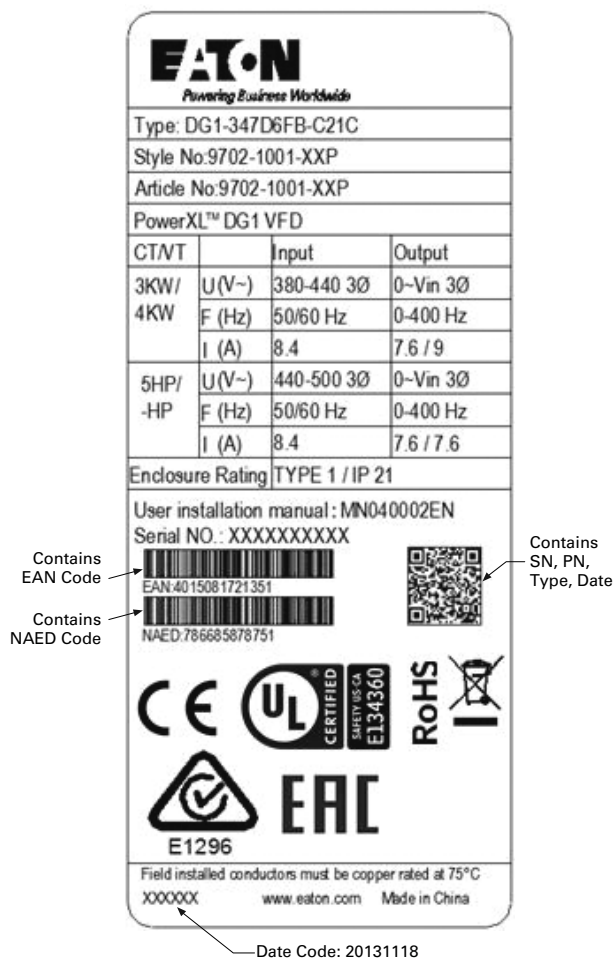


Table 1. Common Abbreviations

Abbreviation	Definition
CT	Constant torque with high overload rating (150%)
VT	Variable torque with low overload rating (110%)
I_H	High Overload Current (150%)
I_L	Low Overload Current (110%)
AFD	Adjustable Frequency Drive
VFD	Variable Frequency Drive

Rating Label

Figure 2. Rating Label

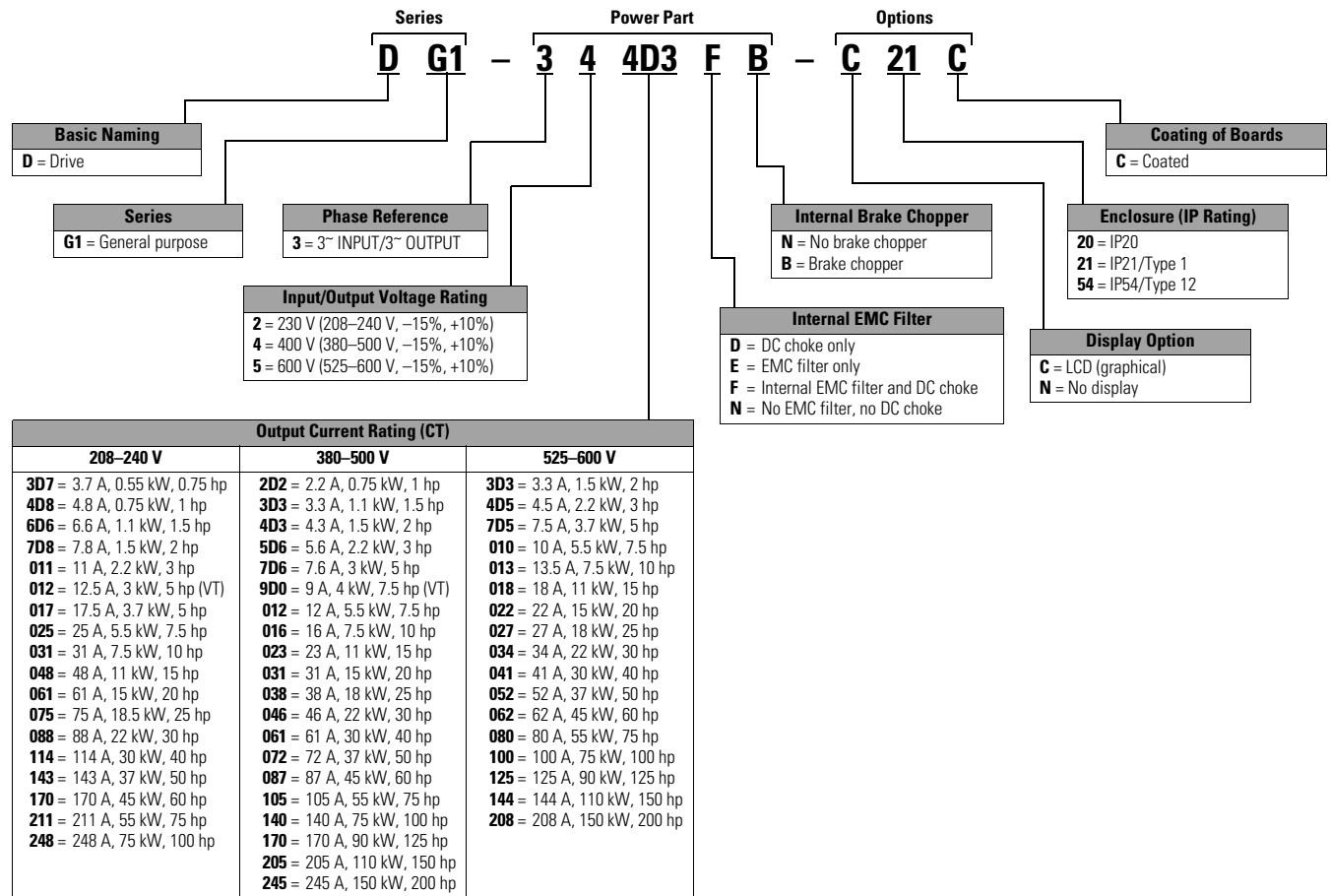


Carton Labels (U.S. and Europe)

Same as rating label shown above.

Catalog Number System

Figure 3. Catalog Numbering System



Power Ratings and Product Selection

DG1 Series Drives—208–240 Volt

Table 2. Type 1/IP21

Frame Size	Constant Torque (CT) / High Overload (I_H)			Variable Torque (VT) / Low Overload (I_L)			Catalog Number
	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	
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 ①	55	75	211	75	100	261	DG1-32211FN-C21C
	75	100	248	90	125	312	DG1-32248FN-C21C

Table 3. Type 12/IP54

Frame Size	Constant Torque (CT) / High Overload (I_H)			Variable Torque (VT) / Low Overload (I_L)			Catalog Number
	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	
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 ①	55	75	211	75	100	261	DG1-32211FN-C54C
	75	100	248	90	125	312	DG1-32248FN-C54C

Note

① FR6 available in 2016.

DG1 Series Drives—380–500 Volt

Table 4. Type 1/IP21

Frame Size	Constant Torque (CT) / High Overload (I_H)			Variable Torque (VT) / Low Overload (I_L)			Catalog Number
	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	
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 ①	110	150	205	132	200	261	DG1-34205FN-C21C
	150	200	245	160	250	310	DG1-34245FN-C21C

Table 5. Type 12/IP54

Frame Size	Constant Torque (CT) / High Overload (I_H)			Variable Torque (VT) / Low Overload (I_L)			Catalog Number
	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	
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 ①	110	150	205	132	200	261	DG1-34205FN-C54C
	150	200	245	160	250	310	DG1-34245FN-C54C

Note

① FR6 available in 2016.

DG1 Series Drives—600 Volt ^①**Table 6. Type 1/IP21**

Frame Size	Constant Torque (CT) / High Overload (I_H)			Variable Torque (VT) / Low Overload (I_L)			Catalog Number
	600 V, 60 Hz kW Rating	600 V, 60 Hz hp	Current A	600 V, 60 Hz kW Rating	600 V, 60 Hz hp	Current A	
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 ^②	110	150	144	150	200	208	DG1-35144FN-C21C
	150	200	208	187	250	250	DG1-35208FN-C21C

Table 7. Type 12/IP54

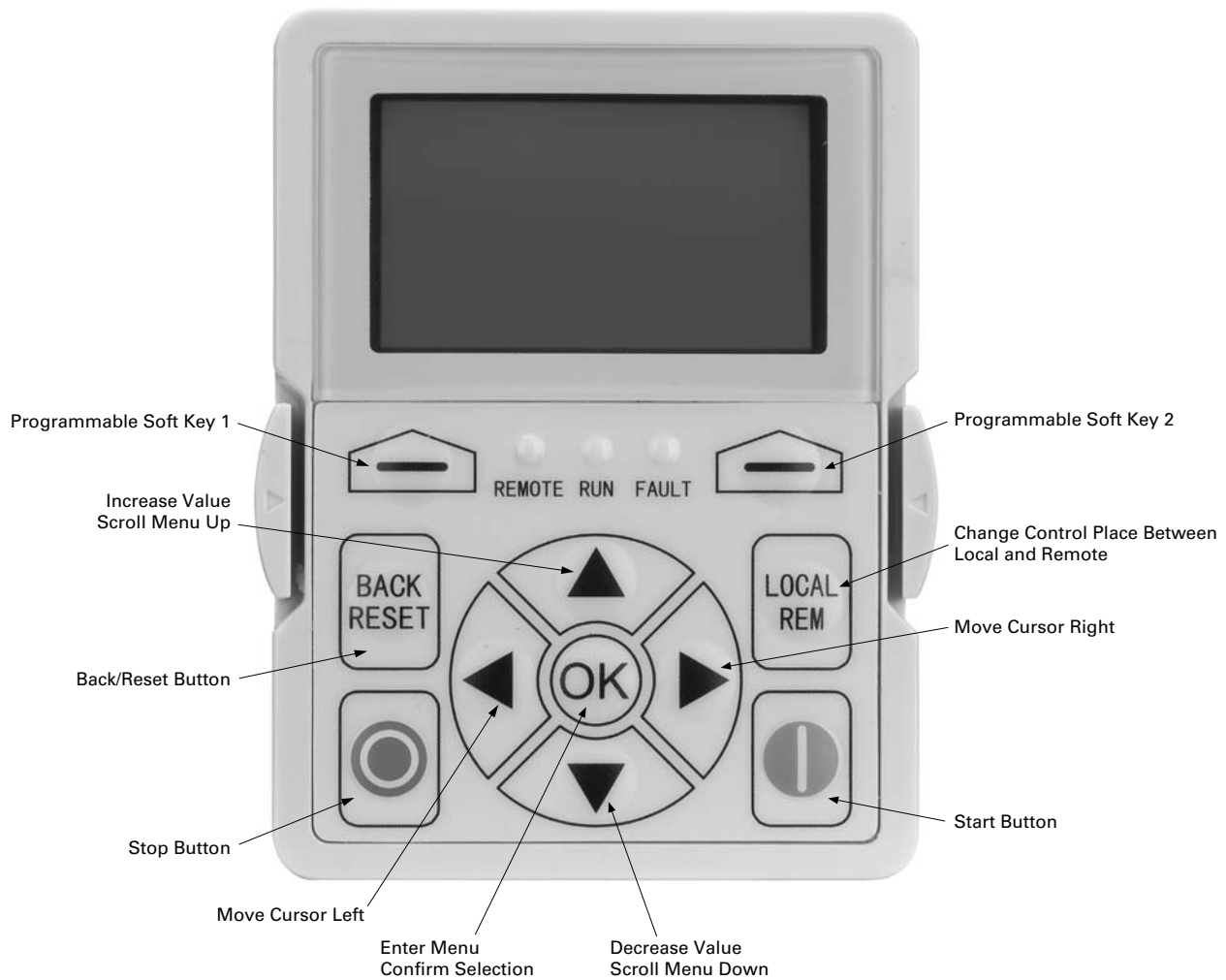
Frame Size	Constant Torque (CT) / High Overload (I_H)			Variable Torque (VT) / Low Overload (I_L)			Catalog Number
	600 V, 60 Hz kW Rating	600 V, 60 Hz hp	Current A	600 V, 60 Hz kW Rating	600 V, 60 Hz hp	Current A	
FR1	1.5	2	3.3	2.2	3	4.5	DG1-353D3FB-C54C
	2.2	3	4.5	3.7	5	7.5	DG1-354D5FB-C54C
	3.7	5	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 ^②	110	150	144	150	200	208	DG1-35144FN-C54C
	150	200	208	187	250	250	DG1-35208FN-C54C

Notes^① 600 V available May 2015.^② FR6 available in 2016.

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 8. Keypad Buttons

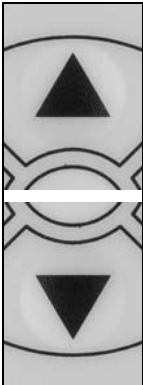
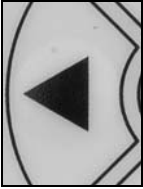
Icon	Button	Description
	Soft Key 1, Soft Key 2	Soft Key 1, Soft Key 2: The functions of these two buttons shall be the following: • Forward/Reverse, this shall change motor's run direction. • Menu, this shall return to main menu. • Details, this shall display the details of the fault. • Bypass, this shall make drive go into bypass. • Jog, this shall activate jog. • 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
	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.

Table 8. Keypad Buttons, continued

Icon	Button	Description
	Left	Left Arrow: - Navigation button, movement to left when editing a parameter digit by digit. - Backs up one step.
	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 9. 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). Blinks when there is one or more active drive warning(s).
 Remote	Local/Remote: Local: If the local control place is selected, the light will be on. Remote: If the remote control place is selected, the light will be off.

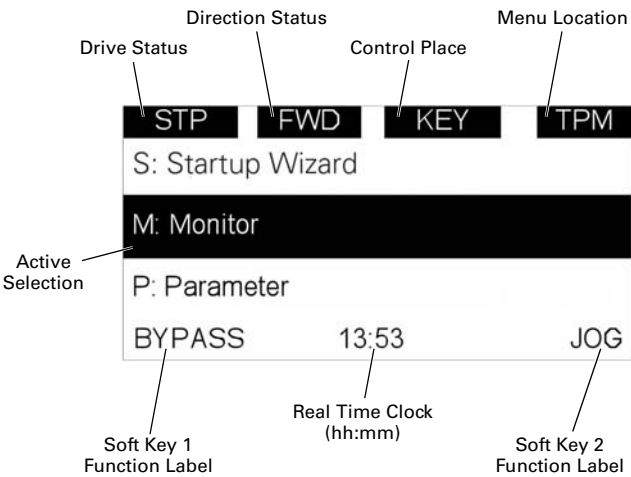
LCD Display

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**—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
- **FWD / REV**—If the motor running direction is clockwise, display “FWD”; otherwise display “REV”
- **KEY / I/O / BPS / BUS**—If it is in bypass currently, display “BPS”; otherwise, if the current control source is I/O terminal, display “I/O”. If it is keypad, then display “KEY”; otherwise display “BUS”
- **PAR / MON / FLT / OPE / QSW / FAV / TPM**—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”

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**.

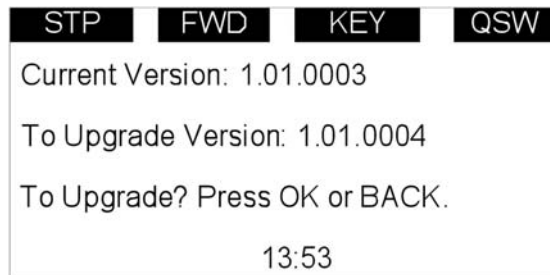
Figure 6. Welcome Page



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.

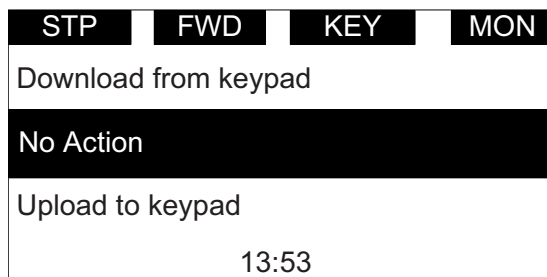
Figure 7. Upgrade Page



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 10. 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

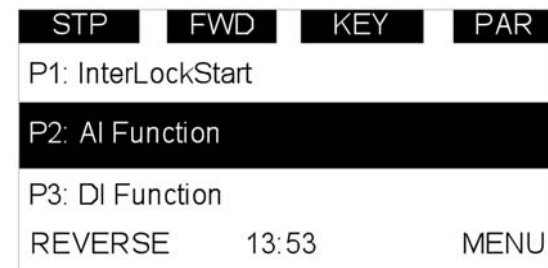
1. In the main menu (root node), "JOG" shall be shown on the right. If bypass is enabled, then "BYPASS" shall be shown on the left. Otherwise, it will not be shown. See **Figure 9**.

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

STP	FWD	KEY	PAR
P2.2			
AI2 Mode			
0 - 20mA			
FAVORITE		13:53	MENU

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

STP	FWD	KEY	PAR
P2.2: AI2 Mode			
M2: Reference Frequency			
M3: Motor Speed			
DELETE		13:53	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

STP	FWD	KEY	FLT
F1.2			
Over Voltage			
2012-4-8 12:30:45			
DETAIL		13:53	MENU

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.

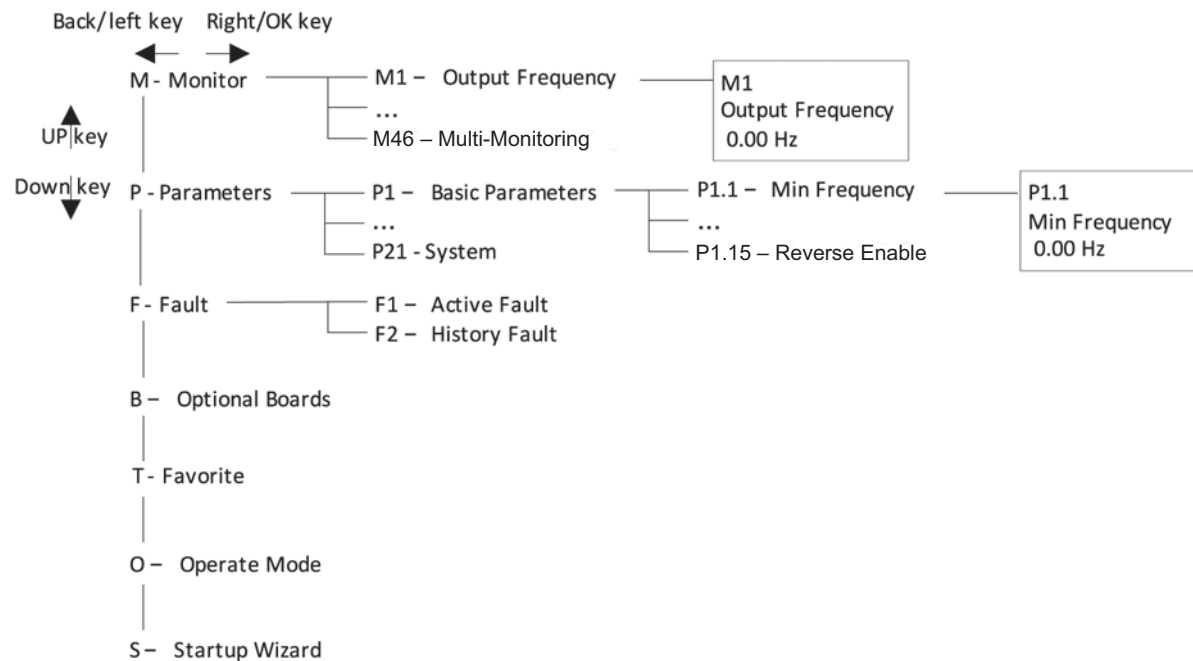
Figure 14. Main Menu Page

STP	FWD	KEY	TPM
S: Startup Wizard			
M: Monitor			
P: Parameter			
BYPASS	13:53	JOG	

Menu Navigation

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

Figure 15. Main Menu Navigation



Menu Structure

Table 11. Keypad Menus

Item	Description		Item	Description	Item	Description
Monitor	M1—Output Frequency	M24—Interval 3	Parameters	P1—Basic Parameters	Fault	F1—Active Fault
	M2—Freq Reference	M25—Interval 4		P2—Analog Input		F2—History Fault
	M3—Motor Speed	M26—Interval 5		P3—Digital Input	Optional Boards	Bx—SlotA
	M4—Motor Current	M27—Timer 1		P4—Analog Output		Bx—SlotB
	M5—Motor Torque	M28—Timer 2		P5—Digital Output	Favorite	—
	M6—Motor Power	M29—Timer 3		P6—Logic Function	Operate Mode	O1—Output Frequency
	M7—Motor Voltage	M30—PID1 Set Point		P7—Drive Control		O2—Freq Reference
	M8—DC-link Voltage	M31—PID1 Feedback		P8—Motor Control		O3—Motor Speed
	M9—Unit Temperature	M32—PID1 Error Value		P9—Protections		O4—Motor Current
	M10—Motor Temperature	M33—PID1 Output		P10—PID Controller1		O5—Motor Torque
	M11—Torque Reference	M34—PID1 Status		P11—PID Controller2		O6—Motor Power
	M12—Analog Input 1	M35—PID2 Set Point		P12—Preset Speed		O7—Motor Voltage
	M13—Analog Input 2	M36—PID2 Feedback		P13—Torque Control		O8—DC-Link Voltage
	M14—Analog Output 1	M37—PID2 Error Value		P14—Brake		O9—Unit Temperature
	M15—Analog Output 2	M38—PID2 Output		P15—Fire Mode		O10—Motor Temperature
	M16—DI1, DI2, DI3	M39—PID2 Status		P16—Second Motor Para		R11—Keypad Torque Ref
	M17—DI4, DI5, DI6	M40—Running Aux Drives		P17—Bypass		R12—Keypad Reference
	M18—DI7, DI8	M41—PT100 Temp		P18—Multi-Pump Ctrl		R13—PID1 Keypad Setpoint 1
	M19—DO1	M42—Last Active Fault		P19—Real Time Clock		R14—PID1 Keypad Setpoint 2
	M20—RO1, RO2, RO3	M43—RTC Battery Status		P20—Communication	Startup Wizard	S—Startup Wizard
	M21—TC1, TC2, TC3	M44—Instance Motor Power		P21—System		
	M22—Interval 1	M45—Energy Savings				
	M23—Interval 2	M46—Multi-Monitoring				

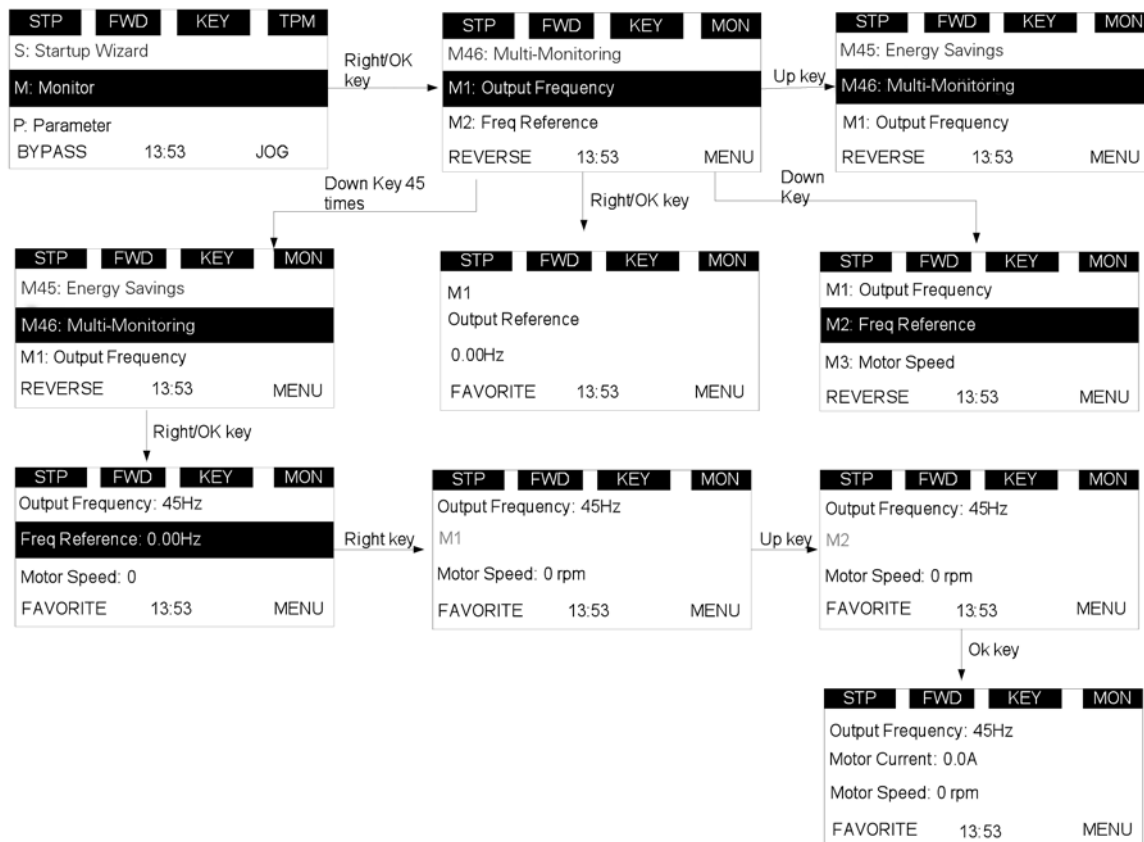
Note: Will vary depending on application selected.

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

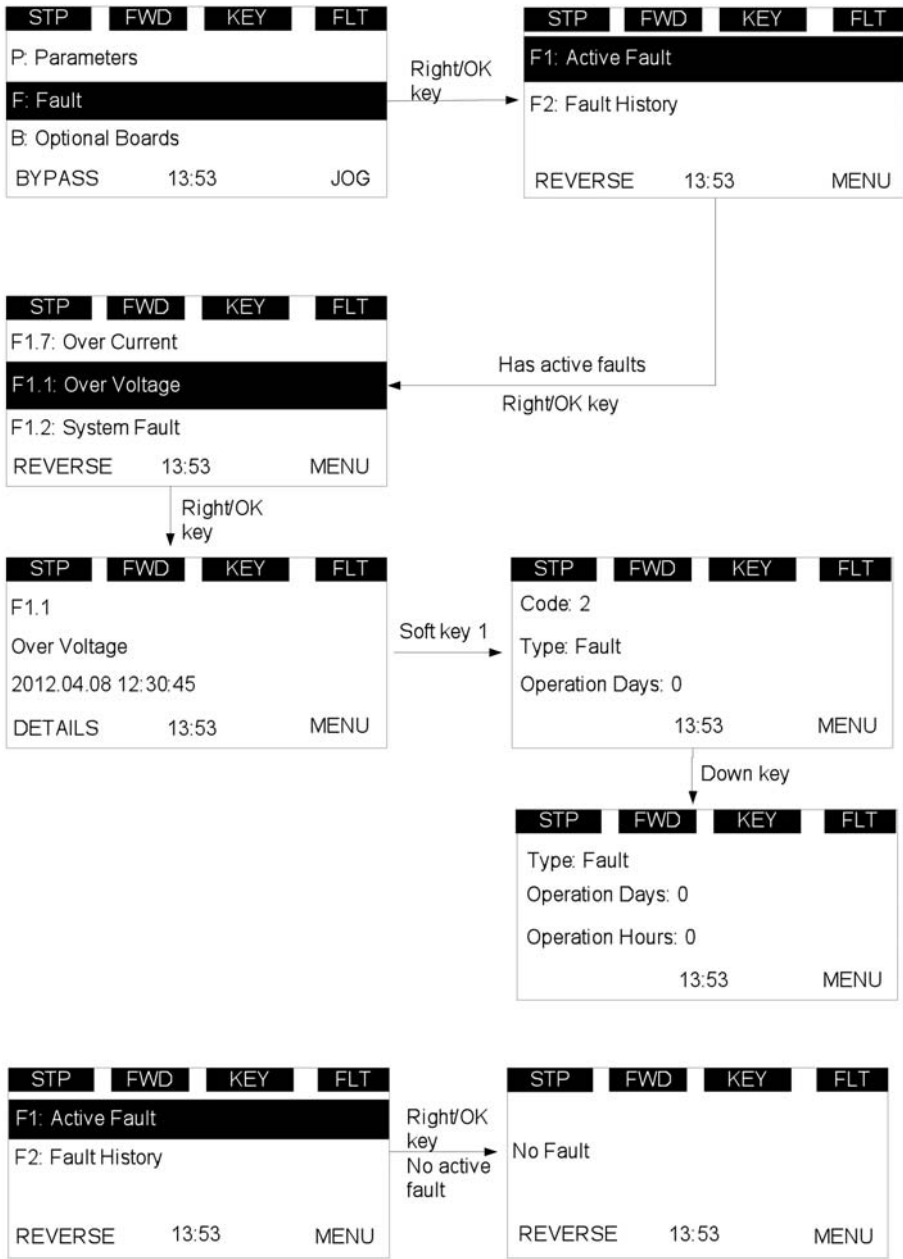
There are three fault pages. The first one is F1 active faults; the second one will pop-up automatically when fault occurs; the third one is F2 fault history. If there is no active fault/history fault, then “No fault” shall be shown.

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.

Active Fault

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

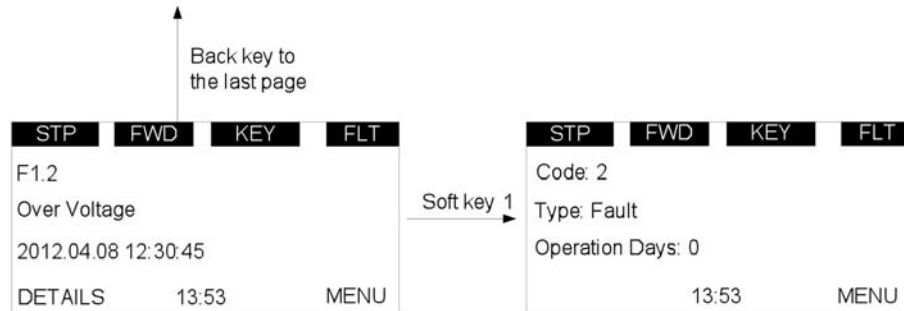
Figure 17. Active Faults



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.

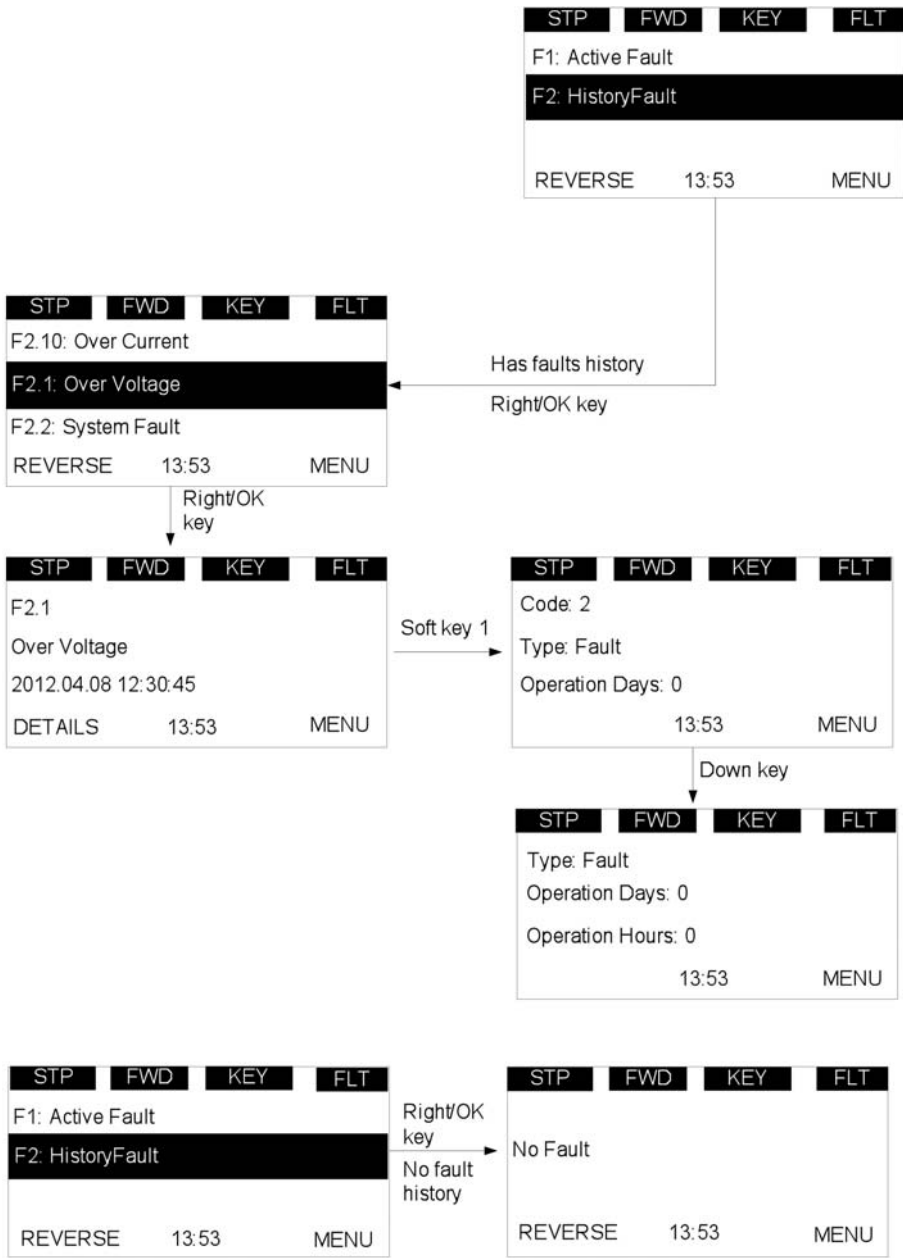
The page for active faults and pop-up faults are the same, except one: the response to the "Back" key. In active faults page, if the Back key is pressed, it returns to the last level menu. In pop-up faults page, it returns to the last page.

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



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



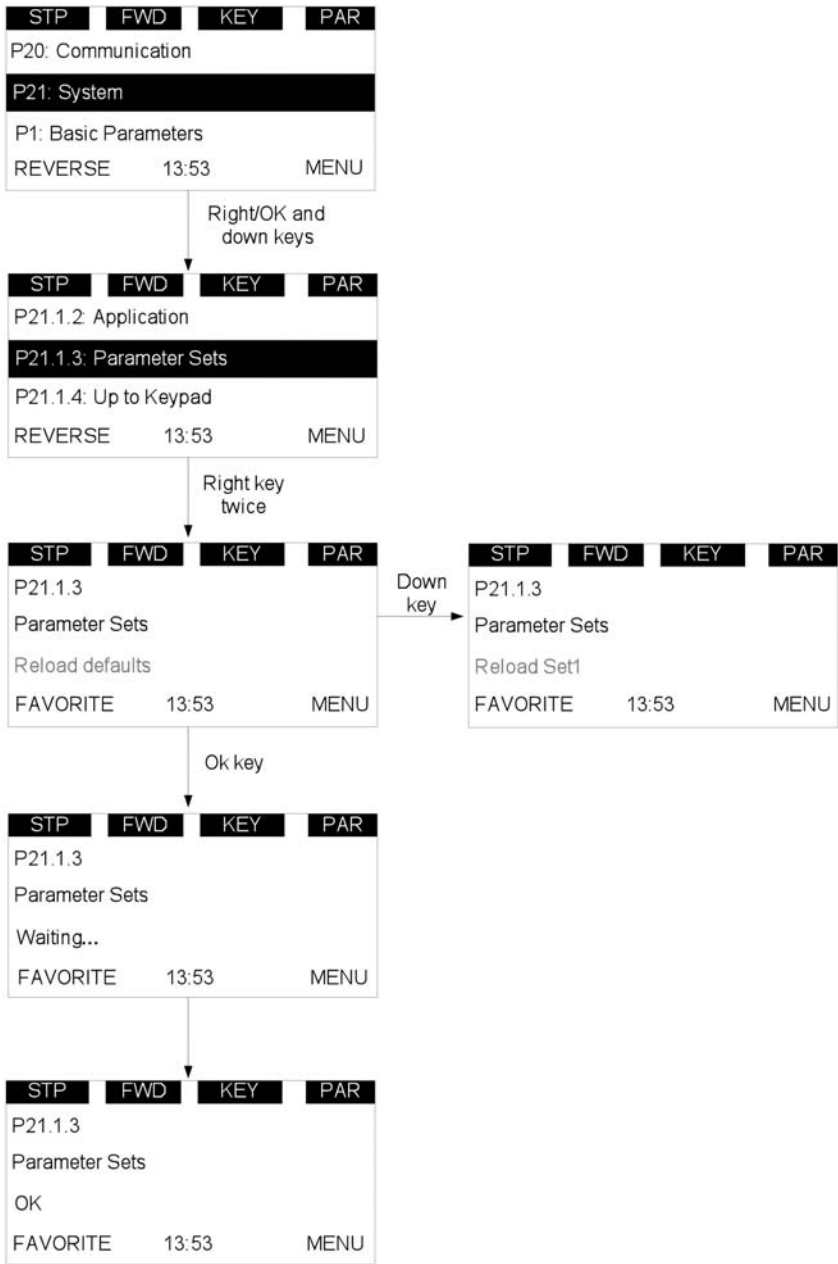
There are several special pages:

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

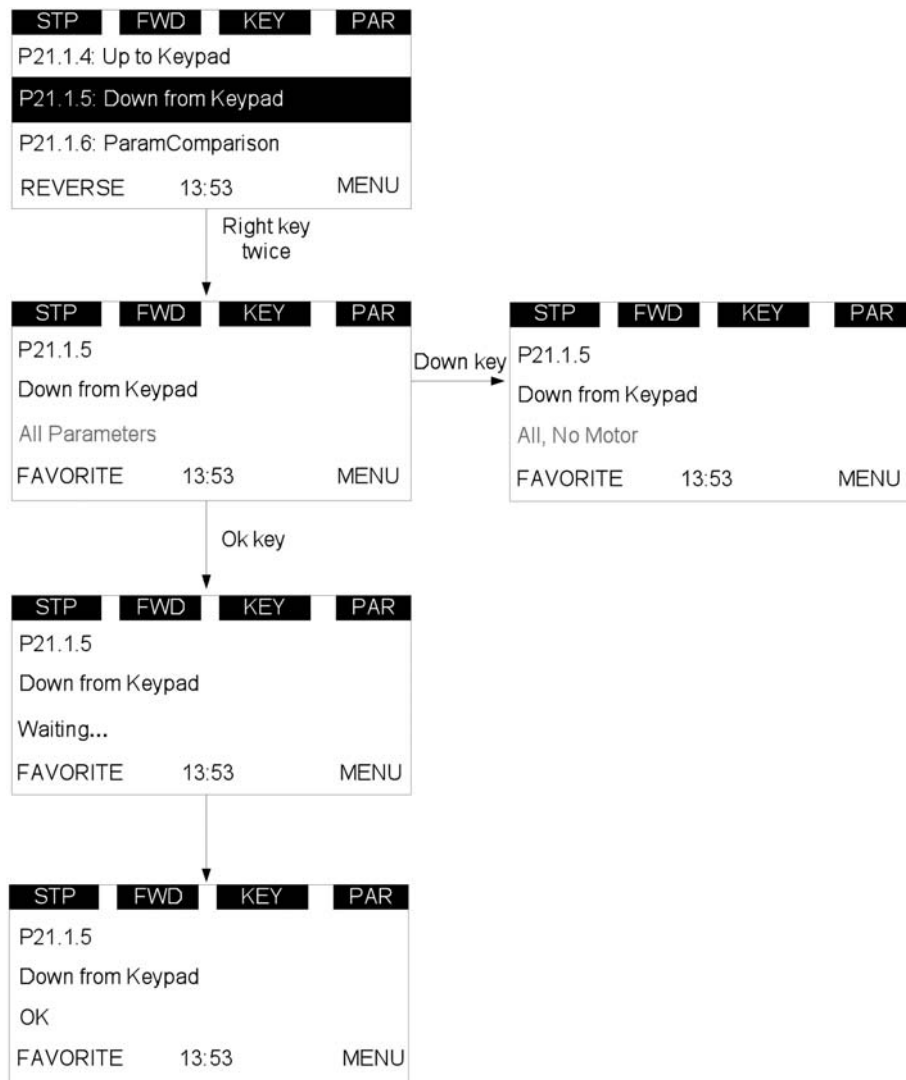


2. P21.1.4 Up to keypad and P21.1.5 Down from keypad

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.

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.

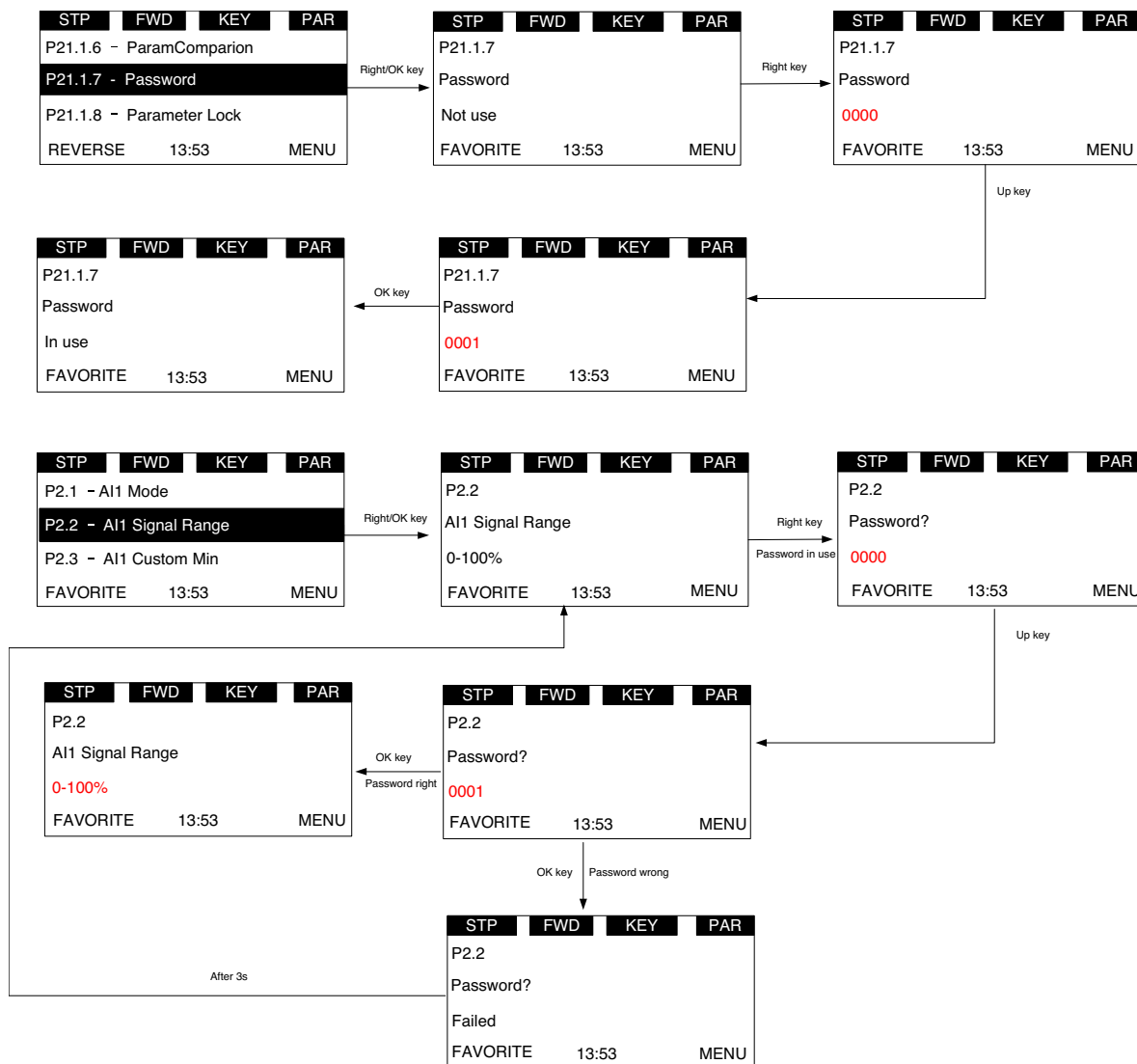
Enter the password setting page. If the password is 0000, then the "Not use" shall be shown. If the password is not 0000, then the "in use" shall be shown.

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



Note: Please contact Eaton customer support if password is forgotten. Factory override password is "1001". This will override any password. If used to override a password, be sure to set the password to a new value for future use.

Value Edit

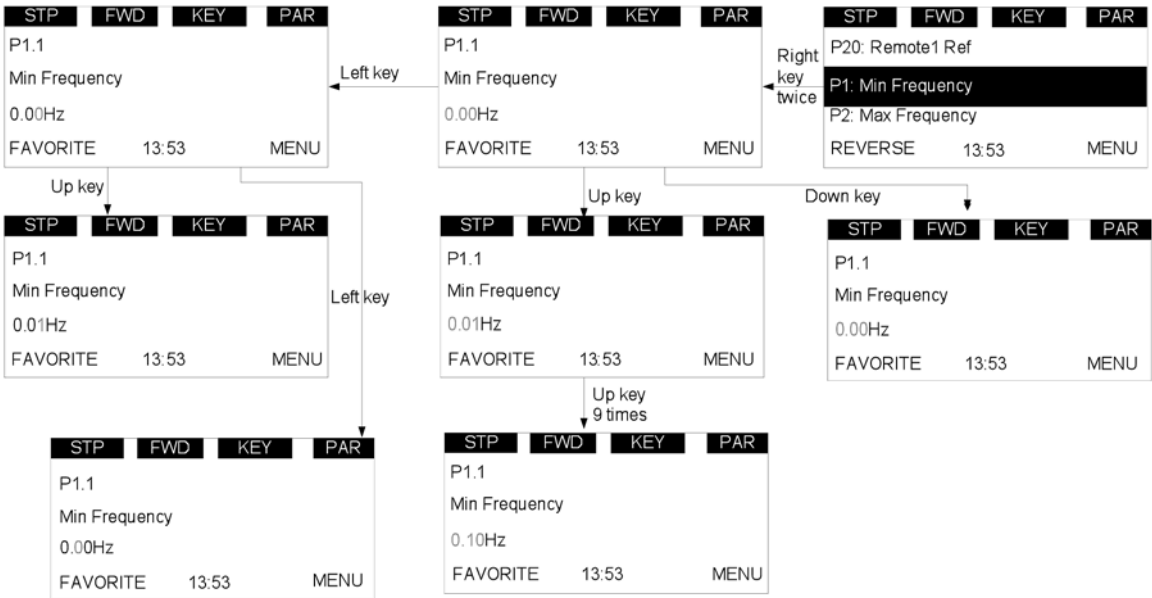
This topic shows the methods to edit value, and what will happen to edit value when password is in use and parameter lock is enabled.

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.

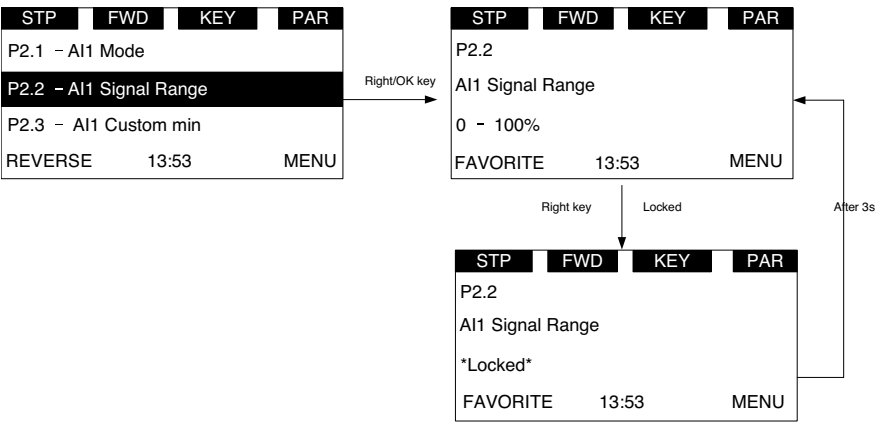
User shall use Left/Right key to change the current editable bit. When editing one number, it increases/decreases circularly, for example, pressing Up key can change to 9 from 0.

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.

The parameters in Startup Wizard shall be in the following sequence: Language, Real Time Clock, Daylight Saving, Application, Min Frequency, Max Frequency, Motor Nom Current, Current Limit, Motor Nom Speed, Motor PF, Motor Nom Volt, Motor Nom Frequency, Acc Time 1 and Dec Time 1, Local Control Place, Remote 1 Control Place, Local Reference, Remote 1 Reference, Application Setup.

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 DG1 frequency converter, and the Startup Wizard is enabled, follow these instructions to easily set up your drive.

Table 12. Startup Wizard Instructions

Item	Description	
1	Startup Wizard	Press OK?
2	Language	0 = English 1 = 中文 2 = Deutsch
3	Real Time Clock	yy.mm.dd hh:mm:ss
4	Daylight Saving	0 = Off 1 = EU 2 = US
5	Application	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
6	Min Frequency	Min: 0.00Hz Max: Max Frequency
7	Max Frequency	Min: Min Frequency Max: 400.00Hz
8	Motor Nom Current	Min: 0.1A Max: 500.0A
9	Current Limit	Min: $I_h \times 1/10$ Max: $I_h \times 2$
10	Motor Nom Speed	Min: $I_h \times 1/10$ Max: $I_h \times 2$

Table 12. 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 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 = PID1 Control Output
18	Remote Control Place	0 = Keypad 1 = I/O terminal Start 1 2 = I/O terminal 2 3 = Fieldbus
19	Remote 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 = PID1 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 13. 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 Motors	Min: 1 Max: 5
29	Bandwidth	Min: 0% Max: 100%
30	Bandwidth 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 14. 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 150** of this manual, “Description of Parameters.” The explanations are arranged according to the parameter number.

Control I/O Configuration

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

Table 15. I/O Connection

Default					
AI1: 0 to 10 V		OFF	ON	AI1: 0 to 20 mA	
AI2		1		OFF	
AI2		2		ON	
AI2		3		2	
				3	
				AI2: 0 to 20 mA	
				OFF	
				ON	
				2	
				3	
				AI2: 0 to 10 V	
				OFF	
				ON	
				2	
				3	
				AI2: -10 V to +10 V	
				OFF	
				ON	
				2	
				3	

External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10 V	Ref. Output Voltage	—	10 Vdc Supply Source
	2	AI1+	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+	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	Emergency Stop (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.

Table 16. 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 150**, “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 17. Monitor—M

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1	Output Frequency			Hz	0.00	1	
M2	Freq Reference			Hz	0.00	24	
M3	Motor Speed			rpm	0	2	
M4	Motor Current			A	0.0	3	
M5	Motor Torque			%	0.0	4	
M6	Motor Power			%	0.0	5	
M7	Motor Voltage			V	0.0	6	
M8	DC-link Voltage			V	0	7	
M9	Unit Temperature			°C	0.0	8	
M10	Motor Temperature			%	0.0	9	
M12	Analog Input 1			Varies	0.00	10	
M13	Analog Input 2			Varies	0.00	11	
M14	Analog Output 1			Varies	0.00	25	
M15	Analog Output 2			Varies	0.00	575	
M16	DI1, DI2, DI3				0	12	
M17	DI4, DI5, DI6				0	13	
M18	DI7, DI8				0	576	
M19	DO1				0	14	
M20	RO1, RO2, RO3				0	557	
M41	PT100 Temperature			°C	1000.0	27	
M42	Last Active Fault				0	28	See Fault Codes on Page 223 in Appendix B
M43	RTC Battery Status					583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = Over Voltage
M44	Instance Motor Power			kW	0.000	1686	
M45	Energy Savings			Varies	0	2120	
M46	Multi-Monitoring				1, 2, 3	30	

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.

Table 18. Operate Mode—O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz	0.00	1	
O2	Freq Reference			Hz	0.00	24	
O3	Motor Speed			rpm	0	2	
O4	Motor Current			A	0.0	3	
O5	Motor Torque			%	0.0	4	
O6	Motor Power			%	0.0	5	
O7	Motor Voltage			V	0.0	6	
O8	DC-link Voltage			V	0	7	
O9	Unit Temperature			°C	0.0	8	
O10	Motor Temperature			%	0.0	9	
R12 ②	Keypad Reference	Par. P1.1	Par. P1.2	Hz	0.00	141	

Table 19. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2 ②	Max Frequency	Par. P1.1	400.00	Hz	60.00	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	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	486	
P1.6 ①	Motor Nom Speed	300	20000	rpm	Motor Nom Speed	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	Motor Nom Voltage	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	Motor Nom Freq	488	
P1.10 ②	Power Up Local Remote Select				0	1685	0 = Hold Last 1 = Local Control 2 = Remote Control
P1.11 ②	Remote1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal 2 3 = Keypad
P1.12 ②	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal 2 3 = Fieldbus

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.

Table 19. Basic Parameters—P1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.13 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 = Min (AI1, AI2) 16 = MAX(AI1, AI2)
P1.14 ①②	Remote1 Reference				1	137	See P1.13
P1.15 ①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled

Table 20. Analog Input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10 V
P2.2 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
P2.3 ②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.4 ②	AI1 Custom Max	Par. P2.3	100.00	%	100.00	177	
P2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.6 ②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.10 ②	AI1 Joystick Offset	–50.00	50.00	%	0.00	133	
P2.11	AI2 Mode				0	223	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V
P2.12 ②	AI2 Signal Range				1	183	0 = 0–100% / 0–20 mA / 0 to 10 V / –10 to 10 V 1 = 20–100% / 4–20 mA / 2 to 10 V / –6 to 10 V 2 = Customized
P2.13 ②	AI2 Custom Min	0.00	Par. P2.14	%	0.00	184	
P2.14 ②	AI2 Custom Max	Par. P2.13	100.00	%	100.00	185	
P2.15 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.16 ②	AI2 Signal Invert				0	189	See P2.6
P2.17 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.18 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.19 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	

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.

Table 20. Analog Input—P2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.20 ②	AI2 Joystick Offset	–50.00	50.00	%	0.00	134	
P2.21 ②	AI Ref Scale Min Value	0.00	Par. P2.22	Hz	0.00	144	
P2.22 ②	AI Ref Scale Max Value	Par. P2.21	400.00	Hz	0.00	145	

Table 21. Digital Input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	Start/Stop Logic				0	143	0 = Forward–Reverse 1 = Start–Reverse 2 = Start–Enable 3 = Start Pulse–Stop Pulse
P3.2 ②	Start Signal 1				2	190	0 = DigIN: ForceOpen 1 = DigIN: ForceClose 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
P3.3 ②	Start Signal 2				3	191	See P3.2
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②	Reverse				0	198	See P3.2
P3.6 ②	Ext. Fault 1 NO				4	192	See P3.2
P3.7 ②	Ext. Fault 1 NC				1	193	See P3.2
P3.8 ②	Fault Reset				5	200	See P3.2
P3.9 ②	Run Enable				1	194	See P3.2
P3.10 ②	Preset Speed B0				6	205	See P3.2
P3.11 ②	Preset Speed B1				7	206	See P3.2
P3.12 ②	Preset Speed B2				0	207	See P3.2
P3.15 ②	Accel/Decel Time Set				0	195	See P3.2

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.

Table 21. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.16 ②	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②	No Access To Param				0	215	See P3.2
P3.21 ②	Remote Control				9	196	See P3.2
P3.22 ②	Local Control				0	197	See P3.2
P3.23 ②	Remote1/2 Select				0	209	See P3.2
P3.26 ②	DC Brake Enable				0	202	See P3.2
P3.32 ②	Jog Enable				0	199	See P3.2
P3.36 ②	AI Ref Source Select				0	208	See P3.2
P3.42 ②	Emergency Stop				1	747	See P3.2
P3.45 ①②	2nd Start Stop Logic				0	2206	See P3.1
P3.46 ②	2nd Start Signal 1				2	2207	See P3.2
P3.47 ②	2nd Start Signal 2				3	2208	See P3.2
P3.48 ②	Ext. Fault 2 NO				0	2293	See P3.2
P3.49 ②	Ext. Fault 2 NC				1	2294	See P3.2
P3.50 ②	Ext. Fault 3 NO				0	2295	See P3.2
P3.51 ②	Ext. Fault 3 NC				1	2296	See P3.2
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
P3.53 ②	Ext. Fault 2 Text				1	2298	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
P3.54 ②	Ext. Fault 3 Text				2	2299	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
P3.55 ②	Parameter Set1/2 Sel				0	2312	See P3.2

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.

Table 22. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	A01 Mode				0	227	0 = 0–20 mA 1 = 0–10 V
P4.2 ②	A01 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 to +2N) 22 = Motor Torque (–2 to +2N) 23 = Motor Power (–2 to +2N) 24 = PT100 Temperature 25 = FB Data Input 1 26 = FB Data Input 2 27 = FB Data Input 3 28 = FB Data Input 4 29 = FB Data Input 5 30 = FB Data Input 6 31 = FB Data Input 7 32 = FB Data Input 8
P4.3 ②	A01 Minimum				1	149	0 = 0 V / 0 mA 1 = 2 V / 4 mA
P4.4 ②	A01 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	A01 Scale	10	1000	%	100	150	
P4.6 ②	A01 Inversion				0	148	0 = Not Inverted 1 = Inverted
P4.7 ②	A01 Offset	–100.00	100.00	%	0.00	173	
P4.8 ②	A02 Mode				0	228	See P4.1
P4.9 ②	A02 Function				4	229	See P4.2
P4.10 ②	A02 Minimum				1	232	See P4.3
P4.11 ②	A02 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	A02 Scale	10	1000	%	100	233	
P4.13 ②	A02 Inversion				0	231	See P4.6
P4.14 ②	A02 Offset	–100.00	100.00	%	0.00	234	

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.

Table 23. 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 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 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
P5.2 ②	RO1 Function				2	152	See P5.1
P5.3 ②	RO2 Function				3	153	See P5.1
P5.4 ②	RO3 Function				7	538	See P5.1
P5.5 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.6 ②	Freq Limit 1 Supv Val	0.00	Par. P1.2	Hz	0.00	155	
P5.7 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 2 Supv Val	0.00	Par. P1.2	Hz	0.00	158	
P5.9 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10 ②	Torque Limit Supv Val	–1000.0	1000.0	%	100.0	160	

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.

Table 23. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.11 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Ref Limit Supv Val	0.00	Par. P1.2	Hz	0.00	162	
P5.15 ②	Temp Limit Supv				0	165	See P5.11
P5.16 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.17 ②	Power Limit Supv				0	167	See P5.11
P5.18 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.19 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.20 ②	AI Limit Supv				0	171	See P5.11
P5.21 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.30	RO1 On Delay	0	320	s	0	2111	
P5.31	RO1 Off Delay	0	320	s	0	2112	
P5.32	RO2 On Delay	0	320	s	0	2113	
P5.33	RO2 Off Delay	0	320	s	0	2114	
P5.34	RO3 On Delay	0	320	s	0	2115	
P5.35	RO3 Off Delay	0	320	s	0	2116	
P5.36	RO3 Reverse				0	2117	0 = No 1 = Yes
P5.37 ②	Motor Current 1 Supv				0	2189	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.38 ②	Motor Current 1 Supv Value	0	DCI_uwDrive NomCurrCT*2	A	DCI_uwDrive NomCurrCT	2190	
P5.39 ②	Motor Current 2 Supv				0	2191	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.40 ②	Motor Current 2 Supv Value	0	DCI_uwDrive NomCurrCT*2	A	DCI_uwDrive NomCurrCT	2192	
P5.41 ②	Second AI Supv Select				0	2193	0 = AI1 1 = AI2
P5.42 ②	Second AI Limit Supv				0	2194	See P5.11
P5.43 ②	Second AI Limit Supv Val	0	100	%	0	2195	
P5.44 ②	Motor Current 1 Supv Hyst	0.1	1	A	0.1	2196	
P5.45 ②	Motor Current 2 Supv Hyst	0.1	1	A	0.1	2197	
P5.46 ②	AI Supv Hyst	1	10	%	1	2198	
P5.47 ②	Second AI Supv Hyst	1	10	%	1	2199	
P5.48 ②	Freq Limit 1 Supv Hyst	0.1	1	Hz	0.1	2200	
P5.49 ②	Freq Limit 2 Supv Hyst	0.1	1	Hz	0.1	2201	
P5.50 ②	Torque Limit Supv Hyst	1	5	%	1	2202	
P5.51 ②	Ref Limit Supv Hyst	0.1	1	Hz	0.1	2203	
P5.52 ②	Temp Limit Supv Hyst	1	10	?	1	2204	
P5.53 ②	Power Limit Supv Hyst	0.1	10	%	0.1	2205	

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.

Table 24. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See P1.11
P7.2 ①②	Remote 2 Reference				7	139	See P1.13
P7.3 ②	Keypad Reference	Par. P1.1	Par. P1.2	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	Par. P1.1	Par. P1.2	Hz	0.00	117	
P7.9 ②	Start Mode				0	252	0 = Ramp 1 = Flying Start
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	Par. P7.16	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	Par. P7.15	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	Par. P7.18	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	Par. P7.17	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	Par. P7.20	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	Par. P7.19	400.00	Hz	0.00	261	
P7.21 ②	Prohibit Accel/Decel Ramp	0.1	10.0		1.0	264	
P7.22 ②	Power Loss Function				0	267	0 = Disabled 1 = Enabled
P7.23 ②	Power Loss Time	0.3	5.0	s	2.0	268	
P7.24	Currency				\$	2121	0 = \$ 1 = GBP 2 = Eur 3 = JPY 4 = Rs 5 = R\$ 6 = Fr 7 = Kr
P7.25	Energy Cost			Varies	0	2122	
P7.26	Data Type				0	2123	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P7.27	Energy Savings Reset				0	2124	0 = No Action 1 = Reset

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.

Table 25. 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	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom VT	107	
P8.3 ①②	V/Hz Optimization				0	109	0 = Disabled 1 = Enabled
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	60.00	289	
P8.6 ①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7 ①②	V/Hz Mid Frequency	0.00	Par. P8.5	Hz	V/Hz Midpoint Freq	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	Min Switching Freq	Max Switching Freq	kHz	Default Switching Freq CT	288	
P8.11 ②	Sine Filter Enable				0	1665	0 = Disabled 1 = Enabled
P8.12 ①②	Overvoltage Control				1	294	0 = Disabled 1 = Enabled
P8.17 ②	Frequency Ramp Out Filter Time Constant	0	3000	ms	0	1585	
P8.39 ②	Start Boost Rise Time	–1	32000	s	0	1622	

Table 26. 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	Par. P1.2	Hz	0.00	331	
P9.3 ①②	External Fault				2	307	See P9.11
P9.4 ①②	Input Phase Fault				2	332	See P9.11
P9.5 ①②	Uvoltage Fault Response				2	330	See P9.11
P9.6 ①②	Output Phase Fault				2	308	See P9.11
P9.7 ①②	Ground Fault				2	309	See P9.11
P9.8 ①②	Motor Thermal Protection				2	310	See P9.11
P9.9 ②	Motor Thermal F0 Current	0.0	150.0	%	40.0	311	
P9.10 ②	Motor Thermal Time	1	200	min	12	312	
P9.11 ①②	Stall Protection				0	313	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P9.12 ②	Stall Current Limit	0.1	Active Motor Nom I*2	A	Active Motor Nom I*13/10	314	
P9.13 ②	Stall Time Limit	1.0	120.0	s	15.0	315	

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.

Table 26. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.14 ②	Stall Frequency Limit	1.00	Par. P1.2	Hz	25.00	316	
P9.15 ①②	Underload Protection				0	317	See P9.11
P9.16 ②	Underload F _{nom} Torque	10.0	150.0	%	50.0	318	
P9.17 ②	Underload F ₀ 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 P9.11
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	See P9.11
P9.22 ①②	OPTCard Fault Response				2	335	See P9.11
P9.23 ①②	Unit Under Temp Prot				2	1564	See P9.11
P9.24 ②	Wait Time	0.10	10.00	s	0.50	321	
P9.25 ②	Trail Time	0.00	60.00	s	30.00	322	
P9.26 ②	Start Function				0	323	0 = Flying Start
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	
P9.32 ②	External Fault Attempts	0	10		0	328	
P9.33 ②	Underload Attempts	0	10		1	336	
P9.34 ①②	RTC Fault				1	955	See P9.11
P9.35 ①②	PT100 Fault Response				2	337	See P9.11
P9.36 ①②	Replace Battery Fault Response				1	1256	See P9.11
P9.37 ①②	Replace Fan Fault Response				1	1257	See P9.11
P9.38 ①②	IP Address Conflicition Resp				1	1678	See P9.11
P9.39	Cold Weather Mode				0	2126	0 = No 1 = Yes
P9.40	Cold Weather Voltage Level	0	20	%	2	2127	
P9.41	Cold Weather Time Out	0	10	min	3	2128	
P9.44 ②	Ground Fault Limit	0	30	%	15	2158	
P9.45 ①②	Keypad Comm Fault Response				2	2157	See P9.11
P9.46 ②	Preheat Mode				0	2159	0 = Disabled 1 = Enabled
P9.47 ②	Preheat Temp Source				0	2160	0 = Drive Temperature 1 = PT100 Temperature
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 Voltage	0.0	20.0	%	2.0	2163	

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.

Table 27. Preset Speed—P12

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1 ②	Preset Speed 1	0.00	Par. P1.2	Hz	5.00	105	
P12.2 ②	Preset Speed 2	0.00	Par. P1.2	Hz	10.00	106	
P12.3 ②	Preset Speed 3	0.00	Par. P1.2	Hz	15.00	118	
P12.4 ②	Preset Speed 4	0.00	Par. P1.2	Hz	20.00	119	
P12.5 ②	Preset Speed 5	0.00	Par. P1.2	Hz	25.00	120	
P12.6 ②	Preset Speed 6	0.00	Par. P1.2	Hz	30.00	121	
P12.7 ②	Preset Speed 7	0.00	Par. P1.2	Hz	35.00	122	

Table 28. Brake—P14

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P14.1 ①②	DC-Brake Current	Drive Nom CT*15/100	Drive Nom CT*15/10	A	Drive Nom CT*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				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	Active Motor Nom I*1/10	Par. P8.2	A	Active Motor Nom I*1/2	265	

Table 29. FB Data Output Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1 ②	FB Data Output 1 Sel				1	1556	
P20.1.2 ②	FB Data Output 2 Sel				2	1557	
P20.1.3 ②	FB Data Output 3 Sel				3	1558	
P20.1.4 ②	FB Data Output 4 Sel				4	1559	
P20.1.5 ②	FB Data Output 5 Sel				5	1560	
P20.1.6 ②	FB Data Output 6 Sel				6	1561	
P20.1.7 ②	FB Data Output 7 Sel				7	1562	
P20.1.8 ②	FB Data Output 8 Sel				28	1563	

Table 30. Modbus RTU—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP 2 = SmartWire-DT
P20.2.2	Slave Address	1	247		1	587	
P20.2.3	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200

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.

Table 30. Modbus RTU—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.4	Parity Type				2	585	0 = None 1 = Odd 2 = Even
P20.2.5	Modbus RTU Protocol Status				0	588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.2.6	Slave Busy				0	589	0 = Not Busy 1 = Busy
P20.2.7	Parity Error				0	590	
P20.2.8	Slave Fault				0	591	
P20.2.9	Last Fault Response				0	592	
P20.2.10	Comm Timeout Modbus RTU			ms	10000	593	

Table 31. BACnet MS/TP—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.11	BACnet Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P20.2.12	BACnet MS/TP Device Address	0	127		1	595	
P20.2.13	BACnet Instance Number	0	4194302		0	596	
P20.2.14	BACnet Comm Timeout			ms	6000	598	
P20.2.15	BACnet Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.2.16	BACnet Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud Rate Fault

Table 32. EtherNet/IP / Modbus TCP—P20.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.1	IP Address Mode				1	1500	0 = Static IP 1 = DHCP with AutoIP
P20.3.2	Active IP Address					1507	
P20.3.3	Active Subnet Mask					1509	
P20.3.4	Active Default Gateway					1511	
P20.3.5	MAC Address					1513	
P20.3.6	Static IP Address				192.168.1.254	1501	
P20.3.7	Static Subnet Mask				255.255.255.0	1503	
P20.3.8	Static Default Gateway				192.168.1.1	1505	
P20.3.9	EtherNet/IP Protocol Status				0	608	0 = Stopped 1 = Operational 2 = Faulted
P20.3.10	Connection Limit				5	609	
P20.3.11	Modbus TCP Unit ID				1	610	

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.

Table 32. EtherNet/IP / Modbus TCP—P20.3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.12	Comm Timeout Modbus TCP			ms	10000	611	
P20.3.13	Modbus TCP Protocol Status				0	612	0 = Stopped 1 = Operational 2 = Faulted
P20.3.14	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.3.15	Modbus TCP Parity Error				0	614	

Table 33. SmartWire-DT—P20.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.4.1	Protocol Status				0	2139	
P20.4.2	Baud Rate				0	2141	0 = 125 kBaud 1 = 250 kBaud

Table 34. Basic Setting—P21.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.1	Language				0	340	0 = English 1 = Depends upon Language Pack 2 = Depends upon Language Pack
P21.1.2 ^①	Application				0	142	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
P21.1.3	Parameter Sets				0	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				0	620	0 = No 1 = Yes
P21.1.5	Down From Keypad				0	621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters
P21.1.6	Parameter Comparison				0	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 P21.1.8

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.

Table 34. Basic Setting—P21.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu
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				2	632	0 = Continuous 1 = Temperature 2 = Run Follow 3 = Calculate Temp
P21.1.15	HMI ACK Timeout	200	5000	ms	200	633	
P21.1.16	HMI Retry Number	1	10		5	634	

Table 35. 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				App Firmware	644	

Table 36. Application Info—P21.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.3.1	Brake Chopper Stat					646	0 = No 1 = Yes
P21.3.2	Brake Resistor					647	See P21.3.1
P21.3.3	Serial Number					648	

Table 37. 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				0	635	0 = Not Reset 1 = Reset
P21.4.8	Trip Power Day Count					636	
P21.4.9	Trip Power Hr Count					637	
P21.4.10	Clear Trip Power Count				0	639	See P21.4.7

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.

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

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 150** of this manual, “Description of Parameters.” The explanations are arranged according to the parameter

Control Examples

Single Drive

Figure 27. Example of Two-Pump Autochange, Main Diagram

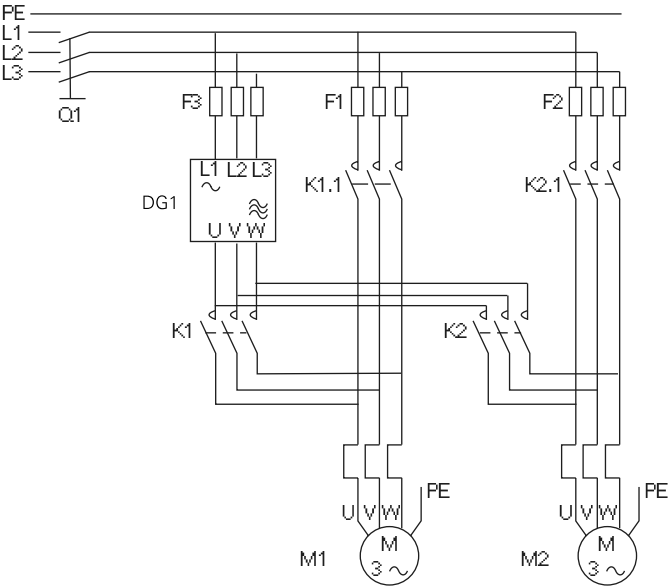


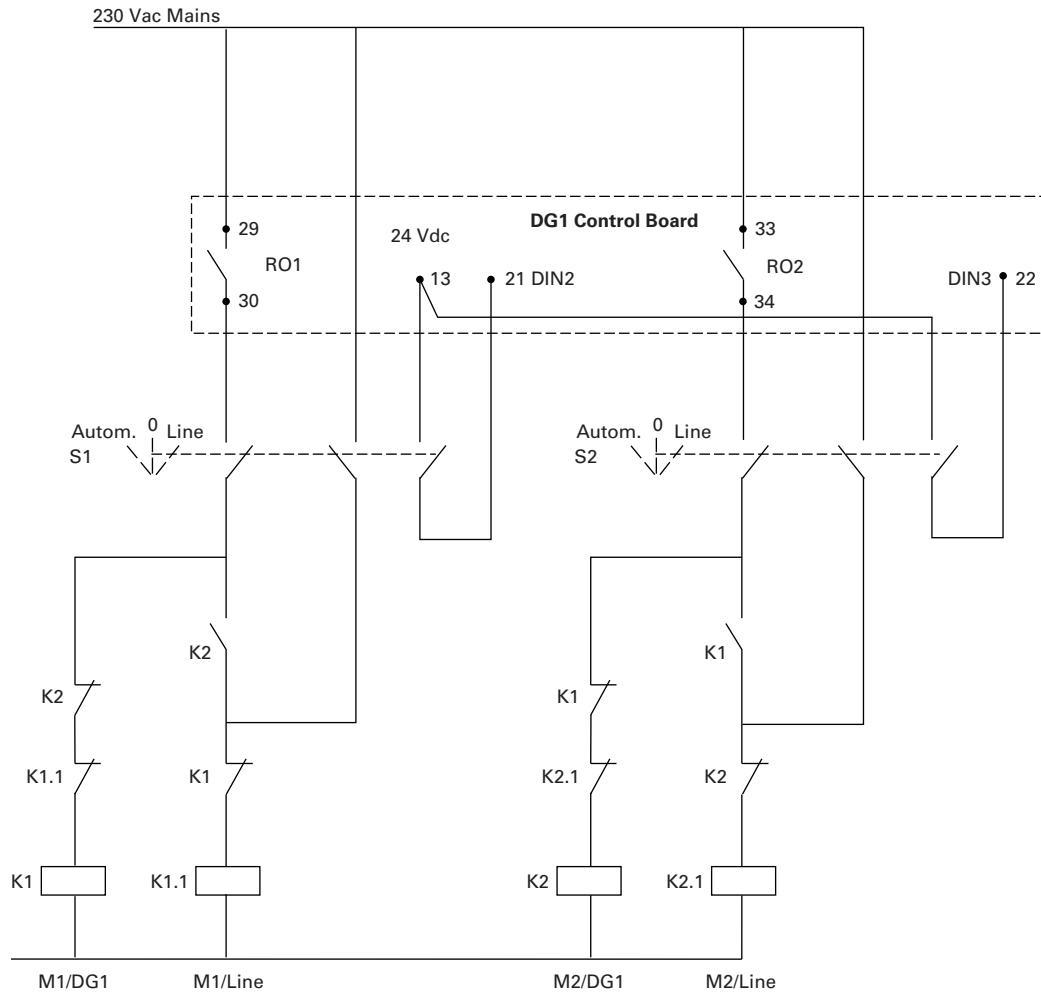
Figure 28. Two-Pump Autochange System Principal Control Diagram

Figure 29. Example of Three-Pump Autochange, Main Diagram

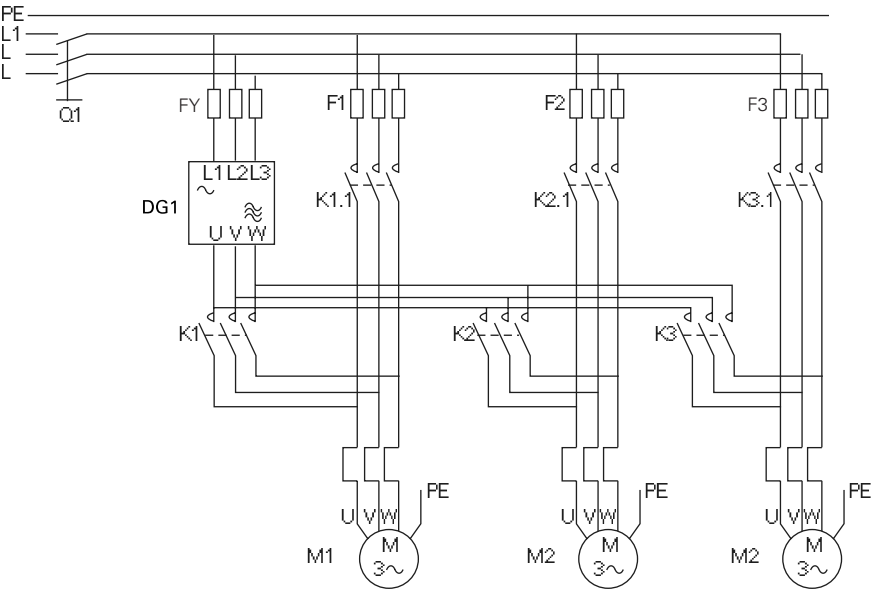


Figure 30. Three-Pump Autochange System Principal Control Diagram

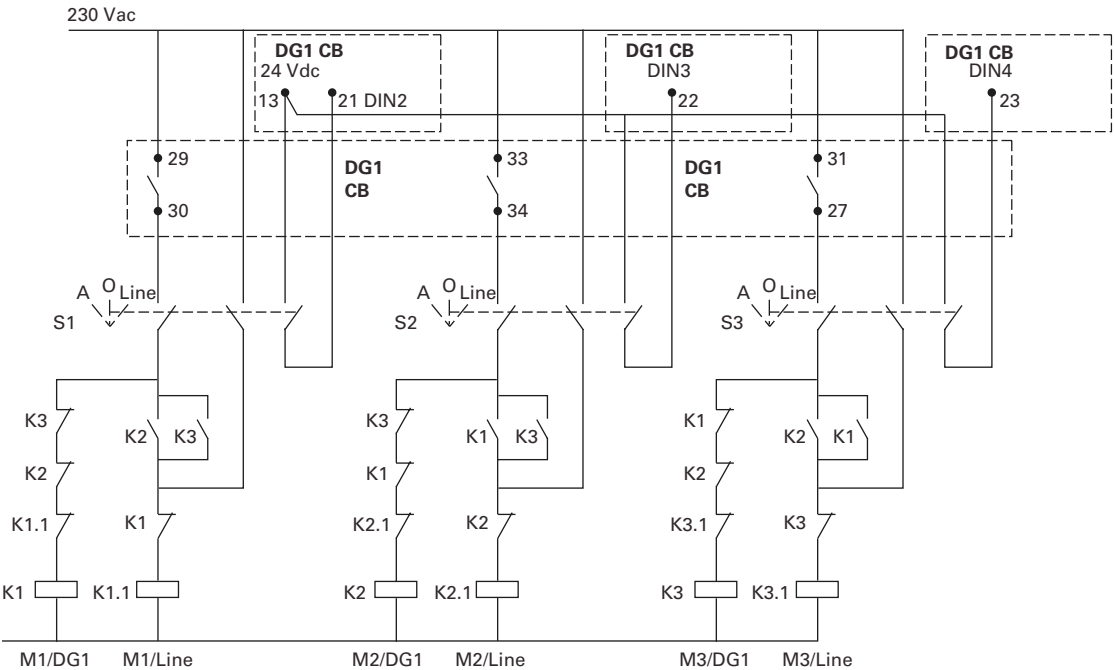


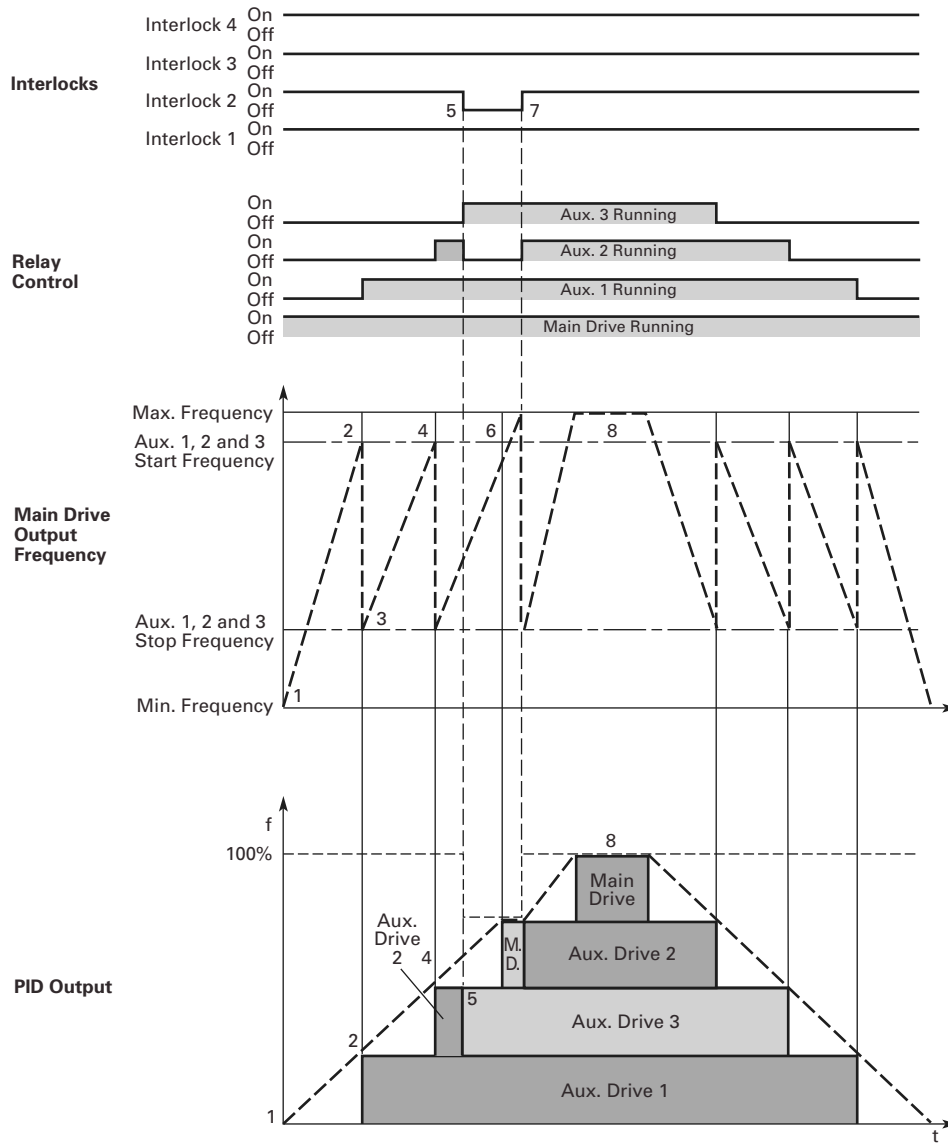
Figure 31. Example of the Function of the PFC Application with Three Auxiliary Drives

Figure 32. Multi Pump Control Curve

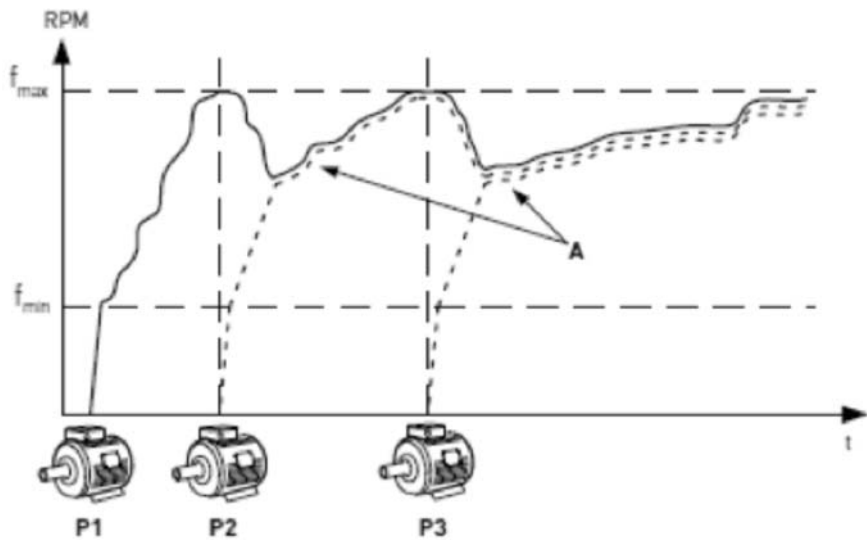


Figure 33. Multi-Drive / Multi-Pump Layout

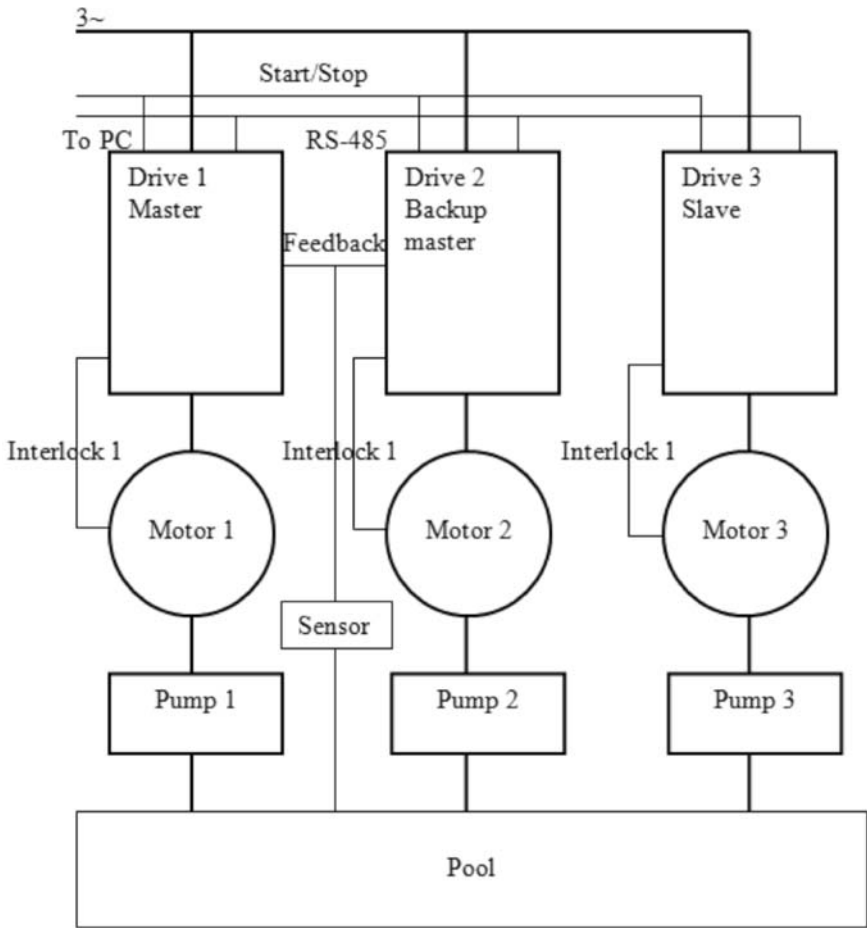


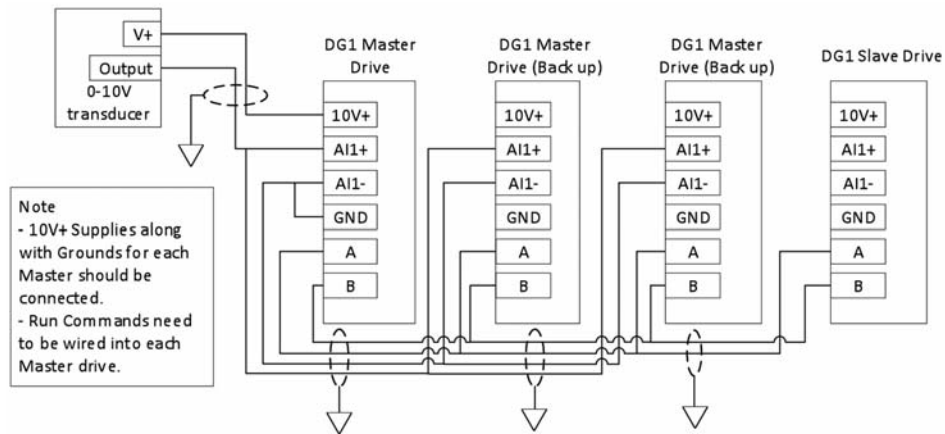
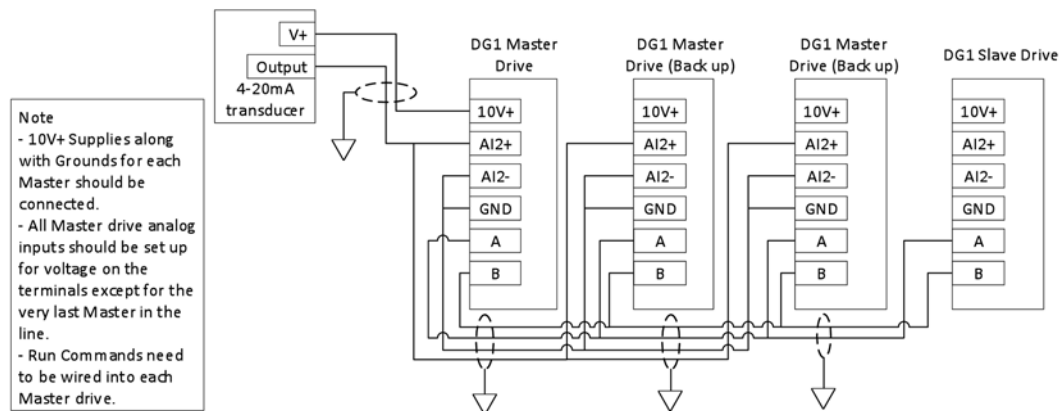
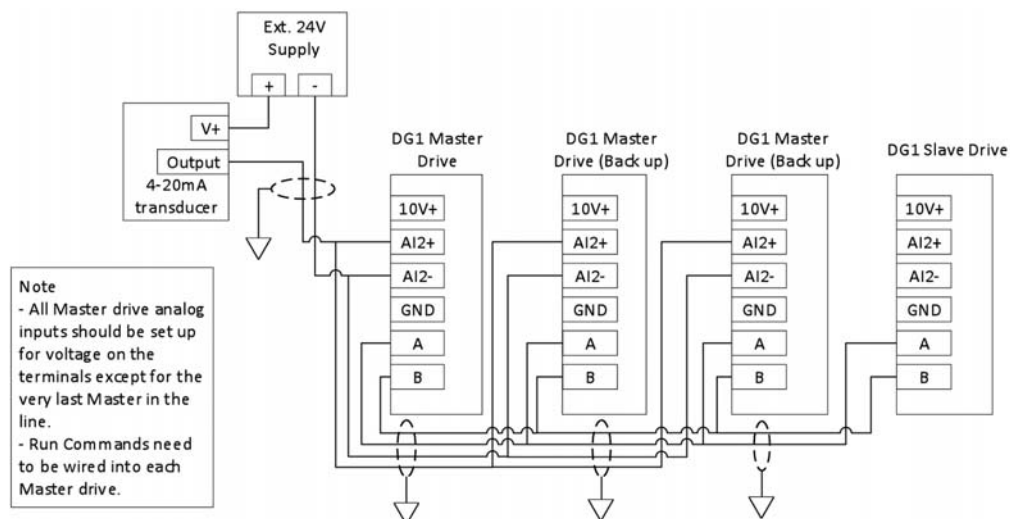
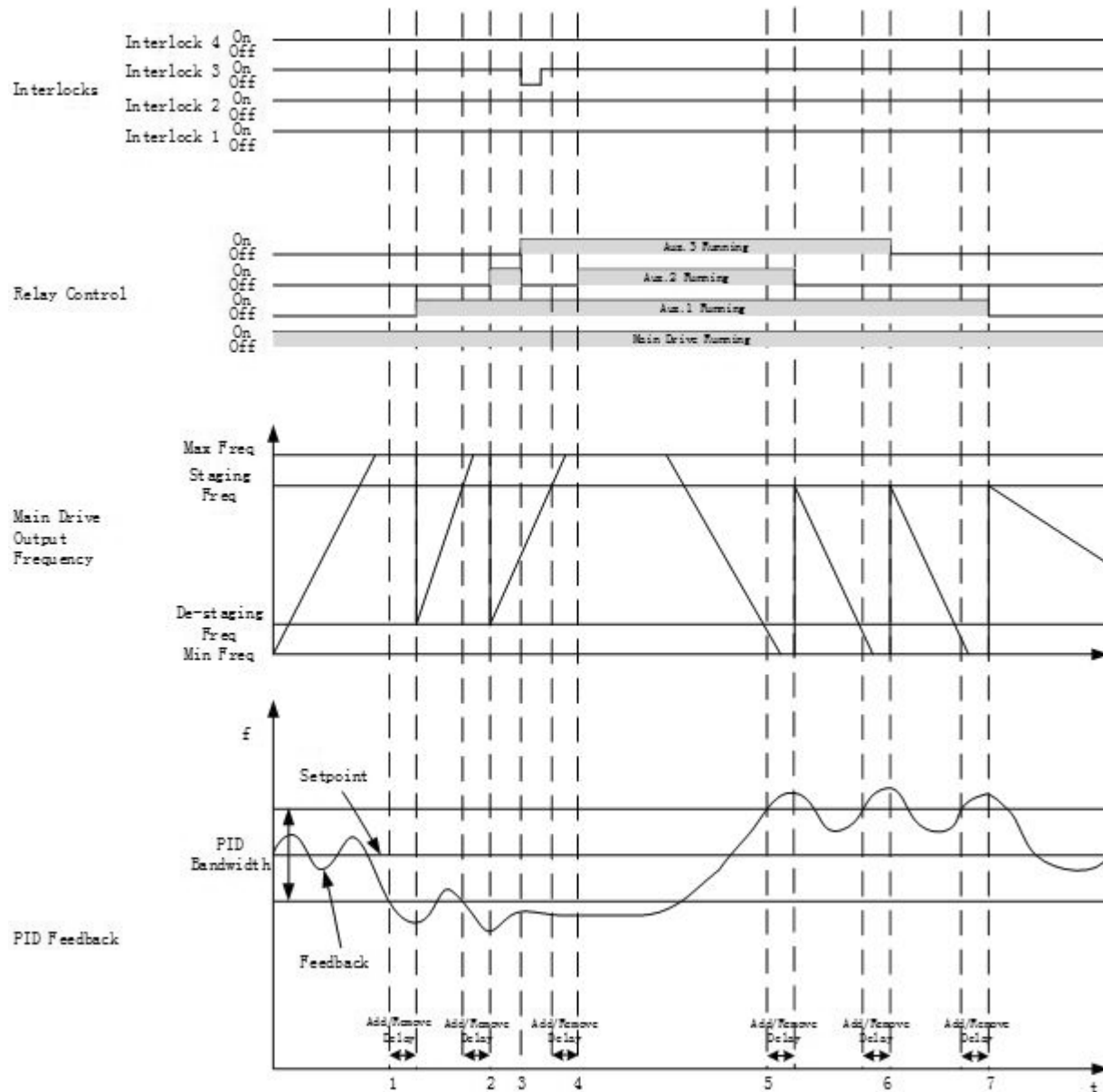
Figure 34. PowerXL Drives with 10 V Supply with a 0–10 V Transducer**Figure 35. PowerXL Drives with 10 V Supply with a 4–20 mA Transducer****Figure 36. PowerXL Drives with Ext Supply with a 4–20 mA Transducer**

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 38. Multi-Pump and Fan Application Default I/O Connection

Default					
AI1: 0 to 10 V		OFF	ON	AI1: 0 to 20 mA	
AI2		1		OFF	
AI2		2		ON	
AI2		3		2	
				3	
				AI2: 0 to 20 mA	
				OFF	
				ON	
				2	
				3	
				AI2: 0 to 10 V	
				OFF	
				ON	
				2	
				3	
				AI2: -10 V to +10 V	
				OFF	
				ON	
				2	
				3	

External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10 V	Ref. Output Voltage	—	10 Vdc Supply Source
	2	AI1+	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+	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	Emergency Stop (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.

Table 39. 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.

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 150**, “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 40. Monitor—M

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1	Output Frequency			Hz	0.00	1	
M2	Freq Reference			Hz	0.00	24	
M3	Motor Speed			rpm	0	2	
M4	Motor Current			A	0.0	3	
M5	Motor Torque			%	0.0	4	
M6	Motor Power			%	0.0	5	
M7	Motor Voltage			V	0.0	6	
M8	DC-link Voltage			V	0	7	
M9	Unit Temperature			°C	0.0	8	
M10	Motor Temperature			%	0.0	9	
M12	Analog Input 1			Varies	0.00	10	
M13	Analog Input 2			Varies	0.00	11	
M14	Analog Output 1			Varies	0.00	25	
M15	Analog Output 2			Varies	0.00	575	
M16	DI1, DI2, DI3				0	12	
M17	DI4, DI5, DI6				0	13	
M18	DI7, DI8				0	576	
M19	DO1				0	14	
M20	RO1, RO2, RO3				0	557	
M21	TC1, TC2, TC3				0	558	
M22	Interval 1				0	559	0 = Inactive 1 = Active
M23	Interval 2				0	560	See M22
M24	Interval 3				0	561	See M22
M25	Interval 4				0	562	See M22
M26	Interval 5				0	563	See M22
M27	Timer 1			s	0	569	
M28	Timer 2			s	0	571	
M29	Timer 3			s	0	573	
M30	PID1 Set Point			Varies	0.00	16	
M31	PID1 Feedback			Varies	0.00	18	
M32	PID1 Error Value			Varies	0.00	20	
M33	PID1 Output			%	0.00	22	

Table 40. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M34	PID1 Status				0	23	0 = Stopped 1 = Running 2 = Sleep Mode
M40	Running Motors				0	26	
M41	PT100 Temperature			°C	1000.0	27	
M42	Last Active Fault				0	28	See Fault Codes on Page 223 in Appendix B
M43	RTC Battery Status					583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = Over Voltage
M44	Instance Motor Power			kW	0.000	1686	
M45	Energy Savings			Varies		2120	
M46	Multi-Monitoring				0, 1, 2	30	

Table 41. Operate Mode—O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz	0.00	1	
O2	Freq Reference			Hz	0.00	24	
O3	Motor Speed			rpm	0	2	
O4	Motor Current			A	0.0	3	
O5	Motor Torque			%	0.0	4	
O6	Motor Power			%	0.0	5	
O7	Motor Voltage			V	0.0	6	
O8	DC-link Voltage			V	0	7	
O9	Unit Temperature			°C	0.0	8	
O10	Motor Temperature			%	0.0	9	
R12 ②	Keypad Reference	Par. P1.1	Par. P1.2	Hz	0.00	141	
R13 ②	PID1 Keypad Set Point 1	Par. P10.5	Par. P10.6	Varies	0	1307	
R14 ②	PID1 Keypad Set Point 2	Par. P10.5	Par. P10.6	Varies	0	1309	

Table 42. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2 ②	Max Frequency	Par. P1.1	400.00	Hz	60.00	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	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	486	
P1.6 ①	Motor Nom Speed	300	20000	rpm	Motor Nom Speed	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	Motor Nom Volt	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	Motor Nom Freq	488	
P1.10 ②	Power Up Local Remote Select				0	1685	0 = Hold Last 1 = Local Control 2 = Remote 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.

Table 42. Basic Parameters—P1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.11 ②	Remote1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal 2 3 = Keypad
P1.12	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal 2 3 = Fieldbus
P1.13 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 = Min (AI1, AI2) 16 = MAX(AI1,AI2) 17 = PID Control Output
P1.14 ①②	Remote1 Reference				1	137	See P1.13
P1.15 ①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled

Table 43. Analog Input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10 V
P2.2 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
P2.3 ②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.4 ②	AI1 Custom Max	Par. P2.3	100.00	%	100.00	177	
P2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.6 ②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.10 ②	AI1 Joystick Offset	–50.00	50.00	%	0.00	133	
P2.11	AI2 Mode				0	223	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V
P2.12 ②	AI2 Signal Range				1	183	0 = 0–100% / 0–20 mA / 0 to 10 V / –10 to 10 V 1 = 20–100% / 4–20 mA / 2 to 10 V / –6 to 10 V 2 = Customized

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.

Table 43. Analog Input—P2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.13 ②	AI2 Custom Min	0.00	Par. P2.14	%	0.00	184	
P2.14 ②	AI2 Custom Max	Par. P2.13	100.00	%	100.00	185	
P2.15 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.16 ②	AI2 Signal Invert				0	189	See P2.6
P2.17 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.18 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.19 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
P2.20 ②	AI2 Joystick Offset	–50.00	50.00	%	0.00	134	
P2.21 ②	AI Ref Scale Min Value	0.00	Par. P2.22	Hz	0.00	144	
P2.22 ②	AI Ref Scale Max Value	Par. P2.21	400.00	Hz	0.00	145	

Table 44. Digital Input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	Start/Stop Logic				0	143	0 = Forward–Reverse 1 = Start–Reverse 2 = Start–Enable 3 = Start Pulse–Stop Pulse
P3.2 ②	Start Signal 1				2	190	0 = DigIN: ForceOpen 1 = DigIN: ForceClose 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
P3.3 ②	Start Signal 2				3	191	See P3.2
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②	Reverse				0	198	See P3.2
P3.6 ②	Ext. Fault 1 NO				4	192	See P3.2

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.

Table 44. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.7 ②	Ext. Fault 1 NC				1	193	See P3.2
P3.8 ②	Fault Reset				5	200	See P3.2
P3.9 ②	Run Enable				1	194	See P3.2
P3.10 ②	Preset Speed B0				6	205	See P3.2
P3.11 ②	Preset Speed B1				7	206	See P3.2
P3.12 ②	Preset Speed B2				0	207	See P3.2
P3.13 ②	PID1 Control Enable				1	550	See P3.2
P3.15 ②	Accel/Decel Time Set				0	195	See P3.2
P3.16 ②	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②	No Access To Param				0	215	See P3.2
P3.21 ②	Remote Control				9	196	See P3.2
P3.22 ②	Local Control				0	197	See P3.2
P3.23 ②	Remote1/2 Select				0	209	See P3.2
P3.24 ②	Second Motor Para Select				0	217	See P3.2
P3.25 ②	Bypass Start				0	218	See P3.2
P3.26 ②	DC Brake Enable				0	202	See P3.2
P3.27 ②	Smoke Mode				0	219	See P3.2
P3.28 ②	Fire Mode				0	220	See P3.2
P3.29 ②	Fire Mode Ref Select				0	221	See P3.2
P3.30 ②	PID1 Set Point Select				0	351	See P3.2
P3.32 ②	Jog Enable				0	199	See P3.2
P3.33 ②	Start Timer 1				0	224	See P3.2
P3.34 ②	Start Timer 2				0	225	See P3.2
P3.35 ②	Start Timer 3				0	226	See P3.2
P3.36 ②	AI Ref Source Select				0	208	See P3.2
P3.37 ②	Motor Interlock 1				0	210	See P3.2
P3.38 ②	Motor Interlock 2				0	211	See P3.2
P3.39 ②	Motor Interlock 3				0	212	See P3.2
P3.40 ②	Motor Interlock 4				0	213	See P3.2
P3.41 ②	Motor Interlock 5					214	See P3.2
P3.42 ②	Emergency Stop				1	747	See P3.2
P3.43 ②	Bypass Overload				0	1246	See P3.2
P3.44	Fire Mode Reverse				0	2118	See P3.2
P3.45 ①②	2nd Start Stop Logic				0	2206	See P3.1
P3.46 ②	2nd Start Signal 1				2	2207	See P3.2
P3.47 ②	2nd Start Signal 2				3	2208	See P3.2
P3.48 ②	Ext. Fault 2 NO				0	2293	See P3.2
P3.49 ②	Ext. Fault 2 NC				1	2294	See P3.2
P3.50 ②	Ext. Fault 3 NO				0	2295	See P3.2
P3.51 ②	Ext. Fault 3 NC				1	2296	See P3.2

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.

Table 44. 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
P3.53 ②	Ext. Fault 2 Text				1	2298	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
P3.54 ②	Ext. Fault 3 Text				2	2299	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
P3.55 ②	Parameter Set1/2 Sel				0	2312	See P3.2

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.

Table 45. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	A01 Mode				0	227	0 = 0–20 mA 1 = 0–10 V
P4.2 ②	A01 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 to +2N) 22 = Motor Torque (–2 to +2N) 23 = Motor Power (–2 to +2N) 24 = PT100 Temperature 25 = FB Data Input 1 26 = FB Data Input 2 27 = FB Data Input 3 28 = FB Data Input 4 29 = FB Data Input 5 30 = FB Data Input 6 31 = FB Data Input 7 32 = FB Data Input 8
P4.3 ②	A01 Minimum				1	149	0 = 0 V / 0 mA 1 = 2 V / 4 mA
P4.4 ②	A01 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	A01 Scale	10	1000	%	100	150	
P4.6 ②	A01 Inversion				0	148	0 = Not Inverted 1 = Inverted
P4.7 ②	A01 Offset	–100.00	100.00	%	0.00	173	
P4.8 ②	A02 Mode				0	228	See P4.1
P4.9 ②	A02 Function				4	229	See P4.2
P4.10 ②	A02 Minimum				1	232	See P4.3
P4.11 ②	A02 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	A02 Scale	10	1000	%	100	233	
P4.13 ②	A02 Inversion				0	231	See P4.6
P4.14 ②	A02 Offset	–100.00	100.00	%	0.00	234	

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.

Table 46. 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 = 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 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
P5.2 ②	RO1 Function				2	152	See P5.1
P5.3 ②	RO2 Function				3	153	See P5.1
P5.4 ②	RO3 Function				7	538	See P5.1
P5.5 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.6 ②	Freq Limit 1 Supv Val	0.00	Par. P1.2	Hz	0.00	155	

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.

Table 46. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.7 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 2 Supv Val	0.00	Par. P1.2	Hz	0.00	158	
P5.9 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10 ②	Torque Limit Supv Val	–1000.0	1000.0	%	100.0	160	
P5.11 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Ref Limit Supv Val	0.00	Par. P1.2	Hz	0.00	162	
P5.15 ②	Temp Limit Supv				0	165	See P5.11
P5.16 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.17 ②	Power Limit Supv				0	167	See P5.11
P5.18 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.19 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.20 ②	AI Limit Supv				0	171	See P5.11
P5.21 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.22 ②	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P5.23 ②	PID1 Superv Upper Limit	Par. P10.5	Par. P10.6	Varies	0.00	1347	
P5.24 ②	PID1 Superv Lower Limit	Par. P10.5	Par. P10.6	Varies	0.00	1349	
P5.25 ②	PID1 Superv Delay	0	3000	s	0	1351	
P5.30	RO1 On Delay	0	320	s	0	2111	
P5.31	RO1 Off Delay	0	320	s	0	2112	
P5.32	RO2 On Delay	0	320	s	0	2113	
P5.33	RO2 Off Delay	0	320	s	0	2114	
P5.34	RO3 On Delay	0	320	s	0	2115	
P5.35	RO3 Off Delay	0	320	s	0	2116	
P5.36	RO3 Reverse				0	2117	0 = No 1 = Yes
P5.37 ②	Motor Current 1 Supv				0	2189	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.38 ②	Motor Current 1 Supv Value	0	DCI_uwDrive NomCurrCT*2	A	DCI_uwDrive NomCurrCT	2190	
P5.39 ②	Motor Current 2 Supv				0	2191	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.40 ②	Motor Current 2 Supv Value	0	DCI_uwDrive NomCurrCT*2	A	DCI_uwDrive NomCurrCT	2192	
P5.41 ②	Second AI Supv Select				0	2193	0 = AI1 1 = AI2
P5.42 ②	Second AI Limit Supv				0	2194	See P5.11
P5.43 ②	Second AI Limit Supv Val	0	100	%	0	2195	
P5.44 ②	Motor Current 1 Supv Hyst	0.1	1	A	0.1	2196	

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.

Table 46. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.45 ②	Motor Current 2 Supv Hyst	0.1	1	A	0.1	2197	
P5.46 ②	AI Supv Hyst	1	10	%	1	2198	
P5.47 ②	Second AI Supv Hyst	1	10	%	1	2199	
P5.48 ②	Freq Limit 1 Supv Hyst	0.1	1	Hz	0.1	2200	
P5.49 ②	Freq Limit 2 Supv Hyst	0.1	1	Hz	0.1	2201	
P5.50 ②	Torque Limit Supv Hyst	1	5	%	1	2202	
P5.51 ②	Ref Limit Supv Hyst	0.1	1	Hz	0.1	2203	
P5.52 ②	Temp Limit Supv Hyst	1	10	deg C	1	2204	
P5.53 ②	Power Limit Supv Hyst	0.1	10	%	0.1	2205	

Table 47. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See P1.11
P7.2 ①②	Remote 2 Reference				7	139	See P1.13
P7.3 ②	Keypad Reference	Par. P1.1	Par. P1.2	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	Par. P1.1	Par. P1.2	Hz	0.00	117	
P7.9 ②	Start Mode				0	252	0 = Ramp 1 = Flying Start
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	Par. P7.16	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	Par. P7.15	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	Par. P7.18	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	Par. P7.17	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	Par. P7.20	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	Par. P7.19	400.00	Hz	0.00	261	
P7.21 ②	Prohibit Accel/Decel Ramp	0.1	10.0		1.0	264	
P7.22 ②	Power Loss Function				0	267	0 = Disabled 1 = Enabled
P7.23 ②	Power Loss Time	0.3	5.0	s	2.0	268	
P7.24	Currency				\$	2121	0 = \$ 1 = GBP 2 = Eur 3 = JPY 4 = Rs 5 = R\$ 6 = Fr 7 = Kr

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.

Table 47. Drive Control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.25	Energy Cost				0	2122	
P7.26	Data Type				0	2123	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P7.27	Energy Savings Reset				0	2124	0 = No Action 1 = Reset

Table 48. 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	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom VT	107	
P8.3 ①②	V/Hz Optimization				0	109	0 = Disabled 1 = Enabled
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	60.00	289	
P8.6 ①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7 ①②	V/Hz Mid Frequency	0.00	Par. P8.5	Hz	V/Hz Curve Midpoint Freq	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	Min Switch Freq	Max Switch Freq	kHz	Default Switching Freq CT	288	
P8.11 ②	Sine Filter Enable				0	1665	0 = Disabled 1 = Enabled
P8.12 ①②	Overvoltage Control				1	294	0 = Disabled 1 = Enabled
P8.17 ②	Frequency Ramp Out FilterTime Constant	0	3000	ms	0	1585	
P8.39 ②	Start Boost Rise Time	–1	32000	s	0	1622	

Table 49. 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	Par. P1.2	Hz	0.00	331	
P9.3 ①②	External Fault				2	307	See P9.11
P9.4 ①②	Input Phase Fault				2	332	See P9.11
P9.5 ①②	Uvolt Fault Response				2	330	See P9.11

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.

Table 49. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.6 ①②	Output Phase Fault				2	308	See P9.11
P9.7 ①②	Ground Fault				2	309	See P9.11
P9.8 ①②	Motor Thermal Protection				2	310	See P9.11
P9.9 ②	Motor Thermal F0 Current	0.0	150.0	%	40.0	311	
P9.10 ②	Motor Thermal Time	1	200	min	12	312	
P9.11 ①②	Stall Protection				0	313	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P9.12 ②	Stall Current Limit	0.1	Active Motor Nom I*2	A	Active Motor Nom I*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	Par. P1.2	Hz	25.00	316	
P9.15 ①②	Underload Protection				0	317	See P9.11
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 P9.11
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	See P9.11
P9.22 ①②	OPTCard Fault Response				2	335	See P9.11
P9.23 ①②	Unit Under Temp Prot				2	1564	See P9.11
P9.24 ②	Wait Time	0.10	10.00	s	0.50	321	
P9.25 ②	Trail Time	0.00	60.00	s	30.00	322	
P9.26 ②	Start Function				0	323	0 = Flying Start
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	
P9.32 ②	External Fault Attempts	0	10		0	328	
P9.33 ②	Underload Attempts	0	10		1	336	
P9.34 ①②	RTC Fault				1	955	See P9.11
P9.35 ①②	PT100 Fault Response				2	337	See P9.11
P9.36 ①②	Replace Battery Fault Response				1	1256	See P9.11
P9.37 ①②	Replace Fan Fault Response				1	1257	See P9.11
P9.38 ①②	IP Address Conflicion Resp				1	1678	See P9.11
P9.39	Cold Weather Mode				0	2126	0 = No 1 = Yes
P9.40	Cold Weather Voltage Level	0	20	%	2	2127	
P9.41	Cold Weather Time Out	0	10	min	3	2128	
P9.44 ②	Ground Fault Limit	0	30	%	15	2158	

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.

Table 49. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.45 ①②	Keypad Comm Fault Response				2	2157	See P9.11
P9.46 ②	Preheat Mode				0	2159	0 = Disabled 1 = Enabled
P9.47 ②	Preheat Temp Source				0	2160	0 = Drive Temperature 1 = PT100 Temperature
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 Voltage	0.0	20.0	%	2.0	2163	

Table 50. 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 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
P10.5 ②	PID1 Process Unit Min	–99999.99	99999.99	Varies	0.00	1298	

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.

Table 50. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.6 ②	PID1 Process Unit Max	–99999.99	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	0 = Not Inverted 1 = Inverted
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	Par. P10.5	Par. P10.6	Varies	0.00	1307	
P10.12 ②	PID1 Keypad Set Point 2	Par. P10.5	Par. P10.6	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 Data Input 1 8 = FB Data Input 2 9 = FB Data Input 3 10 = FB Data Input 4 11 = FB Data Input 5 12 = FB Data Input 6 13 = FB Data Input 7 14 = FB Data Input 8
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	0 = Disabled 1 = Enabled
P10.18 ②	PID1 Set Point 1 Sleep Freq	0.00	400.00	Hz	0.00	1316	
P10.19 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.20 ②	PID1 Set Point 1 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1318	
P10.21 ②	PID1 Set Point 1 Boost	–2.0	2.0		1.0	1320	
P10.22 ①②	PID1 Set Point 2 Source				2	1321	See P10.14
P10.23 ②	PID1 Set Point 2 Min	–200.00	200.00	%	0.00	1322	
P10.24 ②	PID1 Set Point 2 Max	–200.00	200.00	%	100.00	1323	
P10.25 ①②	PID1 Set Point 2 Sleep Enable				0	1324	0 = Disabled 1 = Enabled
P10.26 ②	PID1 Set Point 2 Sleep Freq	0.00	400.00	Hz	0.00	1325	
P10.27 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.28 ②	PID1 Set Point 2 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1327	
P10.29 ②	PID1 Set Point 2 Boost	–2.0	2.0		1.0	1329	

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.

Table 50. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.30 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)
P10.31 ②	PID1 Feedback Gain	–1000.0	1000.0	%	100.0	1331	
P10.32 ①②	PID1 Feedback 1 Source				1	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8 13 = PT100 Temperature
P10.33 ②	PID1 Feedback 1 Min	–200.00	200.00	%	0.00	1333	
P10.34 ②	PID1 Feedback 1 Max	–200.00	200.00	%	100.00	1334	
P10.35 ①②	PID1 Feedback 2 Source				0	1335	See P10.32
P10.36 ②	PID1 Feedback 2 Min	–200.00	200.00	%	0.00	1336	
P10.37 ②	PID1 Feedback 2 Max	–200.00	200.00	%	100.00	1337	
P10.38 ①②	PID1 Feedforward Func				0	1338	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)
P10.39 ②	PID1 Feedforward Gain	–1000.0	1000.0	%	100.0	1339	
P10.40 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8
P10.41 ②	PID1 Feedforward 1 Min	–200.00	200.00	%	0.00	1341	
P10.42 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.

Table 50. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.43 ①②	PID1 Feedforward 2 Source				0	1343	See P10.40
P10.44 ②	PID1 Feedforward 2 Min	–200.00	200.00	%	0.00	1344	
P10.45 ②	PID1 Feedforward 2 Max	–200.00	200.00	%	100.00	1345	
P10.46 ②	PID1 Set Point 1 Comp Enable				0	1352	0 = Disabled 1 = Enabled
P10.47 ②	PID1 Set Point 1 Comp Max	–200.00	200.00	%	0.00	1353	
P10.48 ②	PID1 Set Point 2 Comp Enable				0	1354	0 = Disabled 1 = Enabled
P10.49 ②	PID1 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1355	

Table 51. Preset Speed—P12

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1 ②	Preset Speed 1	0.00	Par. P1.2	Hz	5.00	105	
P12.2 ②	Preset Speed 2	0.00	Par. P1.2	Hz	10.00	106	
P12.3 ②	Preset Speed 3	0.00	Par. P1.2	Hz	15.00	118	
P12.4 ②	Preset Speed 4	0.00	Par. P1.2	Hz	20.00	119	
P12.5 ②	Preset Speed 5	0.00	Par. P1.2	Hz	25.00	120	
P12.6 ②	Preset Speed 6	0.00	Par. P1.2	Hz	30.00	121	
P12.7 ②	Preset Speed 7	0.00	Par. P1.2	Hz	35.00	122	

Table 52. Brake—P14

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P14.1 ①②	DC-Brake Current	Drive Nom CT*15/100	Drive Nom CT*15/10	A	Drive Nom CT*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				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	Active Motor Nom I*1/10	Par. P8.2	A	Active Motor Nom I*1/2	265	

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.

Table 53. 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
P15.3 ②	Fire Mode Min Frequency	Par. P1.1	Par. P1.2	Hz	15.00	537	
P15.4 ②	Fire Mode Freq Ref 1	0.0	100.0	%	75.0	565	
P15.5 ②	Fire Mode Freq Ref 2	0.0	100.0	%	100.0	564	
P15.6 ①②	Smoke Purge Frequency	0.0	100.0	%	50.0	554	

Table 54. Second Motor Parameter—P16

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P16.1 ①	Motor Nom Current 2	Drive Nom CT*1/10	Drive Nom CT*1/10	A	Drive Nom CT	577	
P16.2 ①	Motor Nom Speed 2	300	20000	rpm	2nd Motor Nom Speed	578	
P16.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P16.4 ①	Motor Nom Volt 2	180	690	V	2nd Motor Nom V	580	
P16.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	2nd Motor Nom Freq	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	0.001	65.535	mh	0.128	1421	
P16.9 ①	Mutual Inductance 2	0.01	655.35	mh	3.44	1422	
P16.10 ①	Excitation Current 2	0.1	Drive Nom Curr CT*2	A	0.1	1423	

Table 55. Bypass—P17

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1 ①②	Bypass Enable				0	1418	0 = Disabled 1 = Enabled
P17.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.3 ①②	Auto Bypass				0	542	0 = Disabled 1 = Enabled
P17.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.5 ①②	Overcurrent Bypass Enable				0	547	0 = Disabled 1 = Enabled
P17.6 ①②	IGBT Fault Bypass Enable				0	546	0 = Disabled 1 = Enabled
P17.7 ①②	4 mA Fault Bypass Enable				0	548	0 = Disabled 1 = Enabled
P17.8 ①②	Undervoltage Bypass Enable				0	545	0 = Disabled 1 = Enabled
P17.9 ①②	Overvoltage Bypass Enable				0	549	0 = Disabled 1 = Enabled

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.

Table 56. Multi-Pump Operation Mode—P18.1.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.1.1	Drive 1				0	2218	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.2	Drive 2				0	2230	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.3	Drive 3				0	2242	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.4	Drive 4				0	2254	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.5	Drive 5				0	2266	0 = Offline 1 = Slave Drive 2 = Master Drive

Table 57. Multi-Pump Status—P18.1.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.2.1	Drive 1				5	2219	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.2	Drive 2				5	2231	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.3	Drive 3				5	2243	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.4	Drive 4				5	2255	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.5	Drive 5				5	2267	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown

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.

Table 58. Multi-Pump Network Status—P18.1.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.3.1	Drive 1				0	2220	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.2	Drive 2				0	2232	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.3	Drive 3				0	2244	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.4	Drive 4				0	2256	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.5	Drive 5				0	2268	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error

Table 59. Multi-Pump Latest Fault Code—P18.2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.1.1	Drive 1				0	2221	
P18.2.1.2	Drive 2				0	2233	
P18.2.1.3	Drive 3				0	2245	
P18.2.1.4	Drive 4				0	2257	
P18.2.1.5	Drive 5				0	2269	

Table 60. Multi-Pump Output Frequency—P18.2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.2.1	Drive 1			Hz	0	2222	
P18.2.2.2	Drive 2			Hz	0	2234	
P18.2.2.3	Drive 3			Hz	0	2246	
P18.2.2.4	Drive 4			Hz	0	2258	
P18.2.2.5	Drive 5			Hz	0	2270	

Table 61. Multi-Pump Motor Voltage—P18.2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.3.1	Drive 1			V	0	2223	
P18.2.3.2	Drive 2			V	0	2235	
P18.2.3.3	Drive 3			V	0	2247	
P18.2.3.4	Drive 4			V	0	2259	
P18.2.3.5	Drive 5			V	0	2271	

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.

Table 62. Multi-Pump Motor Current—P18.2.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.4.1	Drive 1			A	0	2224	
P18.2.4.2	Drive 2			A	0	2236	
P18.2.4.3	Drive 3			A	0	2248	
P18.2.4.4	Drive 4			A	0	2260	
P18.2.4.5	Drive 5			A	0	2272	

Table 63. Multi-Pump Motor Torque—P18.2.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.5.1	Drive 1			%	0	2225	
P18.2.5.2	Drive 2			%	0	2237	
P18.2.5.3	Drive 3			%	0	2249	
P18.2.5.4	Drive 4			%	0	2261	
P18.2.5.5	Drive 5			%	0	2273	

Table 64. Multi-Pump Motor Power—P18.2.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.6.1	Drive 1			%	0	2226	
P18.2.6.2	Drive 2			%	0	2238	
P18.2.6.3	Drive 3			%	0	2250	
P18.2.6.4	Drive 4			%	0	2262	
P18.2.6.5	Drive 5			%	0	2274	

Table 65. Multi-Pump Motor Speed—P18.2.7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.7.1	Drive 1			rpm	0	2227	
P18.2.7.2	Drive 2			rpm	0	2239	
P18.2.7.3	Drive 3			rpm	0	2251	
P18.2.7.4	Drive 4			rpm	0	2263	
P18.2.7.5	Drive 5			rpm	0	2275	

Table 66. Multi-Pump Motor Run Time—P18.2.8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.8.1	Drive 1			h	0	2228	
P18.2.8.2	Drive 2			h	0	2240	
P18.2.8.3	Drive 3			h	0	2252	
P18.2.8.4	Drive 4			h	0	2264	
P18.2.8.5	Drive 5			h	0	2276	

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.

Table 67. Multi-Pump Settings—P18.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.1 ①②	Multi-pump Mode				0	2279	0 = Disable 1 = Single Drive Control 2 = Multi Drive Network
P18.3.2 ①②	Drive ID	0	5		0	2278	
P18.3.3 ①②	Number of Motors	1	5		1	342	
P18.3.4 ①②	Regulation Source				0	2284	0 = Network 1 = PID Controller 1
P18.3.5 ①②	Recovery Method				0	2285	0 = Automatic 1 = Stop
P18.3.6 ①②	Callback Source				0	2286	0 = No Action 1 = Safety Torque Off
P18.3.7 ②	Add/Remove Drive Selection				0	2311	0 = Drive ID 1 = Run Time
P18.3.8 ②	PID Bandwidth	0	100	Varies	10	343	
P18.3.9 ①②	Staging Frequency	Par. P1.1	400		Par. P1.2	2315	
P18.3.10 ①②	De-Staging Frequency	0	Par. P1.2		Par. P1.1	2316	
P18.3.11 ②	Add/Remove Delay	0	3600	s	10	344	
P18.3.12 ②	Interlock Enable				0	350	0 = Disabled 1 = Enabled
P18.3.13 ②	Include Freq Converter				1	346	0 = Disabled 1 = Enabled
P18.3.14 ②	Auto-Change Enable				0	345	0 = Disabled 1 = Enabled
P18.3.15 ②	Auto-Change Interval	0	3000	h	48	347	
P18.3.16 ②	Auto-Change Freq Limit	Par. P1.1	Par. P1.2	Hz	25	349	
P18.3.17 ②	Auto-Change Motor Limit	0	5		1	348	
P18.3.18 ②	Run Time Enable				0	2280	0 = Disabled 1 = Enabled
P18.3.19 ②	Run Time Limit	0	300000	h	0	2281	
P18.3.20 ②	Run Time Reset				0	2283	0 = No Action 1 = Reset
P18.3.21 ①②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.3.22 ①②	Damper Time Out	1	32500	s	5	484	
P18.3.23 ①②	Damper Delay	1	32500	s	5	485	

Table 68. 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

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.

Table 68. Real Time Clock—P19, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P19.4 ②	Interval 1 To Day				0	518	See P19.3
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 P19.3
P19.9 ②	Interval 2 To Day				0	521	See P19.3
P19.10 ②	Interval 2 Channel				0	522	See P19.5
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 P19.3
P19.14 ②	Interval 3 To Day				0	524	See P19.3
P19.15 ②	Interval 3 Channel				0	525	See P19.5
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 P19.3
P19.19 ②	Interval 4 To Day				0	527	See P19.3
P19.20 ②	Interval 4 Channel				0	528	See P19.5
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 P19.3
P19.24 ②	Interval 5 To Day				0	530	See P19.3
P19.25 ②	Interval 5 Channel				0	531	See P19.5
P19.26 ②	Timer 1 Duration	0	72000	s	0	511	
P19.27 ②	Timer 1 Channel				0	532	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.28 ②	Timer 2 Duration	0	72000	s	0	513	
P19.29 ②	Timer 2 Channel				0	533	See P19.27
P19.30 ②	Timer 3 Duration	0	72000	s	0	515	
P19.31 ②	Timer 3 Channel				0	534	See P19.27

Table 69. FB Data Output Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1 ②	FB Data Output 1 Sel				1	1556	
P20.1.2 ②	FB Data Output 2 Sel				2	1557	
P20.1.3 ②	FB Data Output 3 Sel				3	1558	
P20.1.4 ②	FB Data Output 4 Sel				4	1559	
P20.1.5 ②	FB Data Output 5 Sel				5	1560	
P20.1.6 ②	FB Data Output 6 Sel				6	1561	
P20.1.7 ②	FB Data Output 7 Sel				7	1562	
P20.1.8 ②	FB Data Output 8 Sel				28	1563	

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.

Table 70. Modbus RTU—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP 2 = SmartWire-DT
P20.2.2	Slave Address	1	247		1	587	
P20.2.3	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.2.4	Parity Type				2	585	0 = None 1 = Odd 2 = Even
P20.2.5	Modbus RTU Protocol Status				0	588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.2.6	Slave Busy				0	589	0 = Not Busy 1 = Busy
P20.2.7	Parity Error				0	590	
P20.2.8	Slave Fault				0	591	
P20.2.9	Last Fault Response				0	592	
P20.2.10	Comm Timeout Modbus RTU			ms	10000	593	

Table 71. BACnet MS/TP—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.11	BACnet Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P20.2.12	BACnet MS/TP Device Address	0	127		1	595	
P20.2.13	BACnet Instance Number	0	4194302		0	596	
P20.2.14	BACnet Comm Timeout			ms	6000	598	
P20.2.15	BACnet Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.2.16	BACnet Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud Rate Fault

Table 72. EtherNet/IP / Modbus TCP—P20.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.1	IP Address Mode				1	1500	0 = Static IP 1 = DHCP with AutoIP
P20.3.2	Active IP Address					1507	
P20.3.3	Active Subnet Mask					1509	
P20.3.4	Active Default Gateway					1511	
P20.3.5	MAC Address					1513	

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.

Table 72. EtherNet/IP / Modbus TCP—P20.3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.6	Static IP Address				192.168.1.254	1501	
P20.3.7	Static Subnet Mask				255.255.255.0	1503	
P20.3.8	Static Default Gateway				192.168.1.1	1505	
P20.3.9	EtherNet/IP Protocol Status				0	608	0 = Stopped 1 = Operational 2 = Faulted
P20.3.10	Connection Limit				5	609	
P20.3.11	Modbus TCP Unit ID				1	610	
P20.3.12	Comm Timeout Modbus TCP			ms	10000	611	
P20.3.13	Modbus TCP Protocol Status				0	612	0 = Stopped 1 = Operational 2 = Faulted
P20.3.14	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.3.15	Modbus TCP Parity Error				0	614	

Table 73. SmartWire-DT—P20.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.4.1	Protocol Status				0	2139	
P20.4.2	Baud Rate				0	2141	0 = 125 kBaud 1 = 250 kBaud

Table 74. Basic Setting—P21.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.1	Language				0	340	0 = English 1 = Depends upon Language Pack 2 = Depends upon Language Pack
P21.1.2 ①	Application				0	142	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
P21.1.3	Parameter Sets				0	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				0	620	0 = No 1 = Yes
P21.1.5	Down From Keypad				0	621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters
P21.1.6	Parameter Comparison				0	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	

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.

Table 74. Basic Setting—P21.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.8	Parameter Lock				0	625	0 = Change Enable 1 = Change Disable
P21.1.9	Multimonitor Set				0	627	See P21.1.8
P21.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu
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				2	632	0 = Continuous 1 = Temperature 2 = Run Follow 3 = Calculate Temp
P21.1.15	HMI ACK Timeout	200	5000	ms	200	633	
P21.1.16	HMI Retry Number	1	10		5	634	

Table 75. 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				App Firmware	644	

Table 76. Application Info—P21.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.3.1	Brake Chopper Stat					646	0 = No 1 = Yes
P21.3.2	Brake Resistor					647	See P21.3.1
P21.3.3	Serial Number					648	

Table 77. 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				0	635	0 = Not Reset 1 = Reset
P21.4.8	Trip Power Day Count					636	
P21.4.9	Trip Power Hr Count					637	
P21.4.10	Clear Trip Power Count				0	639	See P21.4.7

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.

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.

Select the Multi-PID Application in menu **P21.1.2**.

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

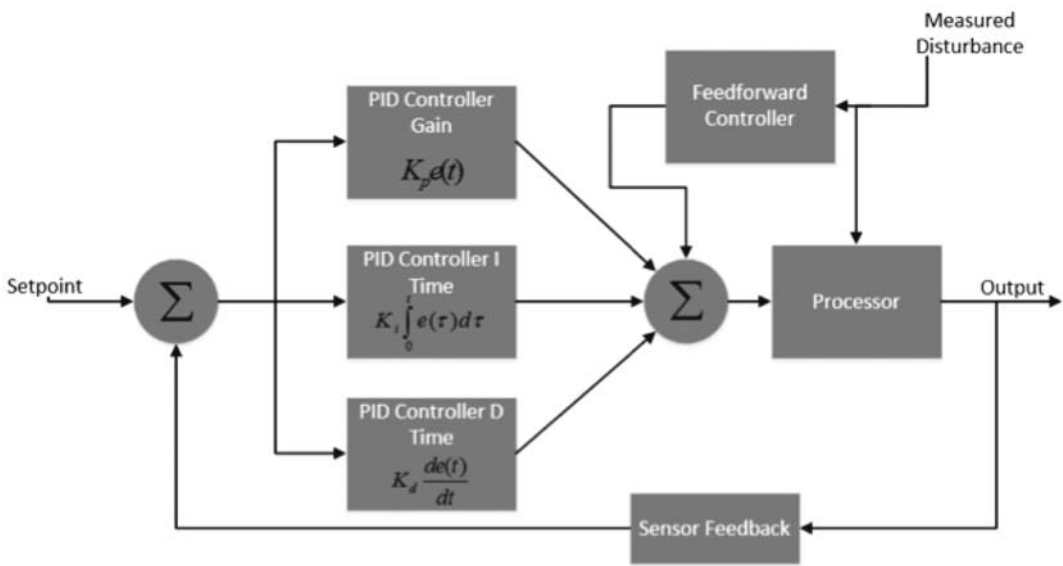
The design behind the programming of the digital inputs in the DG1 drive is to use “Terminal To Function” programming, which is composed of multiple functions that get assigned a digital input to that function. The parameters in the drive are set up with specific functions and by defining the digital 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 150** of this manual, “Description of Parameters.” The explanations are arranged according to the parameter number.

Figure 38. PID Controller Flowchart

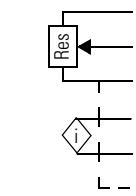
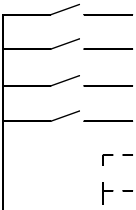
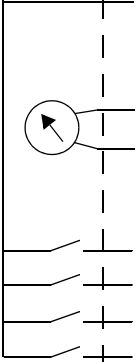


Control I/O Configuration

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

Table 78. Multi-PID Application Default I/O Configuration

Default																																	
AI1: 0 to 10 V		<table><tr><th>OFF</th><th>ON</th></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table>	OFF	ON	1		2		3		AI1: 0 to 20 mA		<table><tr><th>OFF</th><th>ON</th></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table>	OFF	ON	2		3		<table><tr><th>OFF</th><th>ON</th></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table>	OFF	ON	2		3		<table><tr><th>OFF</th><th>ON</th></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table>	OFF	ON	2		3	
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AI2			AI2: 0 to 20 mA		AI2: 0 to 10 V		AI2: -10 V to +10 V																										

External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10 V	Ref. Output Voltage	—	10 Vdc Supply Source
	2	AI1+	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+	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	Emergency Stop (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.

Table 79. 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 150**, “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 80. Monitor—M

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1	Output Frequency			Hz	0.00	1	
M2	Freq Reference			Hz	0.00	24	
M3	Motor Speed			rpm	0	2	
M4	Motor Current			A	0.0	3	
M5	Motor Torque			%	0.0	4	
M6	Motor Power			%	0.0	5	
M7	Motor Voltage			V	0.0	6	
M8	DC-link Voltage			V	0	7	
M9	Unit Temperature			°C	0.0	8	
M10	Motor Temperature			%	0.0	9	
M12	Analog Input 1			Varies	0.00	10	
M13	Analog Input 2			Varies	0.00	11	
M14	Analog Output 1			Varies	0.00	25	
M15	Analog Output 2			Varies	0.00	575	
M16	DI1, DI2, DI3				0	12	
M17	DI4, DI5, DI6				0	13	
M18	DI7, DI8				0	576	
M19	DO1				0	14	
M20	RO1, RO2, RO3				0	557	
M21	TC1, TC2, TC3				0	558	
M22	Interval 1				0	559	0 = Inactive 1 = Active
M23	Interval 2				0	560	See M22
M24	Interval 3				0	561	See M22
M25	Interval 4				0	562	See M22
M26	Interval 5				0	563	See M22
M27	Timer 1			s	0	569	
M28	Timer 2			s	0	571	
M29	Timer 3			s	0	573	
M30	PID1 Set Point			Varies	0.00	16	
M31	PID1 Feedback			Varies	0.00	18	
M32	PID1 Error Value			Varies	0.00	20	
M33	PID1 Output			%	0.00	22	

Table 80. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M34	PID1 Status				0	23	0 = Stopped 1 = Running 2 = Sleep Mode
M35	PID2 Set Point			Varies	0.00	32	
M36	PID2 Feedback			Varies	0.00	34	
M37	PID2 Error Value			Varies	0.00	36	
M38	PID2 Output			%	0.00	38	
M39	PID2 Status				0	39	See M34
M40	Running Motors				0	26	
M41	PT100 Temperature			°C	1000.0	27	
M42	Last Active Fault				0	28	See Fault Codes on Page 223 in Appendix B
M43	RTC Battery Status					583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = Over Voltage
M44	Instance Motor Power			kW	0.000	1686	
M45	Energy Savings			Varies		2120	
M46	Multi-Monitoring				0, 1, 2	30	

Table 81. Operate Mode—O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz	0.00	1	
O2	Freq Reference			Hz	0.00	24	
O3	Motor Speed			rpm	0	2	
O4	Motor Current			A	0.0	3	
O5	Motor Torque			%	0.0	4	
O6	Motor Power			%	0.0	5	
O7	Motor Voltage			V	0.0	6	
O8	DC-link Voltage			V	0	7	
O9	Unit Temperature			°C	0.0	8	
O10	Motor Temperature			%	0.0	9	
R12 ②	Keypad Reference	Par. P1.1	Par. P1.2	Hz	0.00	141	
R13 ②	PID1 Keypad Set Point 1	Par. P10.5	Par. P10.6	Varies	0	1307	
R14 ②	PID1 Keypad Set Point 2	Par. P10.5	Par. P10.6	Varies	0	1309	

Table 82. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2 ②	Max Frequency	Par. P1.1	400.00	Hz	60.0	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	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	486	
P1.6 ①	Motor Nom Speed	300	20000	rpm	Motor Nom Speed	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	Motor Nom Volt	487	

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.

Table 82. Basic Parameters—P1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.9 ^①	Motor Nom Frequency	8.00	400.00	Hz	Motor Nom Freq	488	
P1.10 ^②	Power Up Local Remote Select				0	1685	0 = Hold Last 1 = Local Control 2 = Remote Control
P1.11 ^②	Remote1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal 2 3 = Keypad
P1.12	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal 2 3 = Fieldbus
P1.13 ^{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 = Min (AI1, AI2) 16 = MAX(AI1, AI2) 17 = PID Control Output
P1.14 ^{①②}	Remote1 Reference				1	137	See P1.13
P1.15 ^①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled

Table 83. Analog Input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10 V
P2.2 ^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
P2.3 ^②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.4 ^②	AI1 Custom Max	Par. P2.3	100.00	%	100.00	177	
P2.5 ^②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.6 ^②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.7 ^②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.8 ^②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.9 ^②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.10 ^②	AI1 Joystick Offset	–50.00	50.00	%	0.00	133	
P2.11	AI2 Mode				0	223	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V

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.

Table 83. Analog Input—P2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.12 ②	AI2 Signal Range				1	183	0 = 0–100% / 0–20 mA / 0 to 10 V / –10 to 10 V 1 = 20–100% / 4–20 mA / 2 to 10 V / –6 to 10 V 2 = Customized
P2.13 ②	AI2 Custom Min	0.00	Par. P2.14	%	0.00	184	
P2.14 ②	AI2 Custom Max	Par. P2.13	100.00	%	100.00	185	
P2.15 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.16 ②	AI2 Signal Invert				0	189	See P2.6
P2.17 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.18 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.19 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
P2.20 ②	AI2 Joystick Offset	–50.00	50.00	%	0.00	134	
P2.21 ②	AI Ref Scale Min Value	0.00	Par. P2.22	Hz	0.00	144	
P2.22 ②	AI Ref Scale Max Value	Par. P2.21	400.00	Hz	0.00	145	

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.

Table 84. Digital Input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	Start/Stop Logic				0	143	0 = Forward–Reverse 1 = Start–Reverse 2 = Start–Enable 3 = Start Pulse–Stop Pulse
P3.2 ②	Start Signal 1				2	190	0 = DigIN: ForceOpen 1 = DigIN: ForceClose 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
P3.3 ②	Start Signal 2				3	191	See P3.2
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②	Reverse				0	198	See P3.2
P3.6 ②	Ext. Fault 1 NO				4	192	See P3.2
P3.7 ②	Ext. Fault 1 NC				1	193	See P3.2
P3.8 ②	Fault Reset				5	200	See P3.2
P3.9 ②	Run Enable				1	194	See P3.2
P3.10 ②	Preset Speed B0				6	205	See P3.2
P3.11 ②	Preset Speed B1				7	206	See P3.2
P3.12 ②	Preset Speed B2				0	207	See P3.2
P3.13 ②	PID1 Control Enable				1	550	See P3.2
P3.14 ②	PID2 Control Enable				1	553	See P3.2
P3.15 ②	Accel/Decel Time Set				0	195	See P3.2
P3.16 ②	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②	No Access To Param				0	215	See P3.2
P3.21 ②	Remote Control				9	196	See P3.2
P3.22 ②	Local Control				0	197	See P3.2
P3.23 ②	Remote1/2 Select				0	209	See P3.2

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.

Table 84. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.24 ②	Second Motor Para Select				0	217	See P3.2
P3.25 ②	Bypass Start				0	218	See P3.2
P3.26 ②	DC Brake Enable				0	202	See P3.2
P3.27 ②	Smoke Mode				0	219	See P3.2
P3.28 ②	Fire Mode				0	220	See P3.2
P3.29 ②	Fire Mode Ref Select				0	221	See P3.2
P3.30 ②	PID1 Set Point Select				0	351	See P3.2
P3.31 ②	PID2 Set Point Select				0	352	See P3.2
P3.32 ②	Jog Enable				0	199	See P3.2
P3.33 ②	Start Timer 1				0	224	See P3.2
P3.34 ②	Start Timer 2				0	225	See P3.2
P3.35 ②	Start Timer 3				0	226	See P3.2
P3.36 ②	AI Ref Source Select				0	208	See P3.2
P3.37 ②	Motor Interlock 1				0	210	See P3.2
P3.38 ②	Motor Interlock 2				0	211	See P3.2
P3.39 ②	Motor Interlock 3				0	212	See P3.2
P3.40 ②	Motor Interlock 4				0	213	See P3.2
P3.41 ②	Motor Interlock 5				0	214	See P3.2
P3.42 ②	Emergency Stop				1	747	See P3.2
P3.43 ②	Bypass Overload				0	1246	See P3.2
P3.44	Fire Mode Reverse				0	2118	See P3.2
P3.45 ①②	2nd Start Stop Logic				0	2206	See P3.1
P3.46 ②	2nd Start Signal 1				2	2207	See P3.2
P3.47 ②	2nd Start Signal 2				3	2208	See P3.2
P3.48 ②	Ext. Fault 2 NO				0	2293	See P3.2
P3.49 ②	Ext. Fault 2 NC				1	2294	See P3.2
P3.50 ②	Ext. Fault 3 NO				0	2295	See P3.2
P3.51 ②	Ext. Fault 3 NC				1	2296	See P3.2
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

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.

Table 84. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.53 ②	Ext. Fault 2 Text				1	2298	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
P3.54 ②	Ext. Fault 3 Text				2	2299	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
P3.55 ②	Parameter Set1/2 Sel				0	2312	See P3.2

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.

Table 85. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	A01 Mode				0	227	0 = 0–20 mA 1 = 0–10 V
P4.2 ②	A01 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 to +2N) 22 = Motor Torque (–2 to +2N) 23 = Motor Power (–2 to +2N) 24 = PT100 Temperature 25 = FB Data Input 1 26 = FB Data Input 2 27 = FB Data Input 3 28 = FB Data Input 4 29 = FB Data Input 5 30 = FB Data Input 6 31 = FB Data Input 7 32 = FB Data Input 8
P4.3 ②	A01 Minimum				1	149	0 = 0 V / 0 mA 1 = 2 V / 4 mA
P4.4 ②	A01 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	A01 Scale	10	1000	%	100	150	
P4.6 ②	A01 Inversion				0	148	0 = Not Inverted 1 = Inverted
P4.7 ②	A01 Offset	–100.00	100.00	%	0.00	173	
P4.8 ②	A02 Mode				0	228	See P4.1
P4.9 ②	A02 Function				4	229	See P4.2
P4.10 ②	A02 Minimum				1	232	See P4.3
P4.11 ②	A02 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	A02 Scale	10	1000	%	100	233	
P4.13 ②	A02 Inversion				0	231	See P4.6
P4.14 ②	A02 Offset	–100.00	100.00	%	0.00	234	

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.

Table 86. 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 = 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 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
P5.2 ②	RO1 Function				2	152	See P5.1
P5.3 ②	RO2 Function				3	153	See P5.1
P5.4 ②	RO3 Function				7	538	See P5.1

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.

Table 86. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.5 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.6 ②	Freq Limit 1 Supv Val	0.00	Par. P1.2	Hz	0.00	155	
P5.7 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 2 Supv Val	0.00	Par. P1.2	Hz	0.00	158	
P5.9 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10 ②	Torque Limit Supv Val	−1000.0	1000.0	%	100.0	160	
P5.11 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Ref Limit Supv Val	0.00	Par. P1.2	Hz	0.00	162	
P5.15 ②	Temp Limit Supv				0	165	See P5.11
P5.16 ②	Temp Limit Supv Val	−10.0	75.0	°C	40.0	166	
P5.17 ②	Power Limit Supv				0	167	See P5.11
P5.18 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.19 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.20 ②	AI Limit Supv				0	171	See P5.11
P5.21 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.22 ②	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P5.23 ②	PID1 Superv Upper Limit	Par. P10.5	Par. P10.6	Varies	0.00	1347	
P5.24 ②	PID1 Superv Lower Limit	Par. P10.5	Par. P10.6	Varies	0.00	1349	
P5.25 ②	PID1 Superv Delay	0	3000	s	0	1351	
P5.26 ②	PID2 Superv Enable				0	1408	0 = Disabled 1 = Enabled
P5.27 ②	PID2 Superv Upper Limit	Par. P11.5	Par. P11.6	Varies	0.00	1409	
P5.28 ②	PID2 Superv Lower Limit	Par. P11.5	Par. P11.6	Varies	0.00	1411	
P5.29 ②	PID2 Superv Delay	0	3000	s	0	1413	
P5.30	RO1 On Delay	0	320	s	0	2111	
P5.31	RO1 Off Delay	0	320	s	0	2112	
P5.32	RO2 On Delay	0	320	s	0	2113	
P5.33	RO2 Off Delay	0	320	s	0	2114	
P5.34	RO3 On Delay	0	320	s	0	2115	
P5.35	RO3 Off Delay	0	320	s	0	2116	
P5.36	RO3 Reverse				0	2117	0 = No 1 = Yes
P5.37 ②	Motor Current 1 Supv				0	2189	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.38 ②	Motor Current 1 Supv Value	0	DCI_uwDrive NomCurrCT*2	A	DCI_uwDrive NomCurrCT	2190	

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.

Table 86. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.39 ②	Motor Current 2 Supv				0	2191	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.40 ②	Motor Current 2 Supv Value	0	DCI_uwDrive NomCurrCT*2	A	DCI_uwDrive NomCurrCT	2192	
P5.41 ②	Second AI Supv Select				0	2193	0 = AI1 1 = AI2
P5.42 ②	Second AI Limit Supv				0	2194	See P5.11
P5.43 ②	Second AI Limit Supv Val	0	100	%	0	2195	
P5.44 ②	Motor Current 1 Supv Hyst	0.1	1	A	0.1	2196	
P5.45 ②	Motor Current 2 Supv Hyst	0.1	1	A	0.1	2197	
P5.46 ②	AI Supv Hyst	1	10	%	1	2198	
P5.47 ②	Second AI Supv Hyst	1	10	%	1	2199	
P5.48 ②	Freq Limit 1 Supv Hyst	0.1	1	Hz	0.1	2200	
P5.49 ②	Freq Limit 2 Supv Hyst	0.1	1	Hz	0.1	2201	
P5.50 ②	Torque Limit Supv Hyst	1	5	%	1	2202	
P5.51 ②	Ref Limit Supv Hyst	0.1	1	Hz	0.1	2203	
P5.52 ②	Temp Limit Supv Hyst	1	10	?	1	2204	
P5.53 ②	Power Limit Supv Hyst	0.1	10	%	0.1	2205	

Table 87. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See P1.11
P7.2 ①②	Remote 2 Reference				7	139	See P1.13
P7.3 ②	Keypad Reference	Par. P1.1	Par. P1.2	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	Par. P1.1	Par. P1.2	Hz	0.00	117	
P7.9 ②	Start Mode				0	252	0 = Ramp 1 = Flying Start
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	Par. P7.16	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	Par. P7.15	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	Par. P7.18	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	Par. P7.17	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	Par. P7.20	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	Par. P7.19	400.00	Hz	0.00	261	
P7.21 ②	Prohibit Accel/Decel Ramp	0.1	10.0		1.0	264	

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.

Table 87. Drive Control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.22 ②	Power Loss Function				0	267	0 = Disabled 1 = Enabled
P7.23 ②	Power Loss Time	0.3	5.0	s	2.0	268	
P7.24	Currency				\$	2121	0 = \$ 1 = GBP 2 = Eur 3 = JPY 4 = Rs 5 = R\$ 6 = Fr 7 = Kr
P7.25	Energy Cost				0	2122	
P7.26	Data Type				0	2123	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P7.27	Energy Savings Reset				0	2124	0 = No Action 1 = Reset

Table 88. 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	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	107	
P8.3 ①②	V/Hz Optimization				0	109	0 = Disabled 1 = Enabled
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	60.00	289	
P8.6 ①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7 ①②	V/Hz Mid Frequency	0.00	Par. P8.5	Hz	V/Hz Curve Midpoint Freq	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	Min Switching Freq	Max Switching Freq	kHz	Default Switching Freq CT	288	
P8.11 ②	Sine Filter Enable				0	1665	0 = Disabled 1 = Enabled
P8.12 ①②	Overvoltage Control				1	294	0 = Disabled 1 = Enabled
P8.17 ②	Frequency Ramp Out FilterTime Constant	0	3000	ms	0	1585	
P8.39 ②	Start Boost Rise Time	–1	32000	s	0	1622	

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.

Table 89. 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	Par. P1.2	Hz	0.00	331	
P9.3 ①②	External Fault				2	307	See P9.11
P9.4 ①②	Input Phase Fault				2	332	See P9.11
P9.5 ①②	Uvoltage Fault Response				2	330	See P9.11
P9.6 ①②	Output Phase Fault				2	308	See P9.11
P9.7 ①②	Ground Fault				2	309	See P9.11
P9.8 ①②	Motor Thermal Protection				2	310	See P9.11
P9.9 ②	Motor Thermal FO Current	0.0	150.0	%	40.0	311	
P9.10 ②	Motor Thermal Time	1	200	min	12	312	
P9.11 ①②	Stall Protection				0	313	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P9.12 ②	Stall Current Limit	0.1	Active Motor Nom I*2	A	Active Motor Nom I*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	Par. P1.2	Hz	25.00	316	
P9.15 ①②	Underload Protection				0	317	See P9.11
P9.16 ②	Underload Fnom Torque	10.0	150.0	%	50.0	318	
P9.17 ②	Underload FO 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 P9.11
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	See P9.11
P9.22 ①②	OPTCard Fault Response				2	335	See P9.11
P9.23 ①②	Unit Under Temp Prot				2	1564	See P9.11
P9.24 ②	Wait Time	0.10	10.00	s	0.50	321	
P9.25 ②	Trail Time	0.00	60.00	s	30.00	322	
P9.26 ②	Start Function				0	323	0 = Flying Start
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	
P9.32 ②	External Fault Attempts	0	10		0	328	
P9.33 ②	Underload Attempts	0	10		1	336	
P9.34 ①②	RTC Fault				1	955	See P9.11
P9.35 ①②	PT100 Fault Response				2	337	See P9.11

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.

Table 89. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.36 ①②	Replace Battery Fault Response				1	1256	See P9.11
P9.37 ①②	Replace Fan Fault Response				1	1257	See P9.11
P9.38 ①②	IP Address Conflicition Resp				1	1678	See P9.11
P9.39	Cold Weather Mode				0	2126	0 = No 1 = Yes
P9.40	Cold Weather Voltage Level	0	20	%	2	2127	
P9.41	Cold Weather Time Out	0	10	min	3	2128	
P9.44 ②	Ground Fault Limit	0	30	%	15	2158	
P9.45 ①②	Keypad Comm Fault Response				2	2157	See P9.11
P9.46 ②	Preheat Mode				0	2159	0 = Disabled 1 = Enabled
P9.47 ②	Preheat Temp Source				0	2160	0 = Drive Temperature 1 = PT100 Temperature
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 Voltage	0.0	20.0	%	2.0	2163	

Table 90. 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	

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.

Table 90. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 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
P10.5 ^②	PID1 Process Unit Min	–99999.99	99999.99	Varies	0.00	1298	
P10.6 ^②	PID1 Process Unit Max	–99999.99	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	0 = Not Inverted 1 = Inverted
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	Par. P10.5	Par. P10.6	Varies	0.00	1307	
P10.12 ^②	PID1 Keypad Set Point 2	Par. P10.5	Par. P10.6	Varies	0.00	1309	
P10.13 ^②	PID1 Ramp Time	0.00	300.00	s	0.00	1311	

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.

Table 90. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 Data Input 1 8 = FB Data Input 2 9 = FB Data Input 3 10 = FB Data Input 4 11 = FB Data Input 5 12 = FB Data Input 6 13 = FB Data Input 7 14 = FB Data Input 8
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	0 = Disabled 1 = Enabled
P10.18 ②	PID1 Set Point 1 Sleep Freq	0.00	400.00	Hz	0.00	1316	
P10.19 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.20 ②	PID1 Set Point 1 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1318	
P10.21 ②	PID1 Set Point 1 Boost	–2.0	2.0		1.0	1320	
P10.22 ①②	PID1 Set Point 2 Source				2	1321	See P10.14
P10.23 ②	PID1 Set Point 2 Min	–200.00	200.00	%	0.00	1322	
P10.24 ②	PID1 Set Point 2 Max	–200.00	200.00	%	100.00	1323	
P10.25 ①②	PID1 Set Point 2 Sleep Enable				0	1324	0 = Disabled 1 = Enabled
P10.26 ②	PID1 Set Point 2 Sleep Freq	0.00	400.00	Hz	0.00	1325	
P10.27 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.28 ②	PID1 Set Point 2 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1327	
P10.29 ②	PID1 Set Point 2 Boost	–2.0	2.0		1.0	1329	
P10.30 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)
P10.31 ②	PID1 Feedback Gain	–1000.0	1000.0	%	100.0	1331	

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.

Table 90. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.32 ^{①②}	PID1 Feedback 1 Source				1	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8 13 = PT100 Temperature
P10.33 ^②	PID1 Feedback 1 Min	–200.00	200.00	%	0.00	1333	
P10.34 ^②	PID1 Feedback 1 Max	–200.00	200.00	%	100.00	1334	
P10.35 ^{①②}	PID1 Feedback 2 Source				0	1335	See P10.32
P10.36 ^②	PID1 Feedback 2 Min	–200.00	200.00	%	0.00	1336	
P10.37 ^②	PID1 Feedback 2 Max	–200.00	200.00	%	100.00	1337	
P10.38 ^{①②}	PID1 Feedforward Func				0	1338	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)
P10.39 ^②	PID1 Feedforward Gain	–1000.0	1000.0	%	100.0	1339	
P10.40 ^{①②}	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8
P10.41 ^②	PID1 Feedforward 1 Min	–200.00	200.00	%	0.00	1341	
P10.42 ^②	PID1 Feedforward 1 Max	–200.00	200.00	%	100.00	1342	
P10.43 ^{①②}	PID1 Feedforward 2 Source				0	1343	See P10.40
P10.44 ^②	PID1 Feedforward 2 Min	–200.00	200.00	%	0.00	1344	
P10.45 ^②	PID1 Feedforward 2 Max	–200.00	200.00	%	100.00	1345	
P10.46 ^②	PID1 Set Point 1 Comp Enable				0	1352	0 = Disabled 1 = Enabled
P10.47 ^②	PID1 Set Point 1 Comp Max	–200.00	200.00	%	0.00	1353	
P10.48 ^②	PID1 Set Point 2 Comp Enable				0	1354	0 = Disabled 1 = Enabled
P10.49 ^②	PID1 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1355	

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.

Table 91. 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 P10.4
P11.5 ②	PID2 Process Unit Min	–99999.99	99999.99	Varies	0.00	1360	
P11.6 ②	PID2 Process Unit Max	–99999.99	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	0 = Not Inverted 1 = Inverted
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	Par. P11.5	Par. P11.6	Varies	0.00	1369	
P11.12 ②	PID2 Keypad Set Point 2	Par. P11.5	Par. P11.6	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	See P10.14
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	0 = Disabled 1 = Enabled
P11.18 ②	PID2 Set Point 1 Sleep Freq	0.00	400.00	Hz	0.00	1378	
P11.19 ②	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379	
P11.20 ②	PID2 Set Point 1 WakeUp Level	Par. P11.5	Par. P11.6	Varies	0.00	1380	
P11.21 ②	PID2 Set Point 1 Boost	–2.0	2.0		1.0	1382	
P11.22 ①②	PID2 Set Point 2 Source				2	1383	See P10.14
P11.23 ②	PID2 Set Point 2 Min	–200.00	200.00	%	0.00	1384	
P11.24 ②	PID2 Set Point 2 Max	–200.00	200.00	%	100.00	1385	
P11.25 ①②	PID2 Set Point 2 Sleep Enable				0	1386	0 = Disabled 1 = Enabled
P11.26 ②	PID2 Set Point 2 Sleep Freq	0.00	400.00	Hz	0.00	1387	
P11.27 ②	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388	
P11.28 ②	PID2 Set Point 2 WakeUp Level	Par. P11.5	Par. P11.6	Varies	0.00	1389	
P11.29 ②	PID2 Set Point 2 Boost	–2.0	2.0		1.0	1391	
P11.30 ①②	PID2 Feedback Func				0	1392	See P10.30
P11.31 ②	PID2 Feedback Gain	–1000.0	1000.0	%	100.0	1393	
P11.32 ①②	PID2 Feedback 1 Source				1	1394	See P10.32
P11.33 ②	PID2 Feedback 1 Min	–200.00	200.00	%	0.00	1395	
P11.34 ②	PID2 Feedback 1 Max	–200.00	200.00	%	100.00	1396	
P11.35 ①②	PID2 Feedback 2 Source				0	1397	See P10.32
P11.36 ②	PID2 Feedback 2 Min	–200.00	200.00	%	0.00	1398	
P11.37 ②	PID2 Feedback 2 Max	–200.00	200.00	%	100.00	1399	
P11.38 ①②	PID2 Feedforward Func				0	1400	See P10.38
P11.39 ②	PID2 Feedforward Gain	–1000.0	1000.0	%	100.0	1401	
P11.40 ①②	PID2 Feedforward 1 Source				0	1402	See P10.40

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.

Table 91. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.41 ②	PID2 Feedforward 1 Min	–200.00	200.00	%	0.00	1403	
P11.42 ②	PID2 Feedforward 1 Max	–200.00	200.00	%	100.00	1404	
P11.43 ①②	PID2 Feedforward 2 Source				0	1405	See P10.40
P11.44 ②	PID2 Feedforward 2 Min	–200.00	200.00	%	0.00	1406	
P11.45 ②	PID2 Feedforward 2 Max	–200.00	200.00	%	100.00	1407	
P11.46 ②	PID2 Set Point1 Comp Enable				0	1414	0 = Disabled 1 = Enabled
P11.47 ②	PID2 Set Point1 Comp Max	–200.00	200.00	%	0.00	1415	
P11.48 ②	PID2 Set Point 2 Comp Enable				0	1416	0 = Disabled 1 = Enabled
P11.49 ②	PID2 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1417	

Table 92. Preset Speed—P12

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1 ②	Preset Speed 1	0.00	Par. P1.2	Hz	5.00	105	
P12.2 ②	Preset Speed 2	0.00	Par. P1.2	Hz	10.00	106	
P12.3 ②	Preset Speed 3	0.00	Par. P1.2	Hz	15.00	118	
P12.4 ②	Preset Speed 4	0.00	Par. P1.2	Hz	20.00	119	
P12.5 ②	Preset Speed 5	0.00	Par. P1.2	Hz	25.00	120	
P12.6 ②	Preset Speed 6	0.00	Par. P1.2	Hz	30.00	121	
P12.7 ②	Preset Speed 7	0.00	Par. P1.2	Hz	35.00	122	

Table 93. Brake—P14

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P14.1 ①②	DC-Brake Current	Drive Nom CT*15/100	Drive Nom CT*15/10	A	Drive Nom CT*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				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	Active Motor Nom I*1/10	Par. P8.2	A	Active Motor Nom I*1/2	265	

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.

Table 94. 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 Reference 2 = Fieldbus Reference 3 = AI1 4 = AI2 5 = AI1+AI2 6 = PID1 Control
P15.3 ②	Fire Mode Min Frequency	Par. P1.1	Par. P1.2	Hz	15.00	537	
P15.4 ②	Fire Mode Freq Ref 1	0.0	100.0	%	75.0	565	
P15.5 ②	Fire Mode Freq Ref 2	0.0	100.0	%	100.0	564	
P15.6 ①②	Smoke Purge Frequency	0.0	100.0	%	50.0	554	

Table 95. Second Motor Parameter—P16

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P16.1 ①	Motor Nom Current 2	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	577	
P16.2 ①	Motor Nom Speed 2	300	20000	rpm	2nd Motor Nom Speed	578	
P16.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P16.4 ①	Motor Nom Volt 2	180	690	V	2nd Motor Nom Volt	580	
P16.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	2nd Motor Nom Freq	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	0.001	65.535	mh	0.128	1421	
P16.9 ①	Mutual Inductance 2	0.01	655.35	mh	3.44	1422	
P16.10 ①	Excitation Current 2	0.1	Drive Nom Curr CT*2	A	0.1	1423	

Table 96. Bypass—P17

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1 ①②	Bypass Enable				0	1418	0 = Disabled 1 = Enabled
P17.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.3 ①②	Auto Bypass				0	542	0 = Disabled 1 = Enabled
P17.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.5 ①②	Overcurrent Bypass Enable				0	547	0 = Disabled 1 = Enabled
P17.6 ①②	IGBT Fault Bypass Enable				0	546	0 = Disabled 1 = Enabled
P17.7 ①②	4 mA Fault Bypass Enable				0	548	0 = Disabled 1 = Enabled
P17.8 ①②	Undervoltage Bypass Enable				0	545	0 = Disabled 1 = Enabled
P17.9 ①②	Overvoltage Bypass Enable				0	549	0 = Disabled 1 = Enabled

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.

Table 97. Multi-Pump Operation Mode—P18.1.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.1.1	Drive 1				0	2218	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.2	Drive 2				0	2230	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.3	Drive 3				0	2242	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.4	Drive 4				0	2254	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.5	Drive 5				0	2266	0 = Offline 1 = Slave Drive 2 = Master Drive

Table 98. Multi-Pump Status—P18.1.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.2.1	Drive 1				5	2219	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.2	Drive 2				5	2231	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.3	Drive 3				5	2243	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.4	Drive 4				5	2255	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.5	Drive 5				5	2267	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown

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.

Table 99. Multi-Pump Network Status—P18.1.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.3.1	Drive 1				0	2220	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.2	Drive 2				0	2232	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.3	Drive 3				0	2244	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.4	Drive 4				0	2256	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.5	Drive 5				0	2268	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error

Table 100. Multi-Pump Latest Fault Code—P18.2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.1.1	Drive 1				0	2221	
P18.2.1.2	Drive 2				0	2233	
P18.2.1.3	Drive 3				0	2245	
P18.2.1.4	Drive 4				0	2257	
P18.2.1.5	Drive 5				0	2269	

Table 101. Multi-Pump Output Frequency—P18.2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.2.1	Drive 1			Hz	0	2222	
P18.2.2.2	Drive 2			Hz	0	2234	
P18.2.2.3	Drive 3			Hz	0	2246	
P18.2.2.4	Drive 4			Hz	0	2258	
P18.2.2.5	Drive 5			Hz	0	2270	

Table 102. Multi-Pump Motor Voltage—P18.2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.3.1	Drive 1			V	0	2223	
P18.2.3.2	Drive 2			V	0	2235	
P18.2.3.3	Drive 3			V	0	2247	
P18.2.3.4	Drive 4			V	0	2259	
P18.2.3.5	Drive 5			V	0	2271	

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.

Table 103. Multi-Pump Motor Current—P18.2.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.4.1	Drive 1			A	0	2224	
P18.2.4.2	Drive 2			A	0	2236	
P18.2.4.3	Drive 3			A	0	2248	
P18.2.4.4	Drive 4			A	0	2260	
P18.2.4.5	Drive 5			A	0	2272	

Table 104. Multi-Pump Motor Torque—P18.2.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.5.1	Drive 1			%	0	2225	
P18.2.5.2	Drive 2			%	0	2237	
P18.2.5.3	Drive 3			%	0	2249	
P18.2.5.4	Drive 4			%	0	2261	
P18.2.5.5	Drive 5			%	0	2273	

Table 105. Multi-Pump Motor Power—P18.2.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.6.1	Drive 1			%	0	2226	
P18.2.6.2	Drive 2			%	0	2238	
P18.2.6.3	Drive 3			%	0	2250	
P18.2.6.4	Drive 4			%	0	2262	
P18.2.6.5	Drive 5			%	0	2274	

Table 106. Multi-Pump Motor Speed—P18.2.7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.7.1	Drive 1			rpm	0	2227	
P18.2.7.2	Drive 2			rpm	0	2239	
P18.2.7.3	Drive 3			rpm	0	2251	
P18.2.7.4	Drive 4			rpm	0	2263	
P18.2.7.5	Drive 5			rpm	0	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.

Table 107. Multi-Pump Motor Run Time—P18.2.8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.8.1	Drive 1			h	0	2228	
P18.2.8.2	Drive 2			h	0	2240	
P18.2.8.3	Drive 3			h	0	2252	
P18.2.8.4	Drive 4			h	0	2264	
P18.2.8.5	Drive 5			h	0	2276	

Table 108. Multi-Pump Settings—P18.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.1 ①②	Multi-pump Mode				0	2279	0 = Disabled 1 = Single Drive Control 2 = Multi Drive Network
P18.3.2 ①②	Drive ID	0	5		0	2278	
P18.3.3 ①②	Number of Motors	1	5		1	342	
P18.3.4 ①②	Regulation Source				0	2284	0 = Network 1 = Feedback
P18.3.5 ①②	Recovery Method				0	2285	0 = Automatic 1 = Stop
P18.3.6 ①②	Callback Source				0	2286	0 = No Action 1 = Safety Torque Off
P18.3.7 ②	Add/Remove Drive Selection				0	2311	0 = Drive ID 1 = Run Time
P18.3.8 ②	PID Bandwidth	0	100	Varies	10	343	
P18.3.9 ①②	Staging Frequency	Par. P1.1	400		Par. P1.2	2315	
P18.3.10 ①②	De-Staging Frequency	0	Par. P1.2		Par. P1.1	2316	
P18.3.11 ②	Add/Remove Delay	0	3600	s	10	344	
P18.3.12 ②	Interlock Enable				0	350	0 = Disabled 1 = Enabled
P18.3.13 ②	Include Freq Converter				1	346	0 = Disabled 1 = Enabled
P18.3.14 ②	Auto-Change Enable				0	345	0 = Disabled 1 = Enabled
P18.3.15 ②	Auto-Change Interval	0	3000	h	48	347	
P18.3.16 ②	Auto-Change Freq Limit	Par. P1.1	Par. P1.2	Hz	25	349	
P18.3.17 ②	Auto-Change Motor Limit	0	5		1	348	
P18.3.18 ②	Run Time Enable				0	2280	0 = Disabled 1 = Enabled
P18.3.19 ②	Run Time Limit	0	300000	h	0	2281	
P18.3.20 ②	Run Time Reset				0	2283	0 = No Action 1 = Reset
P18.3.21 ①②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.3.22 ①②	Damper Time Out	1	32500	s	5	484	
P18.3.23 ①②	Damper Delay	1	32500	s	5	485	

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.

Table 109. 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 P19.3
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 P19.3
P19.9 ②	Interval 2 To Day				0	521	See P19.3
P19.10 ②	Interval 2 Channel				0	522	See P19.5
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 P19.3
P19.14 ②	Interval 3 To Day				0	524	See P19.3
P19.15 ②	Interval 3 Channel				0	525	See P19.5
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 P19.3
P19.19 ②	Interval 4 To Day				0	527	See P19.3
P19.20 ②	Interval 4 Channel				0	528	See P19.5
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 P19.3
P19.24 ②	Interval 5 To Day				0	530	See P19.3
P19.25 ②	Interval 5 Channel				0	531	See P19.5
P19.26 ②	Timer 1 Duration	0	72000	s	0	511	
P19.27 ②	Timer 1 Channel				0	532	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.28 ②	Timer 2 Duration	0	72000	s	0	513	
P19.29 ②	Timer 2 Channel				0	533	See P19.27
P19.30 ②	Timer 3 Duration	0	72000	s	0	515	
P19.31 ②	Timer 3 Channel				0	534	See P19.27

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.

Table 110. FB Data Output Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1 ②	FB Data Output 1 Sel				1	1556	
P20.1.2 ②	FB Data Output 2 Sel				2	1557	
P20.1.3 ②	FB Data Output 3 Sel				3	1558	
P20.1.4 ②	FB Data Output 4 Sel				4	1559	
P20.1.5 ②	FB Data Output 5 Sel				5	1560	
P20.1.6 ②	FB Data Output 6 Sel				6	1561	
P20.1.7 ②	FB Data Output 7 Sel				7	1562	
P20.1.8 ②	FB Data Output 8 Sel				28	1563	

Table 111. Modbus RTU—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP 2 = SmartWire-DT
P20.2.2	Slave Address	1	247		1	587	
P20.2.3	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.2.4	Parity Type				2	585	0 = None 1 = Odd 2 = Even
P20.2.5	Modbus RTU Protocol Status				0	588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.2.6	Slave Busy				0	589	0 = Not Busy 1 = Busy
P20.2.7	Parity Error				0	590	
P20.2.8	Slave Fault				0	591	
P20.2.9	Last Fault Response				0	592	
P20.2.10	Comm Timeout Modbus RTU			ms	10000	593	

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.

Table 112. BACnet MS/TP—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.11	BACnet Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P20.2.12	BACnet MS/TP Device Address	0	127		1	595	
P20.2.13	BACnet Instance Number	0	4194302		0	596	
P20.2.14	BACnet Comm Timeout			ms	6000	598	
P20.2.15	BACnet Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.2.16	BACnet Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud Rate Fault

Table 113. EtherNet/IP / Modbus TCP—P20.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.1	IP Address Mode				1	1500	0 = Static IP 1 = DHCP with AutoIP
P20.3.2	Active IP Address					1507	
P20.3.3	Active Subnet Mask					1509	
P20.3.4	Active Default Gateway					1511	
P20.3.5	MAC Address					1513	
P20.3.6	Static IP Address				192.168.1.254	1501	
P20.3.7	Static Subnet Mask				255.255.255.0	1503	
P20.3.8	Static Default Gateway				192.168.1.1	1505	
P20.3.9	EtherNet/IP Protocol Status				0	608	0 = Stopped 1 = Operational 2 = Faulted
P20.3.10	Connection Limit				5	609	
P20.3.11	Modbus TCP Unit ID				1	610	
P20.3.12	Comm Timeout Modbus TCP			ms	10000	611	
P20.3.13	Modbus TCP Protocol Status				0	612	0 = Stopped 1 = Operational 2 = Faulted
P20.3.14	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.3.15	Modbus TCP Parity Error				0	614	

Table 114. SmartWire DT—P20.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.4.1	Protocol Status				0	2139	
P20.4.2	Baud Rate				0	2141	0 = 125 kBaud 1 = 250 kBaud

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.

Table 115. Basic Setting—P21.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.1	Language				0	340	0 = English 1 = Depends upon Language Pack 2 = Depends upon Language Pack
P21.1.2 ^①	Application				0	142	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
P21.1.3	Parameter Sets				0	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				0	620	0 = No 1 = Yes
P21.1.5	Down From Keypad				0	621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters
P21.1.6	Parameter Comparison				0	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 P21.1.8
P21.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu
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				2	632	0 = Continuous 1 = Temperature 2 = Run Follow 3 = Calculate Temp
P21.1.15	HMI ACK Timeout	200	5000	ms	200	633	
P21.1.16	HMI Retry Number	1	10		5	634	

Table 116. 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				App Firmware	644	

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.

Table 117. Application Info—P21.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.3.1	Brake Chopper Stat					646	0 = No 1 = Yes
P21.3.2	Brake Resistor					647	See P21.3.1
P21.3.3	Serial Number					648	

Table 118. 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				0	635	0 = Not Reset 1 = Reset
P21.4.8	Trip Power Day Count					636	
P21.4.9	Trip Power Hr Count					637	
P21.4.10	Clear Trip Power Count				0	639	See P21.4.7

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.

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 150** of this manual, “Description of Parameters.” The explanations are arranged according to the parameter number.

Control I/O Configuration

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

Table 119. Multi-Purpose Application Default I/O Configuration

Default																																	
AI1: 0 to 10 V		<table><tr><th>OFF</th><th>ON</th></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table>	OFF	ON	1		2		3		AI1: 0 to 20 mA		<table><tr><th>OFF</th><th>ON</th></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table>	OFF	ON	2		3		<table><tr><th>OFF</th><th>ON</th></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table>	OFF	ON	2		3		<table><tr><th>OFF</th><th>ON</th></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table>	OFF	ON	2		3	
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AI2			AI2: 0 to 20 mA		AI2: 0 to 10 V		AI2: -10 V to +10 V																										

External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10 V	Ref. Output Voltage	—	10 Vdc Supply Source
	2	AI1+	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+	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	Emergency Stop (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.

Table 120. 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 150**, “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 121. Monitor—M

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1	Output Frequency			Hz	0.00	1	
M2	Freq Reference			Hz	0.00	24	
M3	Motor Speed			rpm	0	2	
M4	Motor Current			A	0.0	3	
M5	Motor Torque			%	0.0	4	
M6	Motor Power			%	0.0	5	
M7	Motor Voltage			V	0.0	6	
M8	DC-link Voltage			V	0	7	
M9	Unit Temperature			°C	0.0	8	
M10	Motor Temperature			%	0.0	9	
M11	Torque Reference			%	0.0	15	
M12	Analog Input 1			Varies	0.00	10	
M13	Analog Input 2			Varies	0.00	11	
M14	Analog Output 1			Varies	0.00	25	
M15	Analog Output 2			Varies	0.00	575	
M16	DI1, DI2, DI3				0	12	
M17	DI4, DI5, DI6				0	13	
M18	DI7, DI8				0	576	
M19	DO1				0	14	
M20	RO1, RO2, RO3				0	557	
M21	TC1, TC2, TC3				0	558	
M22	Interval 1				0	559	0 = Inactive 1 = Active
M23	Interval 2				0	560	See M22
M24	Interval 3				0	561	See M22
M25	Interval 4				0	562	See M22
M26	Interval 5				0	563	See M22
M27	Timer 1			s	0	569	
M28	Timer 2			s	0	571	
M29	Timer 3			s	0	573	
M30	PID1 Set Point			Varies	0.00	16	
M31	PID1 Feedback			Varies	0.00	18	
M32	PID1 Error Value			Varies	0.00	20	
M33	PID1 Output			%	0.00	22	

Table 121. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M34	PID1 Status				0	23	0 = Stopped 1 = Running 2 = Sleep Mode
M35	PID2 Set Point			Varies	0.00	32	
M36	PID2 Feedback			Varies	0.00	34	
M37	PID2 Error Value			Varies	0.00	36	
M38	PID2 Output			%	0.00	38	
M39	PID2 Status				0	39	See M34
M40	Running Motors				0	26	
M41	PT100 Temperature			°C	1000.0	27	
M42	Last Active Fault				0	28	See Fault Codes on Page 223 in Appendix B
M43	RTC Battery Status					583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = Over Voltage
M44	Instance Motor Power			kW	0.000	1686	
M45	Energy Savings			Varies		2120	
M46	Multi-Monitoring				0, 1, 2	30	

Table 122. Operate Mode—O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz	0.00	1	
O2	Freq Reference			Hz	0.00	24	
O3	Motor Speed			rpm	0	2	
O4	Motor Current			A	0.0	3	
O5	Motor Torque			%	0.0	4	
O6	Motor Power			%	0.0	5	
O7	Motor Voltage			V	0.0	6	
O8	DC-link Voltage			V	0	7	
O9	Unit Temperature			°C	0.0	8	
O10	Motor Temperature			%	0.0	9	
R11	Keypad Torque Ref	–300.0	300.0	%	0.0	782	
R12 ②	Keypad Reference	Par. P1.1	Par. P1.2	Hz	0.00	141	
R13 ②	PID1 Keypad Set Point 1	Par. P10.5	Par. P10.6	Varies	0	1307	
R14 ②	PID1 Keypad Set Point 2	Par. P10.5	Par. P10.6	Varies	0	1309	

Table 123. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2 ②	Max Frequency	Par. P1.1	400.00	Hz	60.00	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	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	486	
P1.6 ①	Motor Nom Speed	300	20000	rpm	Motor Nom Speed	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	Motor Nom Volt	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	Motor Nom Freq	488	
P1.10 ②	Power Up Local Remote Select				0	1685	0 = Hold Last 1 = Local Control 2 = Remote Control
P1.11 ②	Remote1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal 2 3 = Keypad
P1.12	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal 2 3 = Fieldbus

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.

Table 123. Basic Parameters—P1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.13 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 = Min (AI1, AI2) 16 = MAX(AI1,AI2) 17 = PID Control Output
P1.14 ①②	Remote1 Reference				1	137	See P1.13
P1.15 ①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled

Table 124. Analog Input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10 V
P2.2 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
P2.3 ②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.4 ②	AI1 Custom Max	Par. P2.3	100.00	%	100.00	177	
P2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.6 ②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.10 ②	AI1 Joystick Offset	–50.00	50.00	%	0.00	133	
P2.11	AI2 Mode				0	223	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V
P2.12 ②	AI2 Signal Range				1	183	0 = 0–100% / 0–20 mA / 0 to 10 V / –10 to 10 V 1 = 20–100% / 4–20 mA / 2 to 10 V / –6 to 10 V 2 = Customized
P2.13 ②	AI2 Custom Min	0.00	Par. P2.14	%	0.00	184	
P2.14 ②	AI2 Custom Max	Par. P2.13	100.00	%	100.00	185	
P2.15 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.16 ②	AI2 Signal Invert				0	189	See P2.6
P2.17 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.18 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	

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.

Table 124. Analog Input—P2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.19 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
P2.20 ②	AI2 Joystick Offset	–50.00	50.00	%	0.00	134	
P2.21 ②	AI Ref Scale Min Value	0.00	Par. P2.22	Hz	0.00	144	
P2.22 ②	AI Ref Scale Max Value	Par. P2.21	400.00	Hz	0.00	145	

Table 125. Digital Input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	Start/Stop Logic				0	143	0 = Forward–Reverse 1 = Start–Reverse 2 = Start–Enable 3 = Start Pulse–Stop Pulse
P3.2 ②	Start Signal 1				2	190	0 = DigIN: ForceOpen 1 = DigIN: ForceClose 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
P3.3 ②	Start Signal 2				3	191	See P3.2
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②	Reverse				0	198	See P3.2
P3.6 ②	Ext. Fault 1 NO				4	192	See P3.2
P3.7 ②	Ext. Fault 1 NC				1	193	See P3.2
P3.8 ②	Fault Reset				5	200	See P3.2
P3.9 ②	Run Enable				1	194	See P3.2
P3.10 ②	Preset Speed B0				6	205	See P3.2
P3.11 ②	Preset Speed B1				7	206	See P3.2
P3.12 ②	Preset Speed B2				0	207	See P3.2

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.

Table 125. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.13 ②	PID1 Control Enable				1	550	See P3.2
P3.14 ②	PID2 Control Enable				1	553	See P3.2
P3.15 ②	Accel/Decel Time Set				0	195	See P3.2
P3.16 ②	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②	No Access To Param				0	215	See P3.2
P3.18 ②	Accel Pot Value				0	203	See P3.2
P3.19 ②	Decel Pot Value				0	204	See P3.2
P3.20 ②	Reset Pot Zero				0	216	See P3.2
P3.21 ②	Remote Control				9	196	See P3.2
P3.22 ②	Local Control				0	197	See P3.2
P3.23 ②	Remote1/2 Select				0	209	See P3.2
P3.24 ②	Second Motor Para Select				0	217	See P3.2
P3.25 ②	Bypass Start				0	218	See P3.2
P3.26 ②	DC Brake Enable				0	202	See P3.2
P3.27 ②	Smoke Mode				0	219	See P3.2
P3.28 ②	Fire Mode				0	220	See P3.2
P3.29 ②	Fire Mode Ref Select				0	221	See P3.2
P3.30 ②	PID1 Set Point Select				0	351	See P3.2
P3.31 ②	PID2 Set Point Select				0	352	See P3.2
P3.32 ②	Jog Enable				0	199	See P3.2
P3.33 ②	Start Timer 1				0	224	See P3.2
P3.34 ②	Start Timer 2				0	225	See P3.2
P3.35 ②	Start Timer 3				0	226	See P3.2
P3.36 ②	AI Ref Source Select				0	208	See P3.2
P3.37 ②	Motor Interlock 1				0	210	See P3.2
P3.38 ②	Motor Interlock 2				0	211	See P3.2
P3.39 ②	Motor Interlock 3				0	212	See P3.2
P3.40 ②	Motor Interlock 4				0	213	See P3.2
P3.41 ②	Motor Interlock 5				0	214	See P3.2
P3.42 ②	Emergency Stop				1	747	See P3.2
P3.43 ②	Bypass Overload				0	1246	See P3.2
P3.44	Fire Mode Reverse				0	2118	See P3.2
P3.45 ①②	2nd Start Stop Logic				0	2206	See P3.1
P3.46 ②	2nd Start Signal 1				2	2207	See P3.2
P3.47 ②	2nd Start Signal 2				3	2208	See P3.2
P3.48 ②	Ext. Fault 2 NO				0	2293	See P3.2
P3.49 ②	Ext. Fault 2 NC				1	2294	See P3.2
P3.50 ②	Ext. Fault 3 NO				0	2295	See P3.2
P3.51 ②	Ext. Fault 3 NC				1	2296	See P3.2

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.

Table 125. 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
P3.53 ②	Ext. Fault 2 Text				1	2298	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
P3.54 ②	Ext. Fault 3 Text				2	2299	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
P3.55 ②	Parameter Set1/2 Sel				0	2312	See P3.2

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.

Table 126. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	A01 Mode				0	227	0 = 0–20 mA 1 = 0–10 V
P4.2 ②	A01 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 to +2N) 22 = Motor Torque (–2 to +2N) 23 = Motor Power (–2 to +2N) 24 = PT100 Temperature 25 = FB Data Input 1 26 = FB Data Input 2 27 = FB Data Input 3 28 = FB Data Input 4 29 = FB Data Input 5 30 = FB Data Input 6 31 = FB Data Input 7 32 = FB Data Input 8
P4.3 ②	A01 Minimum				1	149	0 = 0 V / 0 mA 1 = 2 V / 4 mA
P4.4 ②	A01 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	A01 Scale	10	1000	%	100	150	
P4.6 ②	A01 Inversion				0	148	0 = Not inverted 1 = Inverted
P4.7 ②	A01 Offset	–100.00	100.00	%	0.00	173	
P4.8 ②	A02 Mode				0	228	See P4.1
P4.9 ②	A02 Function				1	229	See P4.2
P4.10 ②	A02 Minimum				1	232	See P4.3
P4.11 ②	A02 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	A02 Scale	10	1000	%	100	233	
P4.13 ②	A02 Inversion				0	231	See P4.6
P4.14 ②	A02 Offset	–100.00	100.00	%	0.00	234	

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.

Table 127. 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 = 4 mA 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 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
P5.2 ②	RO1 Function				2	152	See P5.1
P5.3 ②	RO2 Function				3	153	See P5.1
P5.4 ②	RO3 Function				7	538	See P5.1

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.

Table 127. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.5 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-on Control
P5.6 ②	Freq Limit 1 Supv Val	0.00	Par. P1.2	Hz	0.00	155	
P5.7 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
P5.8 ②	Freq Limit 2 Supv Val	0.00	Par. P1.2	Hz	0.00	158	
P5.9 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-off Control
P5.10 ②	Torque Limit Supv Val	–1000.0	1000.0	%	100.0	160	
P5.11 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Ref Limit Supv Val	0.00	Par. P1.2	Hz	0.00	162	
P5.13 ②	Ext Brake Off Delay	0.0	100.0	s	0.5	163	
P5.14 ②	Ext Brake On Delay	0.0	100.0	s	1.5	164	
P5.15 ②	Temp Limit Supv				0	165	See P5.11
P5.16 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.17 ②	Power Limit Supv				0	167	See P5.11
P5.18 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.19 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.20 ②	AI Limit Supv				0	171	See P5.11
P5.21 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.22 ②	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P5.23 ②	PID1 Superv Upper Limit	Par. P10.5	Par. P10.6	Varies	0.00	1347	
P5.24 ②	PID1 Superv Lower Limit	Par. P10.5	Par. P10.6	Varies	0.00	1349	
P5.25 ②	PID1 Superv Delay	0	3000	s	0	1351	
P5.26 ②	PID2 Superv Enable				0	1408	0 = Disabled 1 = Enabled
P5.27 ②	PID2 Superv Upper Limit	Par. P11.5	Par. P11.6	Varies	0.00	1409	
P5.28 ②	PID2 Superv Lower Limit	Par. P11.5	Par. P11.6	Varies	0.00	1411	
P5.29 ②	PID2 Superv Delay	0	3000	s	0	1413	
P5.30	RO1 On Delay	0	320	s	0	2111	
P5.31	RO1 Off Delay	0	320	s	0	2112	
P5.32	RO2 On Delay	0	320	s	0	2113	
P5.33	RO2 Off Delay	0	320	s	0	2114	
P5.34	RO3 On Delay	0	320	s	0	2115	
P5.35	RO3 Off Delay	0	320	s	0	2116	
P5.36	RO3 Reverse				0	2117	0 = No 1 = Yes

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.

Table 127. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.37 ②	Motor Current 1 Supv				0	2189	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.38 ②	Motor Current 1 Supv Value	0	DCI_uwDrive NomCurrCT*2	A	DCI_uwDrive NomCurrCT	2190	
P5.39 ②	Motor Current 2 Supv				0	2191	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.40 ②	Motor Current 2 Supv Value	0	DCI_uwDrive NomCurrCT*2	A	DCI_uwDrive NomCurrCT	2192	
P5.41 ②	Second AI Supv Select				0	2193	0 = AI1 1 = AI2
P5.42 ②	Second AI Limit Supv				0	2194	See P5.11
P5.43 ②	Second AI Limit Supv Val	0	100	%	0	2195	
P5.44 ②	Motor Current 1 Supv Hyst	0.1	1	A	0.1	2196	
P5.45 ②	Motor Current 2 Supv Hyst	0.1	1	A	0.1	2197	
P5.46 ②	AI Supv Hyst	1	10	%	1	2198	
P5.47 ②	Second AI Supv Hyst	1	10	%	1	2199	
P5.48 ②	Freq Limit 1 Supv Hyst	0.1	1	Hz	0.1	2200	
P5.49 ②	Freq Limit 2 Supv Hyst	0.1	1	Hz	0.1	2201	
P5.50 ②	Torque Limit Supv Hyst	1	5	%	1	2202	
P5.51 ②	Ref Limit Supv Hyst	0.1	1	Hz	0.1	2203	
P5.52 ②	Temp Limit Supv Hyst	1	10	?	1	2204	
P5.53 ②	Power Limit Supv Hyst	0.1	10	%	0.1	2205	

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.

Table 128. 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 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 = 4 mA 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

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.

Table 128. Logic Function—P6, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.3 ②	Logic Operation Input B				0	753	0 = Not Used 1 = Ready 2 = Run 3 = Fault 6 = Reversed 7 = Warning 8 = Zero Frequency 9 = Control from I/O 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 = 4 mA 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

Table 129. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	0 = I/O Terminal 1 = Fieldbus
P7.2 ①②	Remote 2 Reference				7	139	See P1.13
P7.3 ②	Keypad Reference	Par. P1.1	Par. P1.2	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	Par. P1.1	Par. P1.2	Hz	0.00	117	

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.

Table 129. Drive Control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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
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	Par. P7.16	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	Par. P7.15	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	Par. P7.18	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	Par. P7.17	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	Par. P7.20	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	Par. P7.19	400.00	Hz	0.00	261	
P7.21 ②	Prohibit Accel/Decel Ramp	0.1	10.0		1.0	264	
P7.22 ②	Power Loss Function				0	267	0 = Disabled 1 = Enabled
P7.23 ②	Power Loss Time	0.3	5.0	s	2.0	268	
P7.24 ②	Currency				\$	2121	0 = \$ 1 = GBP 2 = Eur 3 = JPY 4 = Rs 5 = R\$ 6 = Fr 7 = Kr
P7.25 ②	Energy Cost				0	2122	
P7.26 ②	Data Type				0	2123	0 = Cumulative 1 = Daily Avg 2 = Weekly 3 = Monthly Avg 4 = Yearly Avg
P7.27	Energy Savings Reset				0	2124	0 = No Action 1 = Reset

Table 130. 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	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom VT	107	
P8.3 ①②	V/Hz Optimization				0	109	0 = Disabled 1 = Enabled

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.

Table 130. Motor Control—P8, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	60.00	289	
P8.6 ①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7 ①②	V/Hz Mid Frequency	0.00	Par. P8.5	Hz	V/Hz Curve Midpoint Freq	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	Min Switching Freq	Max Switching Freq	kHz	Default Switching Freq CT	288	
P8.11 ②	Sine Filter Enable				0	1665	0 = Disabled 1 = Enabled
P8.12 ①②	Overvoltage Control				1	294	0 = Disabled 1 = Enabled
P8.13 ②	Load Drooping	0.00	100.00	%	0.00	298	
P8.14 ②	Identification				0	299	0 = No Action 1 = Identification Only Stator Resistor 2 = Identification with Run 3 = Identification No Run
P8.15 ①②	Neg Frequency Limit	–400.00	Par. P8.16	Hz	–400.00	1574	
P8.16 ①②	Pos Frequency Limit	Par. P8.15	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 ②	Speed Control Kp	0.0	1000.0	%	100.0	1593	
P8.21 ②	Speed Control Ti	0.0	3200.0	ms	20.0	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	Par. P8.25	Hz	0.00	1597	
P8.25 ②	Speed Control F1	Par. P8.24	Par. P8.5	Hz	0.00	1598	
P8.26 ②	Speed Control Kp Below T0	0.0	1000.0	%	0.0	1599	
P8.27 ②	Speed Control T0	0.0	100.0	%	0.0	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	
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	

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.

Table 130. Motor Control—P8, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 Magnetization	0.0	100.0	%	100.0	1621	
P8.39 ②	Start Boost Rise Time	–1	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 = TorqueReference 3 = StartupTorqueFWD/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	0.001	65.535	mh	0.128	773	
P8.53 ①	Mutual Inductance	0.01	655.35	mh	3.44	774	
P8.54 ①	Excitation Current	0.1	Drive Nom CT*2	A	0.1	775	

Table 131. 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	Par. P1.2	Hz	0.00	331	
P9.3 ①②	External Fault				2	307	See P9.11
P9.4 ①②	Input Phase Fault				2	332	See P9.11
P9.5 ①②	Uvoltage Fault Response				2	330	See P9.11
P9.6 ①②	Output Phase Fault				2	308	See P9.11
P9.7 ①②	Ground Fault				2	309	See P9.11
P9.8 ①②	Motor Thermal Protection				2	310	See P9.11
P9.9 ②	Motor Thermal F0 Current	0.0	150.0	%	40.0	311	
P9.10 ②	Motor Thermal Time	1	200	min	12	312	
P9.11 ①②	Stall Protection				0	313	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast

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.

Table 131. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.12 ②	Stall Current Limit	0.1	Active Motor Nom I*2	A	Active Motor Nom I*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	Par. P1.2	Hz	25.00	316	
P9.15 ①②	Underload Protection				0	317	See P9.11
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 P9.11
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	See P9.11
P9.22 ①②	OPTCard Fault Response				2	335	See P9.11
P9.23 ①②	Unit Under Temp Prot				2	1564	See P9.11
P9.24 ②	Wait Time	0.10	10.00	s	0.50	321	
P9.25 ②	Trail Time	0.00	60.00	s	30.00	322	
P9.26 ②	Start Function				0	323	0 = Flying Start
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	
P9.32 ②	External Fault Attempts	0	10		0	328	
P9.33 ②	Underload Attempts	0	10		1	336	
P9.34 ①②	RTC Fault				1	955	See P9.11
P9.35 ①②	PT100 Fault Response				2	337	See P9.11
P9.36 ①②	Replace Battery Fault Response				1	1256	See P9.11
P9.37 ①②	Replace Fan Fault Response				1	1257	See P9.11
P9.38 ①②	IP Address Confliction Resp				1	1678	See P9.11
P9.39	Cold Weather Mode				0	2126	0 = No 1 = Yes
P9.40	Cold Weather Voltage Level	0	20	%	2	2127	
P9.41	Cold Weather Time Out	0	10	min	3	2128	
P9.44 ②	Ground Fault Limit	0	30	%	15	2158	
P9.45 ①②	Keypad Comm Fault Response				2	2157	See P9.11
P9.46 ②	Preheat Mode				0	2159	0 = Disabled 1 = Enabled
P9.47 ②	Preheat Temp Source				0	2160	0 = Drive Temperature 1 = PT100 Temperature
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 Voltage	0.0	20.0	%	2.0	2163	

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.

Table 132. 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 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
P10.5 ②	PID1 Process Unit Min	–99999.99	99999.99	Varies	0.00	1298	
P10.6 ②	PID1 Process Unit Max	–99999.99	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	0 = Not Inverted 1 = Inverted
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	Par. P10.5	Par. P10.6	Varies	0.00	1307	
P10.12 ②	PID1 Keypad Set Point 2	Par. P10.5	Par. P10.6	Varies	0.00	1309	
P10.13 ②	PID1 Ramp Time	0.00	300.00	s	0.00	1311	

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.

Table 132. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 Data Input 1 8 = FB Data Input 2 9 = FB Data Input 3 10 = FB Data Input 4 11 = FB Data Input 5 12 = FB Data Input 6 13 = FB Data Input 7 14 = FB Data Input 8
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	0 = Disabled 1 = Enabled
P10.18 ②	PID1 Set Point 1 Sleep Freq	0.00	400.00	Hz	0.00	1316	
P10.19 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.20 ②	PID1 Set Point 1 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1318	
P10.21 ②	PID1 Set Point 1 Boost	–2.0	2.0		1.0	1320	
P10.22 ①②	PID1 Set Point 2 Source				2	1321	See P10.14
P10.23 ②	PID1 Set Point 2 Min	–200.00	200.00	%	0.00	1322	
P10.24 ②	PID1 Set Point 2 Max	–200.00	200.00	%	100.00	1323	
P10.25 ①②	PID1 Set Point 2 Sleep Enable				0	1324	0 = Disabled 1 = Enabled
P10.26 ②	PID1 Set Point 2 Sleep Freq	0.00	400.00	Hz	0.00	1325	
P10.27 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.28 ②	PID1 Set Point 2 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1327	
P10.29 ②	PID1 Set Point 2 Boost	–2.0	2.0		1.0	1329	
P10.30 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)
P10.31 ②	PID1 Feedback Gain	–1000.0	1000.0	%	100.0	1331	

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.

Table 132. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.32 ①②	PID1 Feedback 1 Source				1	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8 13 = PT100 Temperature
P10.33 ②	PID1 Feedback 1 Min	–200.00	200.00	%	0.00	1333	
P10.34 ②	PID1 Feedback 1 Max	–200.00	200.00	%	100.00	1334	
P10.35 ①②	PID1 Feedback 2 Source				0	1335	See P10.32
P10.36 ②	PID1 Feedback 2 Min	–200.00	200.00	%	0.00	1336	
P10.37 ②	PID1 Feedback 2 Max	–200.00	200.00	%	100.00	1337	
P10.38 ①②	PID1 Feedforward Func				0	1338	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)
P10.39 ②	PID1 Feedforward Gain	–1000.0	1000.0	%	100.0	1339	
P10.40 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8
P10.41 ②	PID1 Feedforward 1 Min	–200.00	200.00	%	0.00	1341	
P10.42 ②	PID1 Feedforward 1 Max	–200.00	200.00	%	100.00	1342	
P10.43 ①②	PID1 Feedforward 2 Source				0	1343	See P10.40
P10.44 ②	PID1 Feedforward 2 Min	–200.00	200.00	%	0.00	1344	
P10.45 ②	PID1 Feedforward 2 Max	–200.00	200.00	%	100.00	1345	
P10.46 ②	PID1 Set Point 1 Comp Enable				0	1352	0 = Disabled 1 = Enabled
P10.47 ②	PID1 Set Point 1 Comp Max	–200.00	200.00	%	0.00	1353	
P10.48 ②	PID1 Set Point 2 Comp Enable				0	1354	0 = Disabled 1 = Enabled
P10.49 ②	PID1 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1355	

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.

Table 133. 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 P10.4
P11.5 ②	PID2 Process Unit Min	–99999.99	99999.99	Varies	0.00	1360	
P11.6 ②	PID2 Process Unit Max	–99999.99	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	0 = Not Inverted 1 = Inverted
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	Par. P11.5	Par. P11.6	Varies	0.00	1369	
P11.12 ②	PID2 Keypad Set Point 2	Par. P11.5	Par. P11.6	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	See P10.14
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	0 = Disabled 1 = Enabled
P11.18 ②	PID2 Set Point 1 Sleep Freq	0.00	400.00	Hz	0.00	1378	
P11.19 ②	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379	
P11.20 ②	PID2 Set Point 1 WakeUp Level	Par. P11.5	Par. P11.6	Varies	0.00	1380	
P11.21 ②	PID2 Set Point 1 Boost	–2.0	2.0		1.0	1382	
P11.22 ①②	PID2 Set Point 2 Source				2	1383	See P10.14
P11.23 ②	PID2 Set Point 2 Min	–200.00	200.00	%	0.00	1384	
P11.24 ②	PID2 Set Point 2 Max	–200.00	200.00	%	100.00	1385	
P11.25 ①②	PID2 Set Point 2 Sleep Enable				0	1386	0 = Disabled 1 = Enabled
P11.26 ②	PID2 Set Point 2 Sleep Freq	0.00	400.00	Hz	0.00	1387	
P11.27 ②	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388	
P11.28 ②	PID2 Set Point 2 WakeUp Level	Par. P11.5	Par. P11.6	Varies	0.00	1389	
P11.29 ②	PID2 Set Point 2 Boost	–2.0	2.0		1.0	1391	
P11.30 ①②	PID2 Feedback Func				0	1392	See P10.30
P11.31 ②	PID2 Feedback Gain	–1000.0	1000.0	%	100.0	1393	
P11.32 ①②	PID2 Feedback 1 Source				1	1394	See P10.32
P11.33 ②	PID2 Feedback 1 Min	–200.00	200.00	%	0.00	1395	
P11.34 ②	PID2 Feedback 1 Max	–200.00	200.00	%	100.00	1396	
P11.35 ①②	PID2 Feedback 2 Source				0	1397	See P10.32
P11.36 ②	PID2 Feedback 2 Min	–200.00	200.00	%	0.00	1398	
P11.37 ②	PID2 Feedback 2 Max	–200.00	200.00	%	100.00	1399	
P11.38 ①②	PID2 Feedforward Func				0	1400	See P10.38
P11.39 ②	PID2 Feedforward Gain	–1000.0	1000.0	%	100.0	1401	
P11.40 ①②	PID2 Feedforward 1 Source				0	1402	See P10.40

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.

Table 133. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.41 ②	PID2 Feedforward 1 Min	–200.00	200.00	%	0.00	1403	
P11.42 ②	PID2 Feedforward 1 Max	–200.00	200.00	%	100.00	1404	
P11.43 ①②	PID2 Feedforward 2 Source				0	1405	See P10.40
P11.44 ②	PID2 Feedforward 2 Min	–200.00	200.00	%	0.00	1406	
P11.45 ②	PID2 Feedforward 2 Max	–200.00	200.00	%	100.00	1407	
P11.46 ②	PID2 Set Point1 Comp Enable				0	1414	0 = Disabled 1 = Enabled
P11.47 ②	PID2 Set Point1 Comp Max	–200.00	200.00	%	0.00	1415	
P11.48 ②	PID2 Set Point 2 Comp Enable				0	1416	0 = Disabled 1 = Enabled
P11.49 ②	PID2 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1417	

Table 134. Preset Speed—P12

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1 ②	Preset Speed 1	0.00	Par. P1.2	Hz	5.00	105	
P12.2 ②	Preset Speed 2	0.00	Par. P1.2	Hz	10.00	106	
P12.3 ②	Preset Speed 3	0.00	Par. P1.2	Hz	15.00	118	
P12.4 ②	Preset Speed 4	0.00	Par. P1.2	Hz	20.00	119	
P12.5 ②	Preset Speed 5	0.00	Par. P1.2	Hz	25.00	120	
P12.6 ②	Preset Speed 6	0.00	Par. P1.2	Hz	30.00	121	
P12.7 ②	Preset Speed 7	0.00	Par. P1.2	Hz	35.00	122	

Table 135. 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 Data Input 1
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	
P13.6	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

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.

Table 135. Torque Control—P13, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	Par. P13.7	Hz	0.00	1638	
P13.10 ②	WindowNeg Off Limit	0.00	Par. P13.8	Hz	0.00	1639	
P13.11 ②	Torque Reference Filter TC	0	32000	ms	0	1640	
P13.12	Pull Out Torque	0	1000.0	%	250.0	1606	
P13.13	Startup Torque Time	0	10000	ms	50	1667	
P13.14	Stop State Magnetization Time	0	32000	S	0	1684	

Table 136. Brake—P14

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P14.1 ①②	DC-Brake Current	Drive Nom CT*15/100	Drive Nom CT*15/10	A	Drive Nom CT*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				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	Active Motor Nom I*1/10	Par. P8.2	A	Active Motor Nom I*1/2	265	

Table 137. 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 Reference 2 = Fieldbus Reference 3 = AI1 4 = AI2 5 = AI1+AI2 6 = PID1 Control
P15.3 ②	Fire Mode Min Frequency	Par. P1.1	Par. P1.2	Hz	15.00	537	
P15.4 ②	Fire Mode Freq Ref 1	0.0	100.0	%	75.0	565	
P15.5 ②	Fire Mode Freq Ref 2	0.0	100.0	%	100.0	564	
P15.6 ①②	Smoke Purge Frequency	0.0	100.0	%	50.0	554	

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.

Table 138. Second Motor Parameter—P16

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P16.1 ①	Motor Nom Current 2	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	577	
P16.2 ①	Motor Nom Speed 2	300	20000	rpm	2nd Motor Nom Speed	578	
P16.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P16.4 ①	Motor Nom Volt 2	180	690	V	2nd Motor Nom Volt	580	
P16.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	2nd Motor Nom Freq	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	0.001	65.535	mh	0.128	1421	
P16.9 ①	Mutual Inductance 2	0.01	655.35	mh	3.44	1422	
P16.10 ①	Excitation Current 2	0.1	Drive Nom CT*2	A	0.1	1423	

Table 139. Bypass—P17

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1 ①②	Bypass Enable				0	1418	0 = Disabled 1 = Enabled
P17.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.3 ①②	Auto Bypass				0	542	0 = Disabled 1 = Enabled
P17.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.5 ①②	Overcurrent Bypass Enable				0	547	0 = Disabled 1 = Enabled
P17.6 ①②	IGBT Fault Bypass Enable				0	546	0 = Disabled 1 = Enabled
P17.7 ①②	4 mA Fault Bypass Enable				0	548	0 = Disabled 1 = Enabled
P17.8 ①②	Undervoltage Bypass Enable				0	545	0 = Disabled 1 = Enabled
P17.9 ①②	Overvoltage Bypass Enable				0	549	0 = Disabled 1 = Enabled

Table 140. Multi-Pump Operation Mode—P18.1.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.1.1	Drive 1				0	2218	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.2	Drive 2				0	2230	0 = Offline 1 = Slave Drive 2 = Master Drive

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.

Table 140. Multi-Pump Operation Mode—P18.1.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.1.3	Drive 3				0	2242	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.4	Drive 4				0	2254	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.1.1.5	Drive 5				0	2266	0 = Offline 1 = Slave Drive 2 = Master Drive

Table 141. Multi-Pump Status—P18.1.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.2.1	Drive 1				5	2219	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.2	Drive2				5	2231	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.3	Drive 3				5	2243	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.4	Drive 4				5	2255	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.1.2.5	Drive 5				5	2267	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown

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.

Table 142. Multi-Pump Network Status—P18.1.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.3.1	Drive 1				0	2220	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.2	Drive 2				0	2232	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.3	Drive 3				0	2244	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.4	Drive 4				0	2256	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.1.3.5	Drive 5				0	2268	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error

Table 143. Multi-Pump Latest Fault Code—P18.2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.1.1	Drive 1				0	2221	
P18.2.1.2	Drive 2				0	2233	
P18.2.1.3	Drive 3				0	2245	
P18.2.1.4	Drive 4				0	2257	
P18.2.1.5	Drive 5				0	2269	

Table 144. Multi-Pump Output Frequency—P18.2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.2.1	Drive 1			Hz	0	2222	
P18.2.2.2	Drive 2			Hz	0	2234	
P18.2.2.3	Drive 3			Hz	0	2246	
P18.2.2.4	Drive 4			Hz	0	2258	
P18.2.2.5	Drive 5			Hz	0	2270	

Table 145. Multi-Pump Motor Voltage—P18.2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.3.1	Drive 1			V	0	2223	
P18.2.3.2	Drive 2			V	0	2235	
P18.2.3.3	Drive 3			V	0	2247	
P18.2.3.4	Drive 4			V	0	2259	
P18.2.3.5	Drive 5			V	0	2271	

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.

Table 146. Multi-Pump Motor Current—P18.2.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.4.1	Drive 1			A	0	2224	
P18.2.4.2	Drive 2			A	0	2236	
P18.2.4.3	Drive 3			A	0	2248	
P18.2.4.4	Drive 4			A	0	2260	
P18.2.4.5	Drive 5			A	0	2272	

Table 147. Multi-Pump Motor Torque—P18.2.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.5.1	Drive 1			%	0	2225	
P18.2.5.2	Drive 2			%	0	2237	
P18.2.5.3	Drive 3			%	0	2249	
P18.2.5.4	Drive 4			%	0	2261	
P18.2.5.5	Drive 5			%	0	2273	

Table 148. Multi-Pump Motor Power—P18.2.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.6.1	Drive 1			%	0	2226	
P18.2.6.2	Drive 2			%	0	2238	
P18.2.6.3	Drive 3			%	0	2250	
P18.2.6.4	Drive 4			%	0	2262	
P18.2.6.5	Drive 5			%	0	2274	

Table 149. Multi-Pump Motor Speed—P18.2.7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.7.1	Drive 1			rpm	0	2227	
P18.2.7.2	Drive 2			rpm	0	2239	
P18.2.7.3	Drive 3			rpm	0	2251	
P18.2.7.4	Drive 4			rpm	0	2263	
P18.2.7.5	Drive 5			rpm	0	2275	

Table 150. Multi-Pump Motor Run Time—P18.2.8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.8.1	Drive 1			h	0	2228	
P18.2.8.2	Drive 2			h	0	2240	
P18.2.8.3	Drive 3			h	0	2252	
P18.2.8.4	Drive 4			h	0	2264	
P18.2.8.5	Drive 5			h	0	2276	

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.

Table 151. Multi-Pump Settings—P18.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.1 ①②	Multi-pump Mode				0	2279	0 = Disabled 1 = Single Drive Control 2 = Multi Drive Network
P18.3.2 ①②	Drive ID	0	5		0	2278	
P18.3.3 ①②	Number of Motors	1	5		1	342	
P18.3.4 ①②	Regulation Source				0	2284	0 = Network 1 = PID Controller 1
P18.3.5 ①②	Recovery Method				0	2285	0 = Automatic 1 = Stop
P18.3.6 ①②	Callback Source				0	2286	0 = No Action 1 = Safety Torque Off
P18.3.7 ②	Add/Remove Drive Selection				0	2311	0 = Drive ID 1 = Run Time
P18.3.8 ②	PID Bandwidth	0	100	Varies	10	343	
P18.3.9 ①②	Staging Frequency	Par. P1.1	400		Par. P1.2	2315	
P18.3.10 ①②	De-Staging Frequency	0	Par. P1.2		Par. P1.1	2316	
P18.3.11 ②	Add/Remove Delay	0	3600	s	10	344	
P18.3.12 ②	Interlock Enable				0	350	0 = Disabled 1 = Enabled
P18.3.13 ②	Include Freq Converter				1	346	0 = Disabled 1 = Enabled
P18.3.14 ②	Auto-Change Enable				0	345	0 = Disabled 1 = Enabled
P18.3.15 ②	Auto-Change Interval	0	3000	h	48	347	
P18.3.16 ②	Auto-Change Freq Limit	Par. P1.1	Par. P1.2	Hz	25	349	
P18.3.17 ②	Auto-Change Motor Limit	0	5		1	348	
P18.3.18 ②	Run Time Enable				0	2280	0 = Disabled 1 = Enabled
P18.3.19 ②	Run Time Limit	0	300000	h	0	2281	
P18.3.20 ②	Run Time Reset				0	2283	0 = No Action 1 = Reset
P18.3.21 ①②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.3.22 ①②	Damper Time Out	1	32500	s	5	484	
P18.3.23 ①②	Damper Delay	1	32500	s	5	485	

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.

Table 152. 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 P19.3
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 P19.3
P19.9 ②	Interval 2 To Day				0	521	See P19.3
P19.10 ②	Interval 2 Channel				0	522	See P19.5
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 P19.3
P19.14 ②	Interval 3 To Day				0	524	See P19.3
P19.15 ②	Interval 3 Channel				0	525	See P19.5
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 P19.3
P19.19 ②	Interval 4 To Day				0	527	See P19.3
P19.20 ②	Interval 4 Channel				0	528	See P19.5
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 P19.3
P19.24 ②	Interval 5 To Day				0	530	See P19.3
P19.25 ②	Interval 5 Channel				0	531	See P19.5
P19.26 ②	Timer 1 Duration	0	72000	s	0	511	
P19.27 ②	Timer 1 Channel				0	532	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.28 ②	Timer 2 Duration	0	72000	s	0	513	
P19.29 ②	Timer 2 Channel				0	533	See P19.27
P19.30 ②	Timer 3 Duration	0	72000	s	0	515	
P19.31 ②	Timer 3 Channel				0	534	See P19.27

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.

Table 153. FB Data Output Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1 ②	FB Data Output 1 Sel				1	1556	
P20.1.2 ②	FB Data Output 2 Sel				2	1557	
P20.1.3 ②	FB Data Output 3 Sel				3	1558	
P20.1.4 ②	FB Data Output 4 Sel				4	1559	
P20.1.5 ②	FB Data Output 5 Sel				5	1560	
P20.1.6 ②	FB Data Output 6 Sel				6	1561	
P20.1.7 ②	FB Data Output 7 Sel				7	1562	
P20.1.8 ②	FB Data Output 8 Sel				28	1563	

Table 154. Modbus RTU—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP 2 = SmartWire-DT
P20.2.2	Slave Address	1	247		1	587	
P20.2.3	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.2.4	Parity Type				2	585	0 = None 1 = Odd 2 = Even
P20.2.5	Modbus RTU Protocol Status				0	588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.2.6	Slave Busy				0	589	0 = Not Busy 1 = Busy
P20.2.7	Parity Error				0	590	
P20.2.8	Slave Fault				0	591	
P20.2.9	Last Fault Response				0	592	
P20.2.10	Comm Timeout Modbus RTU			ms	10000	593	

Table 155. Modbus MS/TCP—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.11	BACnet Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P20.2.12	BACnet MS/TP Device Address	0	127		1	595	
P20.2.13	BACnet Instance Number	0	4194302		0	596	

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.

Table 155. Modbus MS/TCP—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.14	BACnet Comm Timeout			ms	6000	598	
P20.2.15	BACnet Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.2.16	BACnet Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud Rate Fault

Table 156. EtherNet/IP / Modbus TCP—P20.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.1	IP Address Mode				1	1500	0 = Static IP 1 = DHCP with AutoIP
P20.3.2	Active IP Address					1507	
P20.3.3	Active Subnet Mask					1509	
P20.3.4	Active Default Gateway					1511	
P20.3.5	MAC Address					1513	
P20.3.6	Static IP Address				192.168.1.254	1501	
P20.3.7	Static Subnet Mask				255.255.255.0	1503	
P20.3.8	Static Default Gateway				192.168.1.1	1505	
P20.3.9	EtherNet/IP Protocol Status				0	608	0 = Stopped 1 = Operational 2 = Faulted
P20.3.10	Connection Limit				5	609	
P20.3.11	Modbus TCP Unit ID				1	610	
P20.3.12	Comm Timeout Modbus TCP			ms	10000	611	
P20.3.13	Modbus TCP Protocol Status				0	612	0 = Stopped 1 = Operational 2 = Faulted
P20.3.14	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.3.15	Modbus TCP Parity Error				0	614	

Table 157. SmartWire DT—P20.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.4.1	Protocol Status				0	2139	
P20.4.2	Baud Rate				0	2141	0 = 125 kBaud 1 = 250 kBaud

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.

Table 158. Basic Setting — P21.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.1	Language				0	340	0 = English 1 = Depends upon Language Pack 2 = Depends upon Language Pack
P21.1.2 ^①	Application				0	142	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
P21.1.3	Parameter Sets				0	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				0	620	0 = No 1 = Yes
P21.1.5	Down From Keypad				0	621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters
P21.1.6	Parameter Comparison				0	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 P21.1.8
P21.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu
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				2	632	0 = Continuous 1 = Temperature 2 = Run Follow 3 = Calculate Temp
P21.1.15	HMI ACK Timeout	200	5000	ms	200	633	
P21.1.16	HMI Retry Number	1	10		5	634	

Table 159. 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				App Firmware	644	

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.

Table 160. Application Info—P21.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.3.1	Brake Chopper Stat					646	0 = No 1 = Yes
P21.3.2	Brake Resistor					647	See P21.3.1
P21.3.3	Serial Number					648	

Table 161. 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				0	635	0 = Not Reset 1 = Reset
P21.4.8	Trip Power Day Count					636	
P21.4.9	Trip Power Hr Count					637	
P21.4.10	Clear Trip Power Count				0	639	See P21.4.7

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.

Appendix A—Description of Parameters

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

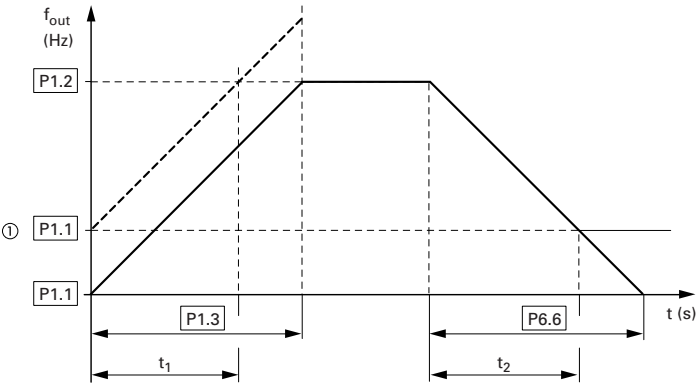
Some parameter names are followed by a number code indicating the applications in which the parameter is included. See the list of applications below. The parameter numbers under which the parameter appears in different applications are also given.

Application Level

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

Code	Modbus ID	Parameter	Application	RO/RW
P1.1	101	Min Frequency	1, 2, 3, 4	RW
P1.2	102	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.	1, 2, 3, 4	RW
P1.3	103	Accel Time 1 The time required for the output frequency to accelerate from zero frequency to Max frequency (P1.2). When accelerating from other frequency levels, the accel time will be a fraction of the total accel time.	1, 2, 3, 4	RW
P1.4	104	Decel Time 1 The time required for the output frequency to decelerate from Max frequency (P1.2) to zero frequency. When decelerating from other frequency levels, the decel time will be a fraction of the total decel time.	1, 2, 3, 4	RW

Figure 39. Acceleration and Deceleration Time



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

$$t_1 = \frac{(P1.2 - P1.1) \times P1.3}{P1.2}$$

$$t_2 = \frac{(P1.2 - P1.1) \times P1.4}{P1.2}$$

The defined acceleration (P1.3) and deceleration times (P1.4) 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 P1.4), parameter P7.10 must be 1.

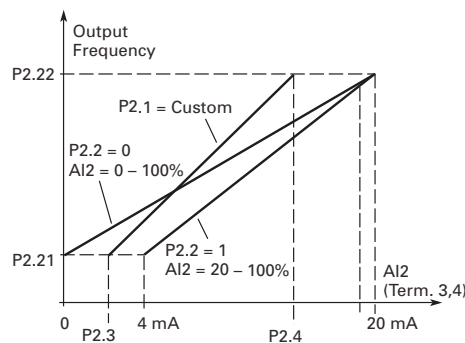
① When setting a minimum output frequency (P1.4 greater than 0 Hz), the acceleration and deceleration time of the drive is reduced to t_1 or t_2 .

Code	Modbus ID	Parameter	Application	RO/RW
P1.5	486	Motor Nom Current Motor nominal nameplate full load current. Find this value on the rating plate of the motor.	1, 2, 3, 4	RW
Figure 40. Motor Parameters from Ratings Plate				
P1.6	489	Motor Nom Speed Motor nominal nameplate base speed. Find this value on the rating plate of the motor.	1, 2, 3, 4	RW
P1.7	490	Motor PF Motor nominal nameplate full load power factor. Find this value on the rating plate of the motor.	1, 2, 3, 4	RW
P1.8	487	Motor Nom Voltage Motor nominal nameplate base voltage. Find this value on the rating plate of the motor.	1, 2, 3, 4	RW
P1.9	488	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
P1.10	1685	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. By selecting Local or Remote, it will power up in that mode no matter the position it was powered down in. 0 = Hold Last 1 = Local Control 2 = Remote Control	1, 2, 3, 4	RW
P1.11	135	Remote1 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 which mode is selected.	1, 2, 3, 4	RW
P1.12	1695	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 which mode is selected.	1, 2, 3, 4	RW

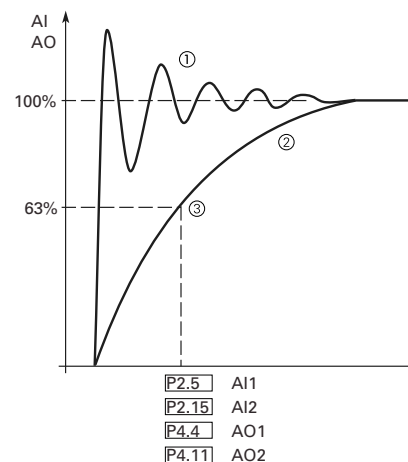
Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P1.13	136	Local Reference This parameter determines the reference for Local control location. This value can be fed from an analog input, keypad, or fieldbus reference signal.	1, 2, 3, 4	RW
		Application—Selection	Standard	Multi-Pump and Fan
				Multi-PID
				Multi-Purpose
0 = AI1—analog input on terminals 2–3			■	■
1 = AI2—analog input on terminals 4–5			■	■
2 = Slot A: AI1—analog input on expander board in slot A			■	■
3 = Slot B: AI1—analog input on expander board in slot B			■	■
4 = AI1 joystick—analog input on terminals 2–3, used for joystick control			■	■
5 = AI2 joystick—analog input on terminals 4–5, used for joystick control			■	■
6 = Keypad—keypad reference (P1.7.3)			■	■
7 = Fieldbus Ref—reference sent of communication bus			■	■
8 = Motor Pot—selects digital inputs for digital inputs to increase/decrease speed			—	—
9 = Max Frequency—maximum frequency value (P1.1.2)			■	■
10 = AI1+AI2—sums the analog input values			■	■
11 = AI1–AI2—subtracts the analog inputs AI1 from AI2			■	■
12 = AI2–AI1—subtracts the analog inputs AI2 from AI1			■	■
13 = AI1*AI2—multiplies analog inputs AI1 and AI2			■	■
14 = AI1 or AI2—selects analog inputs based off of digital input			■	■
15 = Min (AI1, AI2)—selects analog inputs that have the least value			■	■
16 = Max (AI1, AI2)—selects analog inputs that have the higher value			■	■
17 = PID1 Control—selects the PID calculation for output to maintain reference value			—	—
P1.14	137	Remote1 Ref This parameter determines the reference for Remote1 control mode. This value can be fed from an analog input, keypad, or fieldbus reference signal.	1, 2, 3, 4	RW
		Application—Selection	Standard	Multi-Pump and Fan
				Multi-PID
				Multi-Purpose
0 = AI1—analog input on terminals 2–3			■	■
1 = AI2—analog input on terminals 4–5			■	■
2 = Slot A: AI1—analog input on expander board in slot A			■	■
3 = Slot B: AI1—analog input on expander board in slot B			■	■
4 = AI1 joystick—analog input on terminals 2–3, used for joystick control			■	■
5 = AI2 joystick—analog input on terminals 4–5, used for joystick control			■	■
6 = Keypad—keypad reference (P1.7.3)			■	■
7 = Fieldbus Ref—reference sent of communication bus			■	■
8 = Motor Pot—selects digital inputs for digital inputs to increase/decrease speed			—	—
9 = Max Frequency—maximum frequency value (P1.1.2)			■	■
10 = AI1+AI2—sums the analog input values			■	■
11 = AI1–AI2—subtracts the analog inputs AI1 from AI2			■	■
12 = AI2–AI1—subtracts the analog inputs AI2 from AI1			■	■
13 = AI1*AI2—multiplies analog inputs AI1 and AI2			■	■
14 = AI1 or AI2—selects analog inputs based off of digital input			■	■
15 = Min (AI1, AI2)—selects analog inputs that have the least value			■	■
16 = Max (AI1, AI2)—selects analog inputs that have the higher value			■	■
17 = PID1 Control—selects the PID calculation for output to maintain reference value			—	—

Code	Modbus ID	Parameter	Application	RO/RW
P1.15	1679	Reverse Enable Enables or disables the reverse motor direction.	1, 2, 3, 4	RW
P2.1	222	AI1 Mode Sets the analog input mode for AI1 terminals 2 and 3 for current or voltage. The DIP switches on control board, left of the keypad, also need to be set. If using the 10 V 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.	1, 2, 3, 4	RW
P2.2	175	AI1 Signal Range 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 to enable a customized signal range.	1, 2, 3, 4	RW

Figure 41. Analog Input AI Scaling

P2.3	176	AI1 Custom Min	1, 2, 3, 4	RW
P2.4	177	AI1 Custom Max These parameters set the analog input signal for any input signal span within 0–100%. AI1 Custom Min ≤ AI1 Custom Max.	1, 2, 3, 4	RW
P2.5	174	AI1 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 42. AI1 Signal Filtering**Notes**

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

Code	Modbus ID	Parameter	Application	RO/RW
P2.6	181	AI1 Signal Invert Inverts the reference signal. Maximum reference becomes minimum frequency and minimum reference becomes maximum frequency. If this parameter = 0, no inversion of analog V_{in} signal takes place. If this parameter = 1, inversion of analog signal takes place.	1, 2, 3, 4	RW

Figure 43. AI1 No Signal Inversion

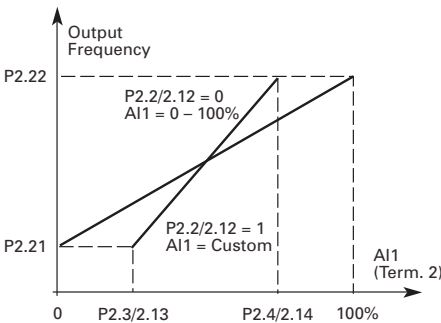
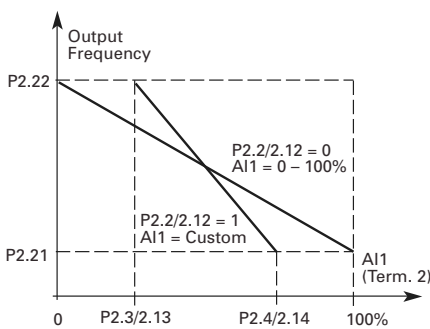


Figure 44. AI1 Signal Inversion



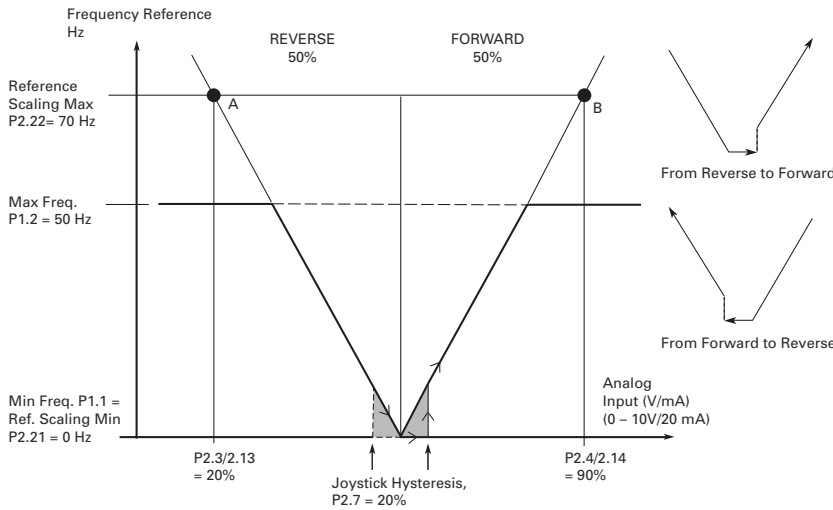
Maximum AI1 signal = minimum set speed.
Minimum AI1 signal = maximum set speed.

Code	Modbus ID	Parameter	Application	RO/RW
P2.7	178	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. See **Figure 45**.

Figure 45. Example of Joystick Hysteresis

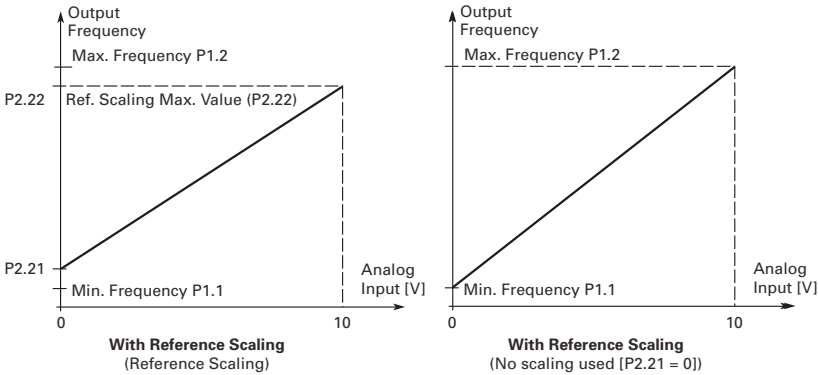


In this example, the value of P1.2.9 (Sleep limit) = 0.

Code	Modbus ID	Parameter	Application	RO/RW
P2.8	179	AI1 Sleep Limit The frequency converter keeps on output min frequency if the AI signal level falls below the Sleep limit defined within 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.	1, 2, 3, 4	RW
Figure 46. Example of Sleep Limit Function				
P2.9	180	AI1 Sleep Delay This parameter defines that 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.	1, 2, 3, 4	RW
P2.10	133	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
P2.11	223	AI2 Mode Sets the analog input mode for AI2 terminals 4 and 5 for current or voltage. The DIP switches on control board, left of the keypad, also need to be set. If using the 10 V supply on Terminal 1 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
P2.12	183	AI2 Signal Range	1, 2, 3, 4	RW
P2.13	184	AI2 Custom Min	1, 2, 3, 4	RW
P2.14	185	AI2 Custom Max	1, 2, 3, 4	RW
P2.15	182	AI2 Filter Time	1, 2, 3, 4	RW
P2.16	189	AI2 Signal Invert	1, 2, 3, 4	RW
P2.17	186	AI2 Joystick Hyst	1, 2, 3, 4	RW
P2.18	187	AI2 Sleep Limit	1, 2, 3, 4	RW
P2.19	188	AI2 Sleep Delay	1, 2, 3, 4	RW
P2.20	134	AI2 Joystick Offset See AI1 parameters.	1, 2, 3, 4	RW
P2.21	144	AI Ref Scale Min Value	1, 2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.22	145	AI Ref Scale Max 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

Figure 47. With and Without Reference Scaling

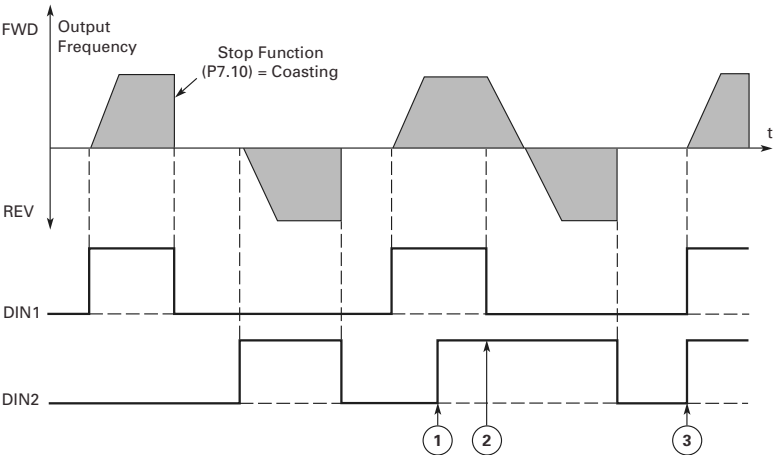


Code	Modbus ID	Parameter	Application	RO/RW
P3.1	143	Start/Stop Logic	1, 2, 3, 4	RW

For the DI function, we use Terminal programming method to function (TTF), where there is a fixed input or output to define a certain function for.

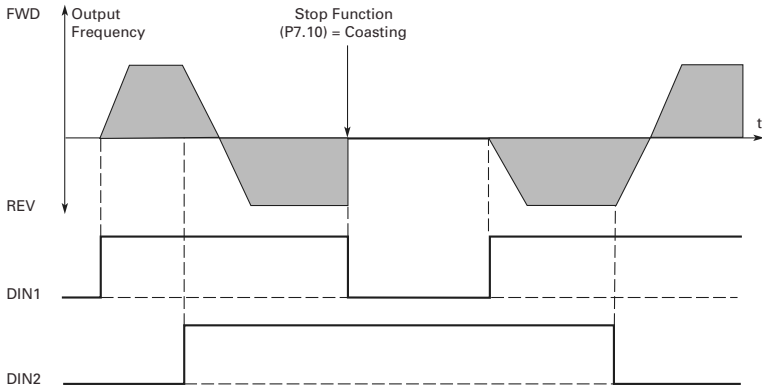
0 = P3.2: DI closed contact = start forward P3.3: DI closed contact = start reverse

Figure 48. Start Forward / Start Reverse



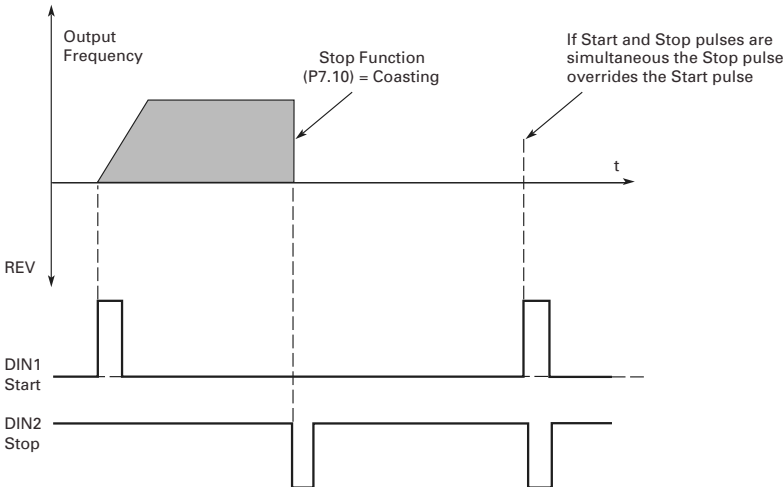
1 = P3.2: DI closed contact = start /open contact = stop P3.3: DI closed contact = reverse / open contact = forward

Figure 49. Start, Stop and Reverse



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.

Code	Modbus ID	Parameter	Application	RO/RW
P3.1	143	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 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 Figure 50. Start Pulse / Stop Pulse 	1, 2, 3, 4	RW
P3.2	190	Start Signal 1 Signal selection 1 for the start/stop logic listed in P3.1. 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.	1, 2, 3, 4	RW
P3.3	191	Start Signal 2 Signal selection 2 for the start/stop logic listed in P3.1. 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.	1, 2, 3, 4	RW
P3.4	881	Thermistor Input Sel This parameter defines DIN7 and DIN8 as 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
P3.5	198	Reverse Allows for switching the direction of the motor when using 3 wire start/stop logic. 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. Contact Open = Forward direction. Contact Close = Reverse direction.	1, 2, 3, 4	RW
P3.6	192	Ext. Fault 1 NO Allows for external input causing drive to fault. 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 of the fault can be changed in P3.52. Closed contact = external fault. Open contact = no external fault.	1, 2, 3, 4	RW

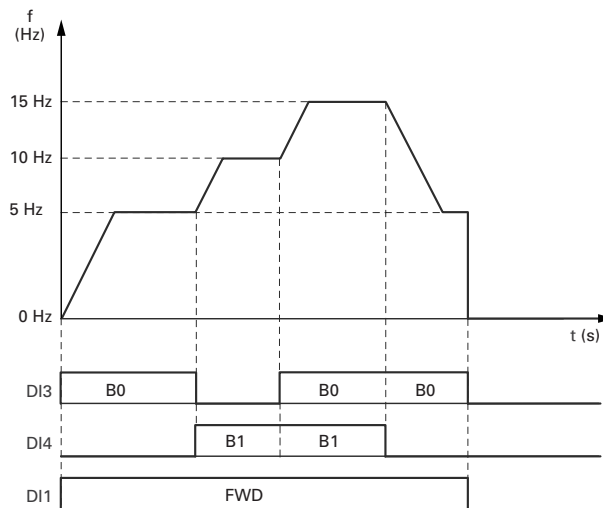
Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P3.7	193	Ext. Fault 1 NO Allows for external input causing drive to fault. 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 of the fault can be changed in P3.52. Closed contact = no external fault. Open contact = external fault.	1, 2, 3, 4	RW
P3.8	200	Fault Reset Allows for external fault reset input. 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. DI change from open contact to closed contact: reset fault.	1, 2, 3, 4	RW
P3.9	194	Run Enable Allows for safety start input that is required along with start command for frequency converter to turn on output. 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. Closed contact = Start of motor enabled. Open contact = Start of motor disabled.	1, 2, 3, 4	RW
P3.10	205	Preset Speed B0	1, 2, 3, 4	RW
P3.11	206	Preset Speed B1	1, 2, 3, 4	RW

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

Preset bit select inputs to select preset speed reference values. Validating three digital inputs will allow for seven preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. 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.

Figure 51. Activation of Fixed Frequencies



Fixed Frequency

Input (Binary)			Fixed Frequency
B0	B1	B2	(Factory setting)
X	—	—	Preset Speed 1, P12.1 = 5 Hz
—	X	—	Preset Speed 2, P12.2 = 10 Hz
X	X	—	Preset Speed 3, P12.3 = 15 Hz
—	—	X	Preset Speed 4, P12.4 = 20 Hz
X	—	X	Preset Speed 5, P12.5 = 25 Hz
—	X	X	Preset Speed 6, P12.6 = 30 Hz
X	X	X	Preset Speed 7, P12.7 = 35 Hz

P3.13	550	PID1 Control Enable	2, 3, 4	RW
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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. 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

Contact Close: Enables PID 1 control mode.

P3.14	553	PID2 Control Enable	3, 4	RW
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Allows for activating PID2 control mode. If the input is not enabled, when starting the drive with PID2 Controller set as the reference, the drive output will not start. 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

Contact Close: Enables PID 2 control mode.

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P3.15	195	Accel/Decel Time Set Selects between accel/decel time 1 and accel/decel time 2. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact = 2nd set of acc/dec time applied. Open contact = 1st set of acc/dec time applied.	1, 2, 3, 4	RW
P3.16	201	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. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X Closed contact: drive output frequency cannot rise or fall, it keeps on current output.	1, 2, 3, 4	RW
P3.17	215	No Access To Param Locks out the ability to change parameters when this input is enabled. This can be used with the password protection. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: all writable parameters cannot be edited.	1, 2, 3, 4	RW
P3.18	203	Accel Pot Value Motor Potentiometer is set for a reference. When this input is enabled, it increases the reference value until the contact opens. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: Potentiometer value keeps on rising.	4	RW
P3.19	204	Decel Pot Value Motor Potentiometer is set for a reference. When this input is enabled, it decreases the reference value until the contact opens. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: Potentiometer value keeps on falling.	4	RW
P3.20	216	Reset Pot Zero When using the Motor Potentiometer as the reference signal, it sets the reference value to zero when the contact closes. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: Potentiometer value reset to zero.	4	RW
P3.21	196	Remote Control Selection allows for external control panel to control frequency converters control place. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed Contact: force to remote control.	1, 2, 3, 4	RW
P3.22	197	Local Control Selection allows for external control panel to control frequency converters control place. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: force to local control.	1, 2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P3.23	209	Remote1/2 Select Selection allows for switching between Remote control 1 (P1.11 and P1.14) and Remote control 2 (P7.1 and P7.2). This switches the control and reference locations. 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. Closed contact: remote2 is selected as control source. Open contact: remote1 is selected as control source.	1, 2, 3, 4	RW
P3.24	217	Second Motor Para Select Selection allows for switching between motor parameter set 1 (P1 Group) and set 2 (P16 Group). 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. Closed contact: the 2nd motor parameters are applied.	2, 3, 4	RW
P3.25	218	Bypass Start 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. 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. Closed contact: switch to bypass. Open contact: switch to drive.	2, 3, 4	RW
P3.26	202	DC Brake Enable Selection enables DC brake on a closed contact. When enabled, this will cause the drive to inject DC voltage into the motor to assist in stopping. 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. Closed contact: DC brake function is enabled.	1, 2, 3, 4	RW
P3.27	219	Smoke Mode Selection enables the smoke purge preset speed to be enabled. 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. Closed contact: drive is in smoke purge mode.	2, 3, 4	RW
P3.28	220	Fire Mode Selection enables drive into fire mode where faults will be ignored and preset speeds are given for reference commands to the drive. These are selectable in P15 group. 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. Closed contact: drive is in fire mode. Ignores all the faults.	2, 3, 4	RW
P3.29	221	Fire Mode Ref Select Selection allows for switching between fire mode speed reference 1 and reference 2 which is set via P15.4 and P15.5. 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. Closed contact: drive output reference frequency selection 2.	2, 3, 4	RW

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P3.30	351	PID1 Set Point Sel	2, 3, 4	RW
P3.31	352	PID2 Set Point Sel 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 allow for multiple setpoints. Can be set to DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X Closed contact: setpoint2 is selected for PID1. Open contact: setpoint1 is selected for PID1.	3, 4	RW
P3.32	199	Jog Enable Selection enables the jog frequency reference and starts the drive to slowly advance the system. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: drive is under jog mode.	1, 2, 3, 4	RW
P3.33	224	Start Timer 1	2, 3, 4	RW
P3.34	225	Start Timer 2	2, 3, 4	RW
P3.35	226	Start Timer 3 Selection enables the timer functions to begin counting. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: Timer1,Timer2 or Timer3 will be started.	2, 3, 4	RW
P3.36	208	AI Ref Source Select Selection switches between AI1 and AI2 reference signals that are located on the control board. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: AI2 is selected for reference source. Open contact: AI1 is selected for reference source.	1, 2, 3, 4	RW
P3.37	210	Motor Interlock 1	2, 3, 4	RW
P3.38	211	Motor Interlock 2	2, 3, 4	RW
P3.39	212	Motor Interlock 3	2, 3, 4	RW
P3.40	213	Motor Interlock 4	2, 3, 4	RW
P3.41	214	Motor Interlock 5 Selects inputs that are allowed to verify aux motors are connected to allow them to run. If inputs are disabled, the drive will see this as a motor not connected and skip over the motor in the booster/auto-change sequence. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	2, 3, 4	RW
P3.42	747	Emergency Stop Function disables the frequency converter from running the motor. Different settings: DigilN:X indicates on board terminal inputs, DigilN:A:IOX:X indicates optional board inputs in A slot, DigilN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. 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

Code	Modbus ID	Parameter	Application	RO/RW
P3.43	1246	BypassOverLoad Function faults frequency converter when using an overload block input. The relay would be fed into this input to fault the drive. 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. Closed contact: motor is over load in bypass. Use TTF method to realize the above functions.	2, 3, 4	RW
P3.44	2118	Fire Mode Reverse Function allows motor to run in reverse when fire mode input is enabled. Different settings: 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.	2, 3, 4	RW
P3.45	2206	2nd Start Stop Logic This function allows for a additional location for a remote control wire station can be used to give a run command. 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.	1, 2, 3, 4	RW
P3.46	2207	2nd 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	1, 2, 3, 4	RW
P3.47	2208	2nd 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	1, 2, 3, 4	RW
P3.48	2293	Ext. Fault 2 NO Allows for external input causing drive to fault. 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. 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
P3.49	2294	Ext. Fault 2 NC Allows for external input causing drive to fault. 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. 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
P3.50	2295	Ext. Fault 3 NO Allows for external input causing drive to fault. 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. 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
P3.51	2296	Ext. Fault 3 NC Allows for external input causing drive to fault. 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. 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

Appendix A—Description of Parameters

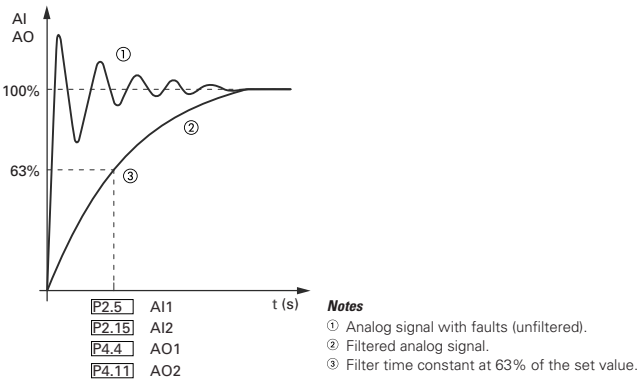
Code	Modbus ID	Parameter	Application	RO/RW
P3.52	2297	Ext, Fault 1 Text This parameter allows for the text to be changed when using external Fault 1 NO or NC. 0 = External Fault 1 = Vibration Cut Out 2 = High Motor Temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage	1, 2, 3, 4	RW
P3.53	2298	Ext, Fault 2 Text This parameter allows for the text to be changed when using external Fault 2 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	1, 2, 3, 4	RW
P3.54	2299	Ext, Fault 3 Text This parameter allows for the text to be changed when using external Fault 3 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	1, 2, 3, 4	RW
P3.55	2312	Parameter Set1/Set 2 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. 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

Code	Modbus ID	Parameter	Application	RO/RW
P4.1	227	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
P4.2	146	AO1 Function Selects the desired function for the AO1 terminal 22.	1, 2, 3, 4	RW
		Application—Function	Standard	Multi-Pump and Fan
				Multi-PID
				Multi-Purpose
0 = Not used—no function			■	■
1 = O/P Frequency—frequency output to motor (0–F _{max})			■	■
2 = Frequency Ref—reference frequency (F _{min} –F _{max})			■	■
3 = Motor Speed—motor speed (0–Motor Nominal Speed)			■	■
4 = Motor Current—output motor current (0–I _n motor)			■	■
5 = Motor Torque—motor torque (0–T _n motor)			■	■
6 = Motor Power—calculated motor power (0–P _n motor)			■	■
7 = Motor Voltage—output motor voltage (0–U _n motor)			■	■
8 = DC Bus Voltage—DC bus voltage level (0–1000 V)			■	■
9 = PID1 Setpoint—PID setpoint value (setpoint min–setpoint max)			—	—
10 = PID1 Feedback1—PID actual value 1 (feedback1 min–feedback1 max)			—	—
11 = PID1 Feedback2—PID actual 2 value (feedback2 min–feedback2 max)			—	■
12 = PID1 Control Error Value—PID error value			—	—
13 = PID1 Control O/P—PID controller output			—	■
14 = PID2 Setpoint—PID setpoint value (setpoint min–setpoint max)			—	■
15 = PID2 Feedback1—PID actual value 1 (feedback1 min–feedback1 max)			—	■
16 = PID2 Feedback2—PID actual 2 value (feedback2 min–feedback2 max)			—	■
17 = PID2 Control Error Value—PID error value			—	■
18 = PID2 Control O/P—PID controller output			—	■
19 = AI1—Analog input 1			■	■
20 = AI2—Analog input 2			■	■
21 = O/P Frequency—Output frequency (–2 to +2x nominal frequency)			■	■
22 = Motor Torque—Motor output torque (–2 to +2x T _n motor)			■	■
23 = Motor Power—Motor calculated power (–2 to +2x P _n motor)			■	■
24 = PT100 Temp—Thermistor input temperature			■	■
P4.3	149	AO1 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). See Figure 53 for details. 0 = Set minimum value to 0 V/0 mA 1 = Set minimum value to 2 V/4 mA	1, 2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P4.4	147	AO1 Filter Time	1, 2, 3, 4	RW

Defines the filtering time for the analog output signal. A higher number will add more filtering time on the output signal. Setting this parameter value to 0.00 will deactivate filtering.

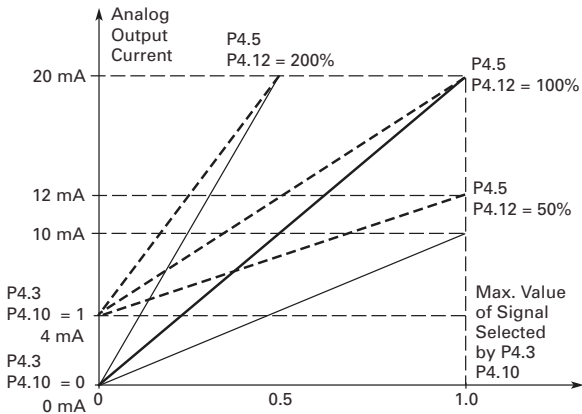
Figure 52. Analog Output Filtering



P4.5	150	AO1 Scale	1, 2, 3, 4	RW
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Scaling factor for analog output function from 10% to 1000%. Adjusting this value 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 53. Analog Output Scaling



Code	Modbus ID	Parameter	Application	RO/RW
P4.6	148	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.	1, 2, 3, 4	RW
Figure 54. Analog Output Invert 				
P4.7	375	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
P4.8	228	AO2 Mode Selects the analog output mode for AO2 current or voltage. There are internal relays to perform the switching of the signal between mA or V.	1, 2, 3, 4	RW
P4.9	229	AO2 Function Selects the desired function for the AO1 terminal 24.	1, 2, 3, 4	RW
P4.10	232	AO2 Minimum	1, 2, 3, 4	RW
P4.11	230	AO2 Filter Time	1, 2, 3, 4	RW
P4.12	233	AO2 Scale	1, 2, 3, 4	RW
P4.13	231	AO2 Inversion	1, 2, 3, 4	RW
P4.14	234	AO2 Offset See AO1 parameters.	1, 2, 3, 4	RW
P5.1	151	DO1 Function	1, 2, 3, 4	RW
P5.2	152	RO1 Function	1, 2, 3, 4	RW
P5.3	153	RO2 Function	1, 2, 3, 4	RW

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application				RO/RW
P5.4	538	RO3 Function	1, 2, 3, 4				RW
Application		Function	Standard	Multi-Pump and Fan	Multi-PID	Multi-Purpose	
0 = Not used		Not operational	■	■	■	■	
1 = Ready		Frequency converter is ready for operations	■	■	■	■	
2 = Run		Frequency converter is running motor	■	■	■	■	
3 = Fault		A fault trip has occurred	■	■	■	■	
4 = Fault inverted		A fault trip has not occurred	■	■	■	■	
5 = Warning		Warning exists in frequency converter	■	■	■	■	
6 = Reverse		Reverse command has been activated	■	■	■	■	
7 = At speed		Output frequency has reached reference	■	■	■	■	
8 = Zero frequency		Motor output is at zero frequency	■	■	■	■	
9 = Frequency Limit1 supervision		Frequency limit1 achieved	■	■	■	■	
10 = Frequency Limit2 supervision		Frequency limit2 achieved	■	■	■	■	
11 = PID1 supervision		PID1 controller level achieved	■	■	■	■	
12 = PID2 supervision		PID2 controller level achieved	■	■	■	■	
13 = Over heat warning		Drive over heat has occurred	■	■	■	■	
14 = Over current regular		Over current controller activated	■	■	■	■	
15 = Over voltage regular		Over voltage controller activated	■	■	■	■	
16 = Under voltage regular		Under voltage controller activated	■	■	■	■	
17 = 4 mA fault		4 mA reference fault occurred	■	■	■	■	
18 = External brake		External brake activated	—	—	—	■	
19 = External brake inverted		External brake control inverted	—	—	—	■	
20 = Torque limit supervision		Torque limit value achieved	■	■	■	■	
21 = Reference limit supervision		Reference limit achieved	■	■	■	■	
22 = Control from IO		Control place I/O is activated	■	■	■	■	
23 = Unrequired rotation direction		Active direction is different than reference direction	■	■	■	■	
24 = Thermal fault		Thermal fault has occurred	■	■	■	■	
25 = Fire mode		Fire mode is activated	■	■	■	■	
26 = Bypass running		Bypass mode is activated	■	■	■	■	
27 = External fault		External fault has occurred	■	■	■	■	
28 = Remote control		Remote control place is activated	■	■	■	■	
29 = Jog speed		Drive is in jog mode	■	■	■	■	
30 = Motor thermal protection		Motor calculated temperature fault activated	■	■	■	■	
31 = Fieldbus input1		Controlled by FB control word	■	■	■	■	
32 = Fieldbus input2		Controlled by FB control word	■	■	■	■	
33 = Fieldbus input3		Controlled by FB control word	■	■	■	■	
34 = Fieldbus input4		Controlled by FB control word	■	■	■	■	
35 = Damper control		Damper control input is activated	■	■	■	■	
36 = Timer1 status		Timer1 activated	■	■	■	■	
37 = Timer2 status		Timer2 activated	■	■	■	■	
38 = Timer3 status		Timer3 activated	■	■	■	■	
39 = Emergency stop		Emergency stop input activated, drive faulted	■	■	■	■	
40 = Power limit supervision		Power limit value achieved	■	■	■	■	
41 = Temperature limit supervision		Temperature limit value achieved	■	■	■	■	
42 = Analog input supervision		Analog limit value achieved	■	■	■	■	
43 = Motor1 control		Auxiliary motor1 activated	—	■	■	■	
44 = Motor2 control		Auxiliary motor2 activated	—	■	■	■	
45 = Motor3 control		Auxiliary motor3 activated	—	■	■	■	
46 = Motor4 control		Auxiliary motor4 activated	—	■	■	■	
47 = Motor5 control		Auxiliary motor5 activated	—	■	■	■	
48 = Logic fulfilled		Logic function is activated	—	—	—	■	
49 = PID1 sleep		PID1 controller sleep mode active	—	■	■	■	
50 = PID2 sleep		PID2 controller sleep mode active	—	—	■	■	

Code	Modbus ID	Parameter	Application	RO/RW														
P5.4	538	RO3 Function, continued	1, 2, 3, 4	RW														
		<table><tr><th>Setting Value</th><th>Signal Content</th></tr><tr><td>51 = Motor Current 1 Supv</td><td>Motor current supervision value active</td></tr><tr><td>52 = Motor Current 2 Supv</td><td>Motor current supervision value active</td></tr><tr><td>53 = Second AI Limit Supv</td><td>Analog input supervision active</td></tr><tr><td>54 = DC Charge Switch Close</td><td>DC bus is charged</td></tr><tr><td>55 = Preheat Active</td><td>Preheat Control mode is activated</td></tr><tr><td>56 = Cold Weather Active</td><td>Cold Weather mode is activated</td></tr></table>	Setting Value	Signal Content	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	55 = Preheat Active	Preheat Control mode is activated	56 = Cold Weather Active	Cold Weather mode is activated		
Setting Value	Signal Content																	
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																	
55 = Preheat Active	Preheat Control mode is activated																	
56 = Cold Weather Active	Cold Weather mode is activated																	
P5.5	154	Freq Limit 1 Supv Selects whether the frequency supervision controller functions as a low limit, high limit, or enables 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														
P5.6	155	Freq Limit 1 Supv Val. Selects the frequency value supervised by P5.5. If the output frequency goes under/over the set limit (P5.6), 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														
Figure 55. Supervision Function																		
P5.7	157	Freq Limit 2 Supv Selects whether the frequency supervision controller functions as a low limit, high limit, or enables/disables 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														
P5.8	158	Freq Limit 2 Supv Val. Selects the frequency value supervised by P5.7. See Figure 55 . If the output frequency goes under/over the set limit (P5.7), 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														

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P5.9	159	Torque Limit Supv Selects whether the torque supervision controller functions as a low limit, high limit, or disables a mechanical brake (torque proofing). 0 = No limit 1 = Low limit supervision 2 = High limit supervision 3 = Brake-off control (Application 4 only)	1, 2, 3, 4	RW
P5.10	160	Torque Limit Supv Val. Set here the torque value to be supervised by P5.9. If the output frequency goes under/over the set limit (P5.10), 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
P5.11	161	Ref Limit Supv Selects whether the reference supervision controller functions as a low limit or high limit. 0 = No supervision 1 = Low limit supervision 2 = High limit supervision	1, 2, 3, 4	RW
P5.12	162	Ref Limit Supv Val The frequency 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
P5.13	163	Ext Brake Off Delay	4	RW
P5.14	164	Ext Brake On Delay The function of the external brake can be time delayed to provide ample time to enable/disable an external brake module. See Figure 56 . 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.	4	RW
Figure 56. External Brake Control a) b) a) Start/Stop Logic Selection, P3.1 = 0, 1 or 2 b) Start/Stop Logic Selection, P3.1 = 3				
P5.15	165	Temp Limit Supv Selects whether the temperature supervision controller functions as a low limit or high limit of the drive temperature. 0 = No supervision 1 = Low limit supervision 2 = High limit supervision	1, 2, 3, 4	RW
P5.16	166	Temp Limit Supv Val This temperature value is supervised by P5.15. If the temperature of the frequency converter unit falls below or exceeds the set limit (P5.16), 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

Code	Modbus ID	Parameter	Application	RO/RW
P5.17	167	Power Limit Supv Selects whether the power supervision controller functions as a low limit or high limit. 0 = No supervision 1 = Low limit supervision 2 = High limit supervision	1, 2, 3, 4	RW
P5.18	168	Power Limit Supv Val This power value is supervised by P5.17. If the calculated power value 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
P5.19	170	AI Supv Select Selects analog signal to use for the AI 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
P5.20	171	AI Limit Supv Selects whether the analog input supervision controller functions as a low limit or high limit. 0 = No supervision 1 = Low limit supervision 2 = High limit supervision	1, 2, 3, 4	RW
P5.21	172	AI Limit Supv Val The value of the selected analog input to be supervised by P5.20. If the value of the selected analog input goes under/over the set limit (P5.21), 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
P5.22	1346	PID1 Superv Enable	2, 3, 4	RW
P5.23	1347	PID1 Superv Upper Limit	2, 3, 4	RW
P5.24	1349	PID1 Superv Lower Limit	2, 3, 4	RW
P5.25	1351	PID1 Superv Delay	2, 3, 4	RW
P5.26	1408	PID2 Superv Enable	3, 4	RW
P5.27	1409	PID2 Superv Upper Limit	3, 4	RW
P5.28	1411	PID2 Superv Lower Limit	3, 4	RW
P5.29	1413	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
P5.30	2111	RO1 On Delay Delay time for RO1 to turn on.	1, 2, 3, 4	RW
P5.31	2112	RO1 Off Delay Delay time for RO1 to turn off.	1, 2, 3, 4	RW
P5.32	2113	RO2 On Delay Delay time for RO2 to turn on.	1, 2, 3, 4	RW
P5.33	2114	RO2 Off Delay Delay time for RO2 to turn off.	1, 2, 3, 4	RW
P5.34	2115	RO3 On Delay Delay time for RO3 to turn on.	1, 2, 3, 4	RW

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P5.35	2116	RO3 Off Delay Delay time for RO3 to turn off.	1, 2, 3, 4	RW
P5.36	2117	RO3 Invert Inverts the output function of RO3 to be normally closed instead of normally open on the Form A relay. 1 = Not Inverted 2 = Inverted	1, 2, 3, 4	RW
P5.37	2189	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	1, 2, 3, 4	RW
P5.38	2190	Motor Current 1 Supv Value The value of the selected motor current value to be monitored by P5.37. If the value of the selected analog input goes under/over the set limit (P5.38), 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
P5.39	2191	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	1, 2, 3, 4	RW
P5.40	2192	Motor Current 2 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
P5.41	2193	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
P5.42	2194	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
P5.43	2195	Second AI Limit Supv Val The value of the selected analog input to be supervised by P5.42. If the value of the selected analog input goes under/over the set limit (P5.43), 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
P5.44	2196	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
P5.45	2197	Motor Current 2 Supv Hyst This value selects the bandwidth between when the motor current 2 supervision enables and disables itself.	1, 2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P5.46	2198	AI Supv Hysteresis This value selects the bandwidth between when the AI supervision enables and disables itself.	1, 2, 3, 4	RW
P5.47	2199	Second AI Supv Hysteresis This value selects the bandwidth between when the AI supervision enables and disables itself.	1, 2, 3, 4	RW
P5.48	2200	Frequency Limit 1 Supv Hysteresis This value selects the bandwidth between when the Output Frequency supervision enables and disables itself.	1, 2, 3, 4	RW
P5.49	2201	Frequency Limit 2 Supv Hysteresis This value selects the bandwidth between when the Output Frequency supervision enables and disables itself.	1, 2, 3, 4	RW
P5.50	2202	Torque Limit Supv Hysteresis This value selects the bandwidth between when the Torque supervision enables and disables itself.	1, 2, 3, 4	RW
P5.51	2203	Ref Limit Supv Hysteresis This value selects the bandwidth between when the Reference limit supervision enables and disables itself.	1, 2, 3, 4	RW
P5.52	2204	Temp Limit Supv Hysteresis This value selects the bandwidth between when the Temp limit supervision enables and disables itself.	1, 2, 3, 4	RW
P5.53	2205	Power Limit Supv Hysteresis This value selects the bandwidth between when the Power limit supervision enables and disables itself.	1, 2, 3, 4	RW
P6.1	751	Logic Function Select The logic function enables you to link both parameters P6.2(A) and P6.3 (B) logically with each other. Different settings: 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 but if both inputs are the same state it disables the logic. The result (LOG) can then be assigned to the digital outputs DO, RO1, RO2 and RO3. 0 = AND 1 = OR 2 = XOR	4	RW
P6.2	752	Logic Operation Input A Input A for Logic function calculation defined in P6.1.	4	RW
P6.3	753	Logic Operation Input B Input B for Logic function calculation defined in P6.1.	4	RW
P7.1	138	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

Appendix A—Description of Parameters

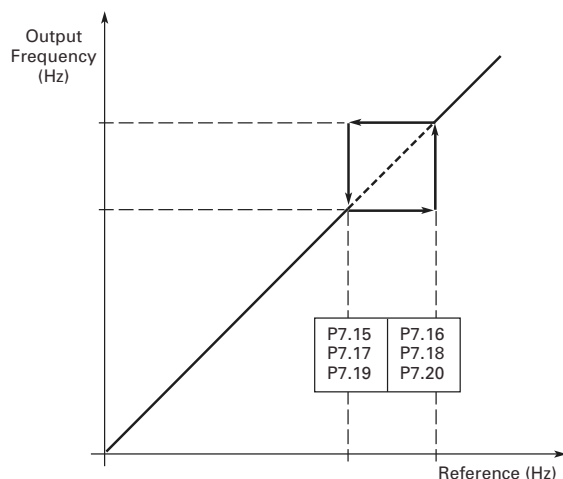
Code	Modbus ID	Parameter	Application	RO/RW
P7.2	139	Remote 2 Reference Selects what frequency reference source to look at when in the Remote 2 control mode.	1, 2, 3, 4	RW
		Application—Selection	Standard	Multi-Pump and Fan
				Multi-PID
				Multi-Purpose
0 = AI1—analog input on terminals 2–3			■	■
1 = AI2—analog input on terminals 4–5			■	■
2 = Slot A: AI1—analog input on expander board in slot A			■	■
3 = Slot B: AI1—analog input on expander board in slot B			■	■
4 = AI1 joystick—analog input on terminals 2–3, used for joystick control			■	■
5 = AI2 joystick—analog input on terminals 4–5, used for joystick control			■	■
6 = Keypad—keypad reference (P1.7.3)			■	■
7 = Fieldbus Ref—reference sent of communication bus			■	■
8 = Motor Pot—selects digital inputs for digital inputs to increase/decrease speed			—	—
9 = Max Frequency—maximum frequency value (P1.1.2)			■	■
10 = AI1+AI2—sums the analog input values			■	■
11 = AI1–AI2—subtracts the analog inputs AI1 from AI2			■	■
12 = AI2–AI1—subtracts the analog inputs AI2 from AI1			■	■
13 = AI1*AI2—multiplies analog inputs AI1 and AI2			■	■
14 = AI1 or AI2—selects analog inputs based off of digital input			■	■
15 = Min (AI1, AI2)—selects analog inputs that have the least value			■	■
16 = Max (AI1, AI2)—selects analog inputs that have the higher value			■	■
17 = PID1 Control—selects the PID calculation for output to maintain reference value			—	■
P7.3	141	Keypad Reference The frequency reference can be adjusted from the keypad with this parameter. This parameter is linked to R1.12 Keypad reference in the operate menu.	1, 2, 3, 4	RW
P7.4	116	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
P7.5	114	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
P7.6	117	Jog Reference Defines the jogging speed set point. This speed is selected by the digital input programmed for Jog Speed. When enabled, the drive starts and ramps to this speed. The drive stops when the input is removed. This parameter’s value is automatically limited between minimum and maximum frequency (P1.1.1 and P1.1.2).	1, 2, 3, 4	RW
P7.7	156	Motor Pot Ramp Time Defines the speed of change of the motor potentiometer reference value.	4	RW
P7.8	169	Motor Pot Ref Reset Defines how the motor potentiometer 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

Code	Modbus ID	Parameter	Application	RO/RW
P7.9	252	Start Mode 0 = Ramp: 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: The frequency converter is able to start into a running motor by applying a small voltage to the 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
P7.10	253	Stop Mode 0 = Coasting: The motor coasts to a halt without any control from the frequency converter after the Stop command. The motor slows based off the inertia loss 1 = Ramp: 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
P7.11	247	Ramp 1 Shape	1, 2, 3, 4	RW
P7.12	248	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 57. Acceleration/Deceleration (S-shaped) 				
P7.13	249	Accel Time 2	1, 2, 3, 4	RW
P7.14	250	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
P7.15	256	Skip F1 Low Lim	1, 2, 3, 4	RW
P7.16	257	Skip F1 High Lim	1, 2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P7.17	258	Skip F2 Low Lim	1, 2, 3, 4	RW
P7.18	259	Skip F2 High Lim	1, 2, 3, 4	RW
P7.19	260	Skip F3 Low Lim	1, 2, 3, 4	RW
P7.20	261	Skip F3 High Lim	1, 2, 3, 4	RW

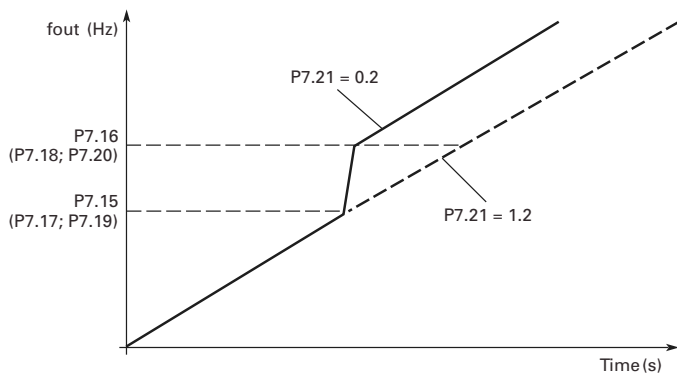
In some systems it may be necessary to avoid certain frequencies because of mechanical resonance problems. With these parameters, limits are set for the “skip frequency” regions. The frequency converter will skip the set frequencies, ramp time will be the same. See **Figure 58**.

Figure 58. Example of Skip Frequency Area Setting



P7.21	264	PH Accel/Decel Ramp 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.	1, 2, 3, 4	RW
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Figure 59. Ramp Speed Scaling between Skip Frequencies



P7.22	267	Power Loss Function This enables the drive to reduce output voltage to the motor to keep the drive up as long as possible. 1 = Enable power loss function 0 = Disable power loss function	1, 2, 3, 4	RW
P7.23	268	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

Code	Modbus ID	Parameter	Application	RO/RW
P7.24	2121	Currency Sets the currency used for energy saving calculator. 0 = \$ 1 = GBP 2 = Eur 3 = JPY 4 = Rs 5 = R\$ 6 = Fr 7 = Kr	1, 2, 3, 4	RW
P7.25	2122	Energy Cost Local energy cost per kWh in the drives area.	1, 2, 3, 4	RW
P7.26	2123	Data Type Selects the format to view energy savings. The drive takes four recordings in an hour and calculates the average based off this setting. The savings are compared to the cost to run an across the line starter for the same load. 0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg	1, 2, 3, 4	RW
P7.27	2124	Energy Savings Reset Resets the energy calculation.	1, 2, 3, 4	RW
P8.1	287	Motor Ctrl Mode 0 = Frequency control: Motor is controlled by giving a frequency reference to it. Voltage reference is calculated from scalar V/Hz 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 V/Hz 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 $\pm 0.5\%$). 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 on a torque reference given to the drive. Then, based on the motor load, the drive will maintain that torque level. Requires running a motor identification to perform the calculations.	1, 2, 3, 4	RW
P8.2	107	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

Code	Modbus ID	Parameter	Application	RO/RW
P8.3	109	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. <i>Example:</i> 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

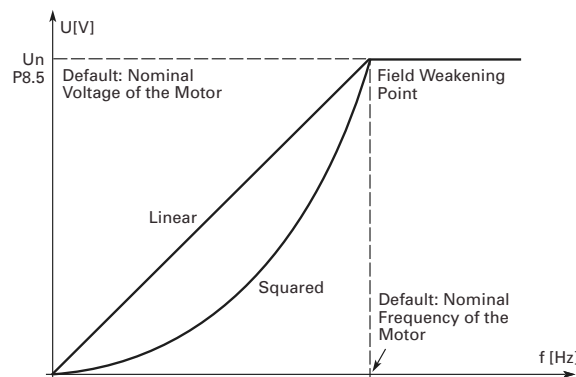
Code	Modbus ID	Parameter	Application	RO/RW
P8.4	108	V/Hz Ratio	1, 2, 3, 4	RW

Linear

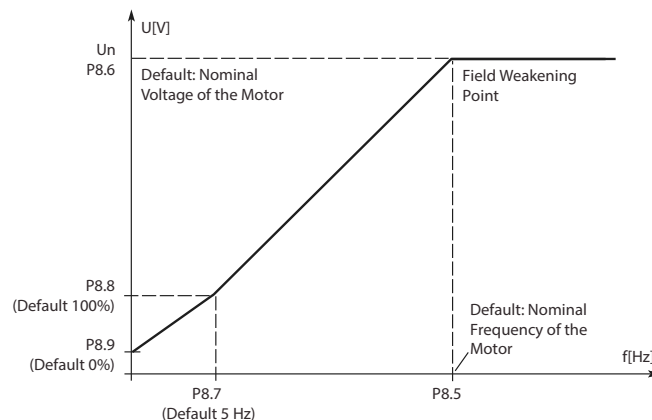
0 = The voltage of the motor changes linearly with the frequency in the constant flux area from 0 Hz to the field weakening point where the nominal voltage is supplied to the motor. A linear V/Hz ratio should be used in constant torque applications. **This default setting should be used if there is no 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 60. 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 zero frequency voltage, midpoint and field 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 and the resistance information of the motor.

Figure 61. Programmable V/Hz Curve**Linear with flux optimization**

3 = The frequency converter starts to search for the minimum motor current in order to save energy and lower the disturbance level and the noise. This function can be used in applications with constant motor load, such as fans, pumps, etc.

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P8.5	289	Field Weakening Point The field weakening point is the output frequency at which the output voltage reaches the set (P8.6) maximum value. This value is usually determined by the motor nameplate value. If the motor's specs were supplied, it can be further adjusted.	1, 2, 3, 4	RW
P8.6	290	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 P8.9. 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. 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
P8.7	291	V/Hz Mid Freq If the programmable V/Hz curve has been selected with P8.4, this parameter defines the middle point frequency of the curve. This value can be set anywhere between 0 and the FWP to have a different V/Hz ramp. If set to the FWP, it will provide the max voltage all the way up the curve. See Figure 61 .	1, 2, 3, 4	RW
P8.8	292	V/Hz Mid Volt If the programmable V/Hz curve has been selected with the P8.4, this parameter defines the middle point voltage of the curve. This value can be set anywhere between the zero frequency voltage and the FWP voltage. This can either have a different ramp above and below this point or allow for maximum voltage. See Figure 61 .	1, 2, 3, 4	RW
P8.9	293	Zero Frequency Volt 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 too high, it can cause the motor to be oversaturated. See Figure 61 .	1, 2, 3, 4	RW
P8.10	288	Switching Frequency This parameter sets the frequency of the pulse width modulation. Higher switching frequencies leads to a cleaner current sine wave, while lower frequencies result in a choppier 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 reduced in the fact that the ambient temperature is high as well as high load currents.	1, 2, 3, 4	RW
P8.11	1665	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 also enables the drive to have a fixed switching frequency when it reaches motor thermal protection.	1, 2, 3, 4	RW
P8.12	294	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
P8.13	298	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 VFDs.	4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P8.14	299	Identification With this parameter, the drive will identify the motor and adjust tuning parameters to improve starting torque and open loop current control. Upon running this operation it will be active until test is performed and then set back to 0. Once completed, it will set the V/Hz curve to correspond with resistance values obtained and provide optimized motor control. 0 = Not active 1 = Identification only stator resistor 2 = Identification with run 3 = Identification no run	4	RW
P8.15	1574	Neg Frequency Limit Frequency limit in the negative direction.	4	RW
P8.16	1576	Pos Frequency Limit Frequency limit in the positive direction.	4	RW
P8.17	1585	Frequency Ramp Out Filter Time Constant Filter time used when ramping the drive to a new reference frequency.	1, 2, 3, 4	RW
P8.18	1591	Speed Error Filter Time Constant Speed control filter time in open loop speed control mode.	4	RW
P8.19	1592	Speed Error Band Stop Frequency When in stop, the speed error for initializing the speed loop control.	4	RW
P8.20	1593	Speed Control Kp Open loop speed control gain.	4	RW
P8.21	1594	Speed Control Ti Open loop speed control integral time.	4	RW
P8.22	1595	Speed Control Kp at Field Weakening Open loop speed control gain at Field Weakening Point.	4	RW
P8.23	1596	Speed Control Kp Below F0 Open loop speed control gain below 0 Hz.	4	RW
P8.24	1597	Speed Control F0 Open loop speed control at frequency 0.	4	RW
P8.25	1598	Speed Control F1 Open loop speed control at frequency 1.	4	RW

P8.26	1599	Speed Control Kp Below T0 Open loop speed gain below torque 0.	4	RW
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Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P8.27	1600	Speed Control T0 Open loop speed torque 0.	4	RW
P8.28	1601	Speed Control Kp Filter Time Constant Open loop speed control gain filter time.	4	RW
P8.29	1602	Motor Torque Limit Torque limit setting in open loop torque control mode.	4	RW
P8.30	1603	Generator Torque Limit Torque limit setting for generator.	4	RW
P8.31	1604	Torque Limit Forward Torque limit setting in forward direction.	4	RW
P8.32	1605	Torque Limit Reverse Torque limit setting in reverse direction.	4	RW
P8.33	1607	Motor Power Limit Motor power limit setting in open loop torque control mode.	4	RW
P8.34	1608	Generator Power Limit Generator power limit setting in open loop torque control mode.	4	RW
P8.35	1611	Acc Compensation Time Constant Acceleration compensation time.	4	RW
P8.36	1612	Acc Compensation Filter Time Constant Acceleration compensation filter time.	4	RW
P8.37	1620	Flux Reference Reference selection for the amount of flux to output to the motor when using advanced programming.	4	RW
P8.38	1621	Stop State Magnetization Magnetization current % level when performing advanced programming of motor identification.	4	RW
P8.39	1622	Start Boost Rise Time Acceleration time used with auto torque boost. Limits the amount of time the boost is enabled.	1, 2, 3, 4	RW
P8.40	1623	Flux Current Ramp Time Time to use the flux ramp level when advanced motor control is needed.	4	RW
P8.41	1624	Zero Speed Start Time Zero speed delay time when starting the motor.	4	RW
P8.42	1625	Zero Speed Stop Time Zero speed delay time when stopping the motor.	4	RW
P8.43	1630	Droop Control Filter Time Constant Filter time when using droop control.	4	RW
P8.44	1631	Start Torque Selection Selects where the startup torque reference comes from (either Start Memory, Torque Reference, and Start Torque FWD/REV).	4	RW
P8.45	1632	Start Memory Start Torque value is stored in memory. If you look at P8.48, you can select where the torque on startup is given from. This is a preset value for both forward and reverse if both are required to be equal.	4	RW
P8.46	1633	Start Torque Forward Selects the amount of starting torque in the Forward direction.	4	RW
P8.47	1634	Start Torque Reverse Selects the amount of starting torque Reverse direction.	4	RW

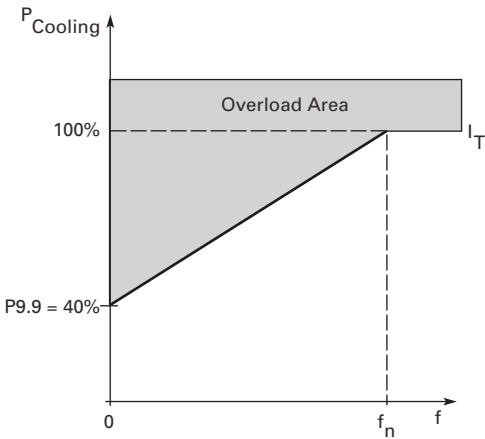
Code	Modbus ID	Parameter	Application	RO/RW
P8.48	1635	Start Torque Actual Actual start torque.	4	RO
P8.49	1667	Startup Torque Time This is the amount of time that the startup torque boost is active in either forward or reverse during startup.	4	RW
P8.50	771	Stator Resistor Motor stator resistor real value. This value is the stator winding resistance of the windings in the motor. Value is measured when performing Identification (P8.14).	4	RW
P8.51	772	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
P8.52	773	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
P8.53	774	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
P8.54	775	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
P9.1	306	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
P9.2	331	4 mA Fault Freq When 4 mA fault happens, the output frequency of drive goes to this preset speed when P9.1 = 3.	1, 2, 3, 4	RW
P9.3	307	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 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
P9.4	332	Input Phase Fault The input phase supervision ensures that the input phases of the frequency converter have approximately equal currents. 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

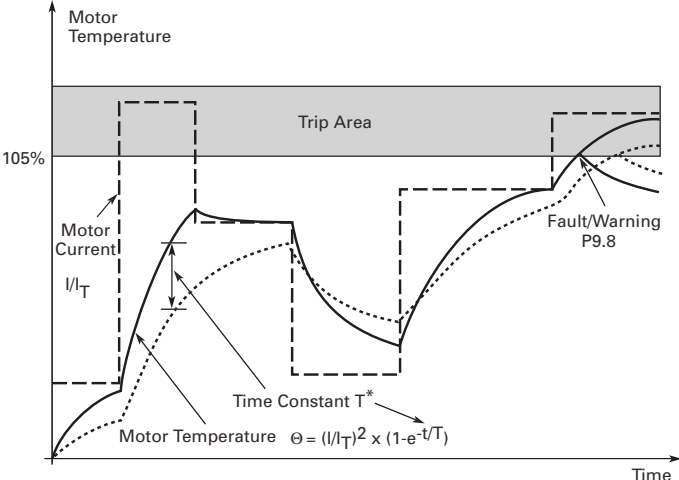
Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P9.5	330	Undervoltage Fault Resp Frequency converter monitors DC Bus Voltage. If it drops below the set level, the drive will respond according 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
P9.6	308	OutputPhaseFault Output phase supervision of the motor ensures that the motor phases have equal currents, if phases are 5% difference from one another 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
P9.7	309	Ground Fault Earth fault protection ensures that the sum of the motor phase currents is zero. P9.44 allows for setting the allowable ground current level. The overcurrent protection is always working and protects the frequency converter from earth faults with high currents. Frequency Converter will correspond 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
P9.8	310	Motor Therm Prot If tripping is selected, the drive will stop and activate the fault stage based off the % calculated motor temperature. The calculated motor temp is based off the initial power values of the drive and the 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

Code	Modbus ID	Parameter	Application	RO/RW
P9.9	311	Motor Therm F0 Current The current can be set between 0–150.0% x I_n Motor. This parameter sets the value for thermal current at zero frequency. See Figure 62 . 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 62. Motor Thermal Current I_T Curve

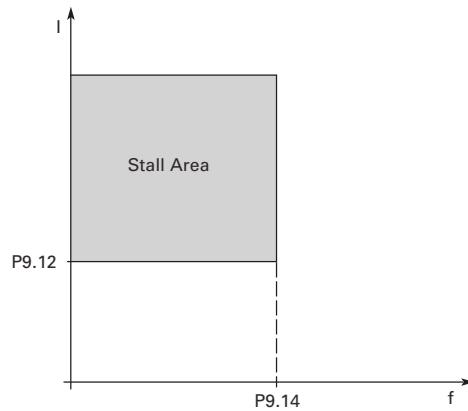


Code	Modbus ID	Parameter	Application	RO/RW
P9.10	312	Motor Thermal Time This time can be set between 1 and 200 minutes. This is the thermal time constant of the motor; the larger the motor, the longer the time constant. The time constant is the time within which the calculated thermal stage has reached 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 2 x t6. 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 63.	1, 2, 3, 4	RW
Figure 63. Motor Temperature Calculation * Changes by motor size and adjusted with P9.10.				
P9.11	313	Stall Protection Stall protection is a type 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

Code	Modbus ID	Parameter	Application	RO/RW
P9.12	314	Stall Current Limit	1, 2, 3, 4	RW

The current can be set to $0.1 \cdot I_{nMotor} \cdot 2$. For a stall stage to occur, the current must have exceeded this limit. See **Figure 64**. The software does not allow entering a greater value than $I_{nMotor} \cdot 2$. If P1.5, nominal motor current is changed, this parameter is automatically restored to the default value (I_L).

Figure 64. Stall Characteristics Settings

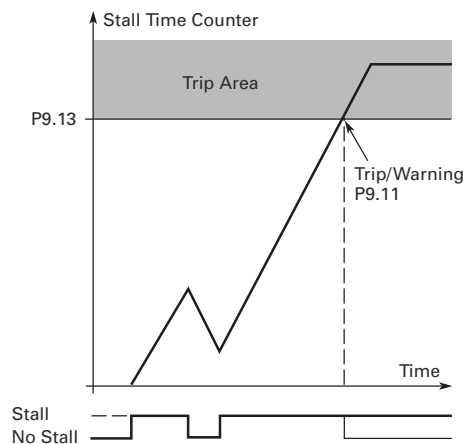


P9.13	315	Stall Time Limit	1, 2, 3, 4	RW
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This time can be set between 1.0 and 120.0s.

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).

Figure 65. Stall Time Count

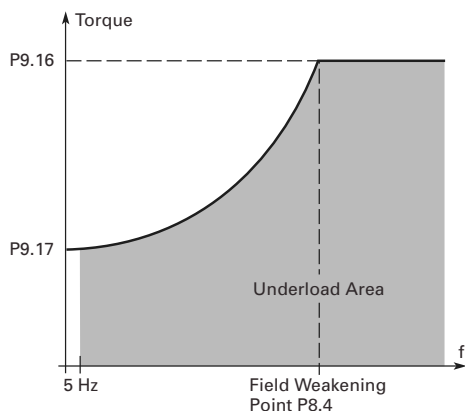


P9.14	316	Stall Frequency Limit	1, 2, 3, 4	RW
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The frequency can be set between $1 \cdot f_{max}$ (P1.1.2).

For a stall state to occur, the output frequency must have remained below this limit and above the current limit for the stall time.

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P9.15	317	Underload Protection If the motor torque drops below the F_{nom} and F_0 torque levels for the time limit, the underload protection is enabled. Deactivating the protection by setting the parameter to zero 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
P9.16	318	Underload F_{nom} Torque The torque limit can be set between 10.0–150.0% $\times T_{nMotor}$. This parameter gives the value for the minimum torque allowed when the output frequency is at or above the field weakening point. See Figure 66 . If you change P1.5, nominal motor current, this parameter is automatically restored to the default value.	1, 2, 3, 4	RW
Figure 66. Setting of Minimum Load  The graph illustrates the relationship between torque and frequency for underload protection. The vertical axis is labeled 'Torque' and has two marked points: P9.17 at 5 Hz and P9.16 at the Field Weakening Point P8.4. The horizontal axis is labeled 'f' (frequency). A curve starts at (5 Hz, P9.17) and rises to (P8.4, P9.16). The area under this curve is shaded gray and labeled 'Underload Area'. A vertical dashed line marks the 'Field Weakening Point P8.4'.				
P9.17	319	Underload F_0 Torque The torque limit can be set between 5.0–150.0% $\times T_{nMotor}$. This parameter gives value for the minimum torque allowed with zero frequency. See Figure 67 . 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

Code	Modbus ID	Parameter	Application	RO/RW
P9.18	320	Underload Time Limit This time can be set between 2.0s and 600.0s. This is the maximum 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 67 .	1, 2, 3, 4	RW
Figure 67. Underload Time Counter Function				
P9.19	333	Thermistor Fault Response Setting the parameter to 0 will deactivate the protection. If motor thermistors input is enabled, it requires enabling the fault condition. If used with motor thermistors 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
P9.20	750	Line Start Lockout Determines the response of frequency converter starting motor on power cycle if I/O run command is still active. 0 = Response I/O command when power is on. No response to I/O commands when control source is changed to I/O location 1 = Do not respond I/O command when power is on. No response to I/O commands when control source is changed to I/O location 2 = Response I/O command when power is on. Respond to I/O command when control source is changed to I/O location 3 = Do not respond I/O command when power is on. Respond to I/O command when control sources are changed to I/O location	1, 2, 3, 4	RW
P9.21	334	Fieldbus Fault Response This sets the response mode for the fieldbus fault when a fieldbus board is used and communication is lost between the PLC and communication port. See P9.19.	1, 2, 3, 4	RW
P9.22	335	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
P9.23	1564	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

Code	Modbus ID	Parameter	Application	RO/RW
P9.24	321	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 are listed in P9.27 to P9.33.	1, 2, 3, 4	RW
P9.25	322	Trial Time Sets the amount of time after the Wait Time (P9.24) that the drive uses for attempting to restart after a fault. After this time has run out without the alarm resetting, the drive will fault. See Figure 68 .	1, 2, 3, 4	RW
Figure 68. Example of Automatic Restarts with Two Restarts				
P9.27 to P9.32 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 P9.32 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.				
P9.26	323	Start Function The Start function for Automatic restart is selected with this parameter. The parameter defines the start mode upon an auto restart condition: 0 = Start with ramp 1 = Flying start 2 = Start according to P7.9	1, 2, 3, 4	RW
P9.27	324	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 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
P9.28	325	Oversvoltage Attempts This parameter determines how many automatic restarts can be made during the trial time set by P9.25 after an oversvoltage trip. 0 = No automatic restart after oversvoltage fault trip >0 = Number of automatic restarts after oversvoltage 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

Code	Modbus ID	Parameter	Application	RO/RW
P9.29	326	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
P9.30	327	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
P9.31	329	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
P9.32	328	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
P9.33	336	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
P9.34	955	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
P9.35	337	PT100 Fault Response PT100 Thermistor Protection is used with motor PT100 thermistors and the input option board. It is used to fault the frequency converter if motor has reached the set temperature fault level. 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
P9.36	1256	Replace Battery Fault Response Sets how the frequency converter responds to a low voltage on the Real Time Clock battery. 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

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P9.37	1257	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 on 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
P9.38	1678	IP Address Conflict Response Indicates there is a conflict in the IP address assigned, 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
P9.39	2126	Cold Weather Mode With this parameter, you are able to enable the cold weather function of the drive, causing the frequency converter's under temp limit to drop from –10°C to –30°C. 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. 0 = No 1 = Yes	1, 2, 3, 4	RW
P9.40	2127	Cold Weather Voltage 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
P9.41	2128	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
P9.42	2129	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 to access P9.43. This value gets reset on cycle of power.	1, 2, 3, 4	RW
P9.43	2130	Drive Under Temperature 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
P9.44	2158	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
P9.45	2157	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

Code	Modbus ID	Parameter	Application	RO/RW
P9.46	2159	Preheat Mode This parameter enables/disables the preheat function. With this enabled, it tracks the preheat temp source and if it falls below the preheat enter temp, it enables current to flow through the motor to prevent condensation. 0 = Disable 1 = Enable	1, 2, 3, 4	RW
P9.47	2160	Preheat Temp Source Selects the source of where the temperature is coming from. Can be set to either the drive heat sink temperature or the PT100 sensor temperature. 0 = Drive heat sink temperature 1 = PT100 Temperature sensor in motor	1, 2, 3, 4	RW
P9.48	2161	Preheat Enter Temp Temperature when the preheat is enabled. The drive goes into a run state to allow the preheat voltage to flow through the motor and create current.	1, 2, 3, 4	RW
P9.49	2162	Preheat Quit Temp Temperature when the preheat is disabled. The drive goes into a stop state if the temperature is above this rating.	1, 2, 3, 4	RW
P9.50	2163	Preheat output Voltage Voltage level outputted 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
P10.1	1294	PID1 Control Gain Defines the gain of the PID Controller. It adjusts 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
P10.2	1295	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 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
P10.3	1296	PID1Control 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
P10.4	1297	PID1 Process Unit Defines the unit type for PID Feedback.	2, 3, 4	RW
P10.5	1298	PID1 Process Unit Min Defines the minimum process unit Value.	2, 3, 4	RW
P10.6	1300	PID1 Process Unit Min Defines the minimum process unit Value.	2, 3, 4	RW
P10.7	1302	PID1 Process Unit Decimal Defines the amount of decimal places in process unit Value.	2, 3, 4	RW
P10.8	1303	PID1 Error Inversion Defines the way the process value output reacts to the feedback signal. 0 = Normal, If feedback is less than setpoint, PID controller output increases 1 = Inverted, If feedback is less than setpoint, PID controller output decreases	2, 3, 4	RW
P10.9	1304	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 the controller. The PID output is locked if the feedback stays within the deadband area for a delay.	2, 3, 4	RW

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P10.10	1306	PID1 Dead Band Delay If the PID process value goes out of the Dead Band area for the desired time delay, the controller will re-initialize and try to level out again.	2, 3, 4	RW
P10.11	1307	PID1 Keypad Set Point 1 This is the stored keypad set point for use of the PID feedback to match.	2, 3, 4	RW
P10.12	1309	PID1 Keypad Set Point 2 This is the stored keypad set point for use of the PID feedback to match.	2, 3, 4	RW
P10.13	1311	PID1 Ramp Time Defines the rising and falling ramp times for changes in the process value.	2, 3, 4	RW
P10.14	1312	PID1 Set Point 1 Source Defines source of the setpoint. This can be an internal preset value, keypad setpoint, analog signal or Fieldbus message.	2, 3, 4	RW
P10.15	1313	PID1 Set Point 1 Min Defines Minimum Value.	2, 3, 4	RW
P10.16	1314	PID1 Set Point 1 Max Defines Maximum Value.	2, 3, 4	RW
P10.17	1315	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-enables when feedback rises above the wakeup level.	2, 3, 4	RW
P10.18	1316	PID1 Set Point 1 Sleep Freq Drive goes to sleep mode when the output frequency drops below this limit for a time greater than that defined by parameter Sleep delay.	2, 3, 4	RW
P10.19	1317	PID1 Set Point 1 Sleep Delay The minimum amount of time the frequency has to remain below the sleep level before the drive output drops out.	2, 3, 4	RW
P10.20	1318	PID1 Set Point 1 Wake-Up Level Defines the level that the PID feedback value must exceed to re-enable drive output. Uses selected process units.	2, 3, 4	RW
P10.21	1320	PID1 Set Point 1 Boost The setpoint can be boosted via a multiplier value	2, 3, 4	RW
P10.22	1321	PID1 Set Point 2 Source Defines source of the setpoint. This can be an internal preset value, keypad setpoint, analog signal or Fieldbus message.	2, 3, 4	RW
P10.23	1322	PID1 Set Point 2 Min Defines Minimum Value.	2, 3, 4	RW
P10.24	1323	PID1 Set Point 2 Max Defines Maximum Value.	2, 3, 4	RW
P10.25	1324	PID1 Set Point 2 Sleep Enable Enable PID sleep function. This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re-enables when feedback rises above the wakeup level.	2, 3, 4	RW
P10.26	1325	PID1 Set Point2 Sleep Freq Drive goes to sleep mode when the output frequency drops below this limit for a time greater than that defined by parameter Sleep delay.	2, 3, 4	RW
P10.27	1326	PID1 Set Point 2 Sleep Delay The minimum amount of time the frequency has to remain below the sleep level before the output drops out.	2, 3, 4	RW
P10.28	1327	PID1 Set Point 2 Wake-Up Level Defines the level that the PID feedback value must exceed to re-enable drive output.. Uses selected process units.	2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P10.29	1329	PID1 Set Point 2 Boost The setpoint can be boosted via a multiplier value.	2, 3, 4	RW
P10.30	1330	PID1 Feedback Function Choose a single signal used as feedback. This parameter allows for doing math functions with 2 sources.	2, 3, 4	RW
P10.31	1331	PID1 Feedback Gain Define Gain associated with feedback signal from the measuring device.	2, 3, 4	RW
P10.32	1332	PID1 Feedback 1 Source Define where feedback signal is being fed into the drive, via analog or Fieldbus data value..	2, 3, 4	RW
P10.33	1333	PID1 Feedback 1 Min Minimum Unit Value for the feedback 1 signal.	2, 3, 4	RW
P10.34	1334	PID1 Feedback 1 Max Maximum Unit Value for the feedback 1 signal.	2, 3, 4	RW
P10.35	1335	PID1 Feedback 2 Source Define where feedback signal is being fed into the drive, via analog or Fieldbus data value.	2, 3, 4	RW
P10.36	1336	PID1 Feedback 2 Min Minimum Unit Value for the Feedback 2 signal.	2, 3, 4	RW
P10.37	1337	PID1 Feedback 2 Max Maximum Unit Value for the Feedback 2 signal.	2, 3, 4	RW
P10.38	1338	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
P10.39	1339	PID1 Feedforward Gain Define feed forward gain control level.	2, 3, 4	RW
P10.40	1340	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
P10.41	1341	PID1 Feedforward 1 Min Define feed forward Minimum Value.	2, 3, 4	RW
P10.42	1342	PID1 Feedforward 1 Max Define feed forward Maximum Unit Value.	2, 3, 4	RW
P10.43	1343	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
P10.44	1344	PID1 Feedforward 2 Min Define feed forward2 Minimum Unit Value.	2, 3, 4	RW
P10.45	1345	PID1 Feedforward 2 Max Define feed forward2 Maximum Unit Value.	2, 3, 4	RW
P10.46	1352	PID1 Set Point 1 Comp Enable Enables pressure loss compensation for setpoint 1 value.	2, 3, 4	RW
P10.47	1353	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
P10.48	1354	PID1 Set Point 2 Comp Enable Enables pressure loss compensation for setpoint 2 signal value.	2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P10.49	1355	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).

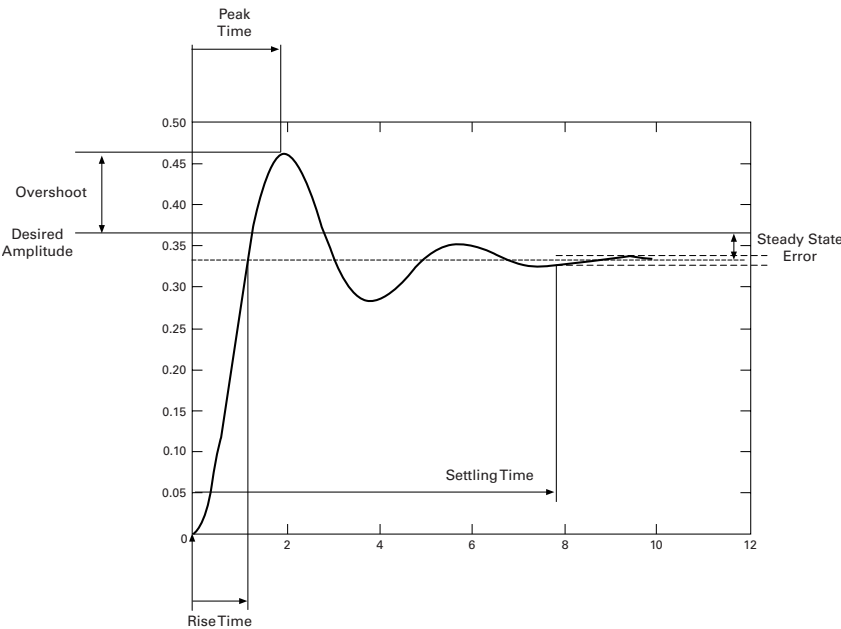
Procedure for setting up PID Application:

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 varies to filter the signal. If further tuning is required refer to the table showing what is affected.

Figure 69. 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.
Settling 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.



P11.1	1356	PID2 Control Gain See P10.1.	3, 4	RW
P11.2	1357	PID2 Control ITime See P10.2.	3, 4	RW
P11.3	1358	PID2 Control DTime See P10.3.	3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P11.4	1359	PID2 Process Unit See P10.4.	3, 4	RW
P11.5	1360	PID2 Process Unit Min See P10.5.	3, 4	RW
P11.6	1362	PID2 Process Unit Max See P10.6.	3, 4	RW
P11.7	1364	PID2 Process Unit Decimal See P10.7.	3, 4	RW
P11.8	1365	PID2 Error Inversion See P10.8.	3, 4	RW
P11.9	1366	PID2 Dead Band See P10.9.	3, 4	RW
P11.10	1368	PID2 Dead Band Delay See P10.10.	3, 4	RW
P11.11	1369	PID2 Keypad Set Point 1 See P10.11.	3, 4	RW
P11.12	1371	PID2 Keypad Set Point 2 See P10.12.	3, 4	RW
P11.13	1373	PID2 Ramp Time See P10.13.	3, 4	RW
P11.14	1374	PID2 Set Point 1 Source See P10.14.	3, 4	RW
P11.15	1375	PID2 Set Point 1 Min See P10.15.	3, 4	RW
P11.16	1376	PID2 Set Point 1 Max See P10.16.	3, 4	RW
P11.17	1377	PID2 Set Point 1 Sleep Enable See P10.17.	3, 4	RW
P11.18	1378	PID2 Set Point 1 Sleep Freq See P10.18.	3, 4	RW
P11.19	1379	PID2 Set Point 1 Sleep Delay See P10.19.	3, 4	RW
P11.20	1380	PID2 Set Point 1 Wake-Up Level See P10.20.	3, 4	RW
P11.21	1382	PID2 Set Point 1 Boost See P10.21.	3, 4	RW
P11.22	1383	PID2 Set Point 2 Source See P10.22.	3, 4	RW
P11.23	1384	PID2 Set Point 2 Min See P10.23.	3, 4	RW
P11.24	1385	PID2 Set Point 2 Max See P10.24.	3, 4	RW
P11.25	1386	PID2 Set Point 2 Sleep Enable See P10.25.	3, 4	RW
P11.26	1387	PID2 Set Point 2 Sleep Freq See P10.26.	3, 4	RW

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P11.27	1388	PID2 Set Point 2 Sleep Delay See P10.27.	3, 4	RW
P11.28	1389	PID2 Set Point 2 Wake-Up Level See P10.28.	3, 4	RW
P11.29	1391	PID2 Set Point 2 Boost See P10.29.	3, 4	RW
P11.30	1392	PID2 Feedback Func See P10.30.	3, 4	RW
P11.31	1393	PID2 Feedback Gain See P10.31.	3, 4	RW
P11.32	1394	PID2 Feedback 1 Source See P10.32.	3, 4	RW
P11.33	1395	PID2 Feedback 1 Min See P10.33.	3, 4	RW
P11.34	1396	PID2 Feedback 1 Max See P10.34.	3, 4	RW
P11.35	1397	PID2 Feedback 2 Source See P10.35.	3, 4	RW
P11.36	1398	PID2 Feedback 2 Min See P10.36.	3, 4	RW
P11.37	1399	PID2 Feedback 2 Max See P10.37.	3, 4	RW
P11.38	1400	PID2 Feedforward Func See P10.38.	3, 4	RW
P11.39	1401	PID2 Feedforward Gain See P10.39.	3, 4	RW
P11.40	1402	PID2 Feedforward 1 Source See P10.40.	3, 4	RW
P11.41	1403	PID2 Feedforward 1 Min See P10.41.	3, 4	RW
P11.42	1404	PID2 Feedforward 1 Max See P10.42.	3, 4	RW
P11.43	1405	PID2 Feedforward 2 Source See P10.43.	3, 4	RW
P11.44	1406	PID2 Feedforward 2 Min See P10.44.	3, 4	RW
P11.45	1407	PID2 Feedforward 2 Max See P10.45.	3, 4	RW
P11.46	1414	PID2 Set Point 1 Comp Enable See P10.46.	3, 4	RW
P11.47	1415	PID2 Set Point 1 Comp Max See P10.47.	3, 4	RW
P11.48	1416	PID2 Set Point 2 Comp Enable See P10.48.	3, 4	RW
P11.49	1417	PID2 Set Point 2 Comp Max See P10.49.	3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P12.1	105	Preset Speed 1	1, 2, 3, 4	RW
P12.2	106	Preset Speed 2 Parameter values are automatically limited between the minimum and maximum frequencies (P1.1, P1.2). Sets the desired frequency as referenced when input is applied.	1, 2, 3, 4	RW
P12.3	118	Preset Speed 3	1, 2, 3, 4	RW
P12.4	119	Preset Speed 4	1, 2, 3, 4	RW
P12.5	120	Preset Speed 5	1, 2, 3, 4	RW
P12.6	121	Preset Speed 6	1, 2, 3, 4	RW
P12.7	122	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
P13.1	295	Torque Limit With this parameter you can set the torque limit control between 0.0–400.0% when in open loop torque control.	4	RW
P13.2	303	Torque Ref Sel 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
P13.3	782	Keypad Torque Ref When Keypad is selected for torque reference setpoint, the value can be entered here.	4	RW
P13.4	304	Torque Ref Max	4	RW
P13.5	305	Torque Ref Min Scales the minimum and maximum level for the torque ref to be between –300.0 and 300.0%.	4	RW
P13.6	1666	Torque Control Freq Max When in torque control mode, this parameter defines the speed window the drive will operate in. 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
P13.7	1636	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

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P13.8	1637	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
P13.9	1638	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
P13.10	1639	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
P13.11	1640	Torque Reference Filter TC Torque reference filter time.	4	RW
P13.12	1606	Pull Out Torque Startup torque level in percentage.	4	RW
P13.13	1667	Startup Torque Time Startup torque time limit for starting torque level in open loop torque control mode.	4	RW
P13.14	1684	Stop State Magnetization Time Motor stop magnetization time upon stopping in open loop torque control mode.	4	RW
P14.1	254	DC-Brake Current Defines the current level injected into the motor during DC-braking.	1, 2, 3, 4	RW
P14.2	263	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
P14.3	262	Stop DC-Brake Frequency The output frequency at which the DC-braking is applied on stopping. See Figure 70 .	1, 2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P14.4	255	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

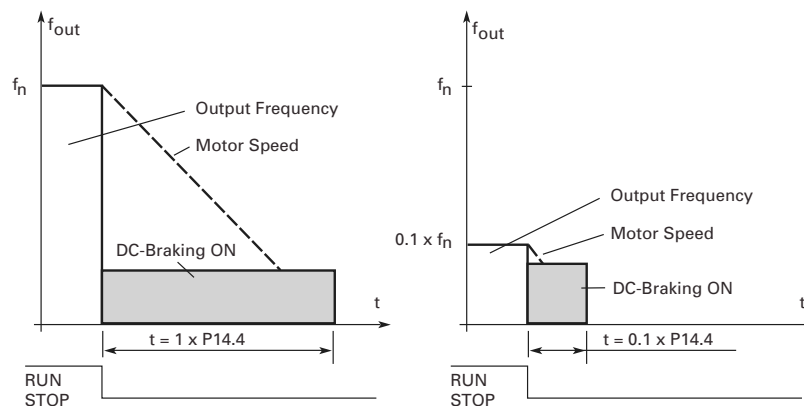
Par. P7.10 = 0; Stop function = Coasting:

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 $\geq$ the nominal frequency of the motor, the set value of parameter P14.4 determines the braking time. When the frequency is $\leq 10\%$ of the nominal, the braking time is 10% of the set value of P14.4.

Figure 70. DC-Braking Time when Stop Mode = Coasting

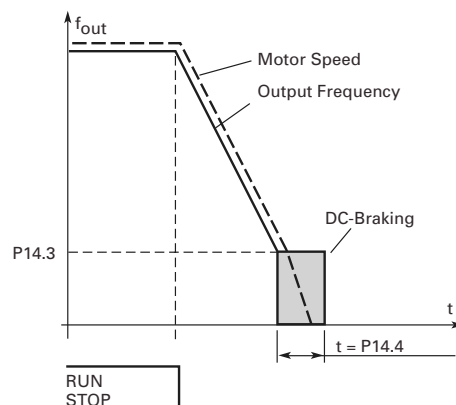


Par. P7.10 = 1; Stop function = Ramp:

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 71**.

Figure 71. DC-Braking Time when Stop Mode = Ramp



Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P14.5	251	Brake Chopper 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
P14.6	266	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
P14.7	519	Flux Brake Current Defines the flux braking current value output when Flux Brake is enabled.	1, 2, 3, 4	RW
P15.1	535	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	2, 3, 4	RW
P15.2	536	FMRefSelFunction This parameter sets the reference location for when the firemode 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
P15.3	537	Fire Mode Min 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
P15.4	565	Fire Mode Freq 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
P15.5	564	Fire Mode Freq 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
P15.6	554	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

Code	Modbus ID	Parameter	Application	RO/RW
P16.1	557	Motor Nom Current 2 The second motor set nameplate current. Selected based off of a digital input.	2, 3, 4	RW
P16.2	578	Motor Nom Speed 2 The second motor set nameplate RPM. Selected based off of a digital input.	2, 3, 4	RW
P16.3	579	Motor PF 2 The second motor set nameplate power factor. Selected based off of a digital input.	2, 3, 4	RW
P16.4	580	Motor Nom Voltage 2 The second motor set nameplate voltage. Selected based off of a digital input.	2, 3, 4	RW
P16.5	581	Motor Nom Freq 2 The second motor set nameplate frequency. Selected based off of a digital input.	2, 3, 4	RW
P16.6	1419	Stator Resistor 2 The second set of motor stator resistor real values for 2nd motor set.	4	RW
P16.7	1420	Rotor Resistor 2 The second set of motor rotor resistor real values for 2nd motor set.	4	RW
P16.8	1421	Leak Inductance 2 The second set of motor leakage inductance real values for 2nd motor set.	4	RW
P16.9	1422	Mutual Inductance 2 The second set of motor mutual inductance real values for 2nd motor set.	4	RW
P16.10	1423	Excitation Current 2 The second set of motor no-load current real values for 2nd motor set.	4	RW
P17.1	1418	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
P17.2	544	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. It also specifies the time to switch back to drive once bypass is removed.	2, 3, 4	RW
P17.3	542	Auto Bypass This parameter specifies whether an automatic switch to bypass will occur based on Overvoltage Fault condition. It is enabled based off a specific fault condition of Auto Bypass (P10.5) through Undervoltage Fault Auto Bypass (P10.9) parameters. 0 = Auto Bypass disabled 1 = Auto Bypass enabled	2, 3, 4	RW
P17.4	543	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
P17.5	547	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
P17.6	546	IGBT FLT 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

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P17.7	548	4 mA FLT 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
P17.8	545	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
P17.9	549	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
P18.1.1.1	2218	Drive 1 This parameter gives the operation mode 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, slave drive which lost master in multi-drive or slave drive is in fire 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
P18.1.1.2	2230	Drive 2 This parameter gives the operation mode 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, slave drive which lost master in multi-drive or slave drive is in fire 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
P18.1.1.3	2242	Drive 3 This parameter gives the operation mode 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, slave drive which lost master in multi-drive or slave drive is in fire 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
P18.1.1.4	2254	Drive 4 This parameter gives the operation mode 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, slave drive which lost master in multi-drive or slave drive is in fire 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
P18.1.1.5	2266	Drive 5 This parameter gives the operation mode 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, slave drive which lost master in multi-drive or slave drive is in fire 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

Code	Modbus ID	Parameter	Application	RO/RW
P18.1.2.1	2219	Drive 1 This parameter gives the status of Drive 1 in terms of the Multi-pump level when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Stopped—For master or single drive that is stopped 1 = Sleep—For master or single drive that is asleep 2 = Regulating—For master or single drive which is running 3 = Wait for CMD—For slave drive which is stopped 4 = Following—For slave drive which is running 5 = Unknown—status for disconnected drives showing on the other drives menu	2, 3, 4	RO
P18.1.2.2	2231	Drive 2 This parameter gives the status of Drive 2 in terms of the Multi-pump level when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Stopped—For master or single drive that is stopped 1 = Sleep—For master or single drive that is asleep 2 = Regulating—For master or single drive which is running 3 = Wait for CMD—For slave drive which is stopped 4 = Following—For slave drive which is running 5 = Unknown—status for disconnected drives showing on the other drives menu	2, 3, 4	RO
P18.1.2.3	2243	Drive 3 This parameter gives the status of Drive 3 in terms of the Multi-pump level when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Stopped—For master or single drive that is stopped 1 = Sleep—For master or single drive that is asleep 2 = Regulating—For master or single drive which is running 3 = Wait for CMD—For slave drive which is stopped 4 = Following—For slave drive which is running 5 = Unknown—status for disconnected drives showing on the other drives menu	2, 3, 4	RO
P18.1.2.4	2255	Drive 4 This parameter gives the status of Drive 4 in terms of the Multi-pump level when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Stopped—For master or single drive that is stopped 1 = Sleep—For master or single drive that is asleep 2 = Regulating—For master or single drive which is running 3 = Wait for CMD—For slave drive which is stopped 4 = Following—For slave drive which is running 5 = Unknown—status for disconnected drives showing on the other drives menu	2, 3, 4	RO
P18.1.2.5	2267	Drive 5 This parameter gives the status of Drive 5 in terms of the Multi-pump level when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Stopped—For master or single drive that is stopped 1 = Sleep—For master or single drive that is asleep 2 = Regulating—For master or single drive which is running 3 = Wait for CMD—For slave drive which is stopped 4 = Following—For slave drive which is running 5 = Unknown—status for disconnected drives showing on the other drives menu	2, 3, 4	RO

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P18.1.3.1	2220	Drive 1 This parameter gives the status of Drive 1 in terms of the Network Status when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Disconnected—for disconnected slave drive, single drive or MPFC is disabled 1 = Fault—For drives that suffer fault 2 = Pump Lost—for drives that lose interlock signal 3 = Need Alternation—for drives that run time is over limit 4 = No Error	2, 3, 4	RO
P18.1.3.2	2232	Drive 2 This parameter gives the status of Drive 2 in terms of the Network Status when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Disconnected—for disconnected slave drive, single drive or MPFC is disabled 1 = Fault—For drives that suffer fault 2 = Pump Lost—for drives that lose interlock signal 3 = Need Alternation—for drives that run time is over limit 4 = No Error	2, 3, 4	RO
P18.1.3.3	2244	Drive 3 This parameter gives the status of Drive 3 in terms of the Network Status when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Disconnected—for disconnected slave drive, single drive or MPFC is disabled 1 = Fault—For drives that suffer fault 2 = Pump Lost—for drives that lose interlock signal 3 = Need Alternation—for drives that run time is over limit 4 = No Error	2, 3, 4	RO
P18.1.3.4	2256	Drive 4 This parameter gives the status of Drive 4 in terms of the Network Status when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Disconnected—for disconnected slave drive, single drive or MPFC is disabled 1 = Fault—For drives that suffer fault 2 = Pump Lost—for drives that lose interlock signal 3 = Need Alternation—for drives that run time is over limit 4 = No Error	2, 3, 4	RO
P18.1.3.5	2268	Drive 5 This parameter gives the status of Drive 5 in terms of the Network Status when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. 0 = Disconnected—for disconnected slave drive, single drive or MPFC is disabled 1 = Fault—For drives that suffer fault 2 = Pump Lost—for drives that lose interlock signal 3 = Need Alternation—for drives that run time is over limit 4 = No Error	2, 3, 4	RO
P18.2.1.1	2221	Drive 1 This parameter gives the status of Drive 1 in terms of the Latest Fault Code when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO

Code	Modbus ID	Parameter	Application	RO/RW
P18.2.1.2	2233	Drive 2 This parameter gives the status of Drive 2 in terms of the Latest Fault Code when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.1.3	2245	Drive 3 This parameter gives the status of Drive 3 in terms of the Latest Fault Code when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.1.4	2257	Drive 4 This parameter gives the status of Drive 4 in terms of the Latest Fault Code when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.1.5	2269	Drive 5 This parameter gives the status of Drive 5 in terms of the Latest Fault Code when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.2.1	2222	Drive 1 This parameter gives the status of Drive 1 in terms of the Output Frequency when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.2.2	2234	Drive 2 This parameter gives the status of Drive 2 in terms of the Output Frequency when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.2.3	2246	Drive 3 This parameter gives the status of Drive 3 in terms of the Output Frequency when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.2.4	2258	Drive 4 This parameter gives the status of Drive 4 in terms of the Output Frequency when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.2.5	2270	Drive 5 This parameter gives the status of Drive 5 in terms of the Output Frequency when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.3.1	2223	Drive 1 This parameter gives the status of Drive 1 in terms of the Motor Voltage when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.3.2.	2235	Drive 2 This parameter gives the status of Drive 2 in terms of the Motor Voltage when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.3.3	2247	Drive 3 This parameter gives the status of Drive 3 in terms of the Motor Voltage when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.3.4	2259	Drive 4 This parameter gives the status of Drive 4 in terms of the Motor Voltage when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.3.5	2271	Drive 5 This parameter gives the status of Drive 5 in terms of the Motor Voltage when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO

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Code	Modbus ID	Parameter	Application	RO/RW
P18.2.4.1	2224	Drive 1 This parameter gives the status of Drive 1 in terms of the Motor Current when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.4.2	2236	Drive 2 This parameter gives the status of Drive 2 in terms of the Motor Current when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.4.3	2248	Drive 3 This parameter gives the status of Drive 3 in terms of the Motor Current when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.4.4	2260	Drive 4 This parameter gives the status of Drive 4 in terms of the Motor Current when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.4.5	2272	Drive 5 This parameter gives the status of Drive 5 in terms of the Motor Current when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.5.1	2225	Drive 1 This parameter gives the status of Drive 1 in terms of the Motor Torque when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.5.2	2237	Drive 2 This parameter gives the status of Drive 2 in terms of the Motor Torque when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.5.3	2249	Drive 3 This parameter gives the status of Drive 3 in terms of the Motor Torque when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.5.4	2261	Drive 4 This parameter gives the status of Drive 4 in terms of the Motor Torque when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.5.5	2273	Drive 5 This parameter gives the status of Drive 5 in terms of the Motor Torque when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.6.1	2226	Drive 1 This parameter gives the status of Drive 1 in terms of the Motor Power when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.6.2	2238	Drive 2 This parameter gives the status of Drive 2 in terms of the Motor Power when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.6.3	2250	Drive 3 This parameter gives the status of Drive 3 in terms of the Motor Power when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.6.4	2262	Drive 4 This parameter gives the status of Drive 4 in terms of the Motor Power when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO

Code	Modbus ID	Parameter	Application	RO/RW
P18.2.6.5	2274	Drive 5 This parameter gives the status of Drive 5 in terms of the Motor Power when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.7.1	2227	Drive 1 This parameter gives the status of Drive 1 in terms of the Motor Speed when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.7.2	2239	Drive 2 This parameter gives the status of Drive 2 in terms of the Motor Speed when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.7.3	2251	Drive 3 This parameter gives the status of Drive 3 in terms of the Motor Speed when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.7.4	2263	Drive 4 This parameter gives the status of Drive 4 in terms of the Motor Speed when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.7.5	2275	Drive 5 This parameter gives the status of Drive 5 in terms of the Motor Speed when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.8.1	2228	Drive 1 This parameter gives the status of Drive 1 in terms of the Motor Run Time when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.8.2	2240	Drive 2 This parameter gives the status of Drive 2 in terms of the Motor Run Time when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.8.3	2252	Drive 3 This parameter gives the status of Drive 3 in terms of the Motor Run Time when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.8.4	2264	Drive 4 This parameter gives the status of Drive 4 in terms of the Motor Run Time when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.2.8.5	2276	Drive 5 This parameter gives the status of Drive 5 in terms of the Motor Run Time when doing the Multi-Pump mode with multiple drives connected via Modbus together to run individual motors. This will be seen from the Master drive.	2, 3, 4	RO
P18.3.1	2279	Multi-pump Mode Determines the number of drives being used in the Multi-pump configuration. 0 = Disabled—MPFC function disabled 1 = Single Drive—single drive for main motor, contactors used on other motors 2 = Multi Drive—multi-follower sequence with multiple drives.	2, 3, 4	RW
P18.3.2	2778	Drive ID Determines the address of this drive in the multi-drive line up. This must be a unique network identifier for communication to occur. Modbus address has to be set different along with this ID to determine order of operation.	2, 3, 4	RW

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Code	Modbus ID	Parameter	Application	RO/RW
P18.3.3	342	Number of Motors 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
P18.3.4	2284	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 = PID Controller 1	2, 3, 4	RW
P18.3.5	2285	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
P18.3.6	2286	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
P18.3.7	2311	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. Not used in single drive mode. 0 = Drive ID 1 = Run Time	2, 3, 4	RW
P18.3.8	343	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
P18.3.9	2315	Staging Frequency Master drive can only add pump when output frequency is over staging frequency and feedback is out of bandwidth.	2, 3, 4	RW
P18.3.10	2316	De-Staging Frequency Master drive can only reduce pump when output frequency is below de-staging frequency and feedback is out of bandwidth.	2, 3, 4	RW
P18.3.11	344	Add/Remove Delay With feedback outside the bandwidth and the output frequency is over/below the staging/de-staging frequency, this time must pass before motors/pumps are added or removed from the system.	2, 3, 4	RW
P18.3.12	350	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. When in Multi drive mode only looks at interlock 1 or in single drive control when not including frequency converter.	2, 3, 4	RW
P18.3.13	346	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
P18.3.14	345	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

Code	Modbus ID	Parameter	Application	RO/RW
P18.3.15	347	AutoChange Interval Defines how often to rotate starting order of motors/pumps. Not available in multi-drive mode.	2, 3, 4	RW
P18.3.16	349	AutoChange 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
P18.3.17	348	AutoChange Motor 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
P18.3.18	2280	Run Time Enable The run time counter will start counting only if this parameter is enabled. 0 = Disable 1 = Enable	2, 3, 4	RW
P18.3.19	2281	Run Time Limit If drive run time is over this limit, there will be "Need Alternation" warning. Limit equals 0 means run time counter disabled.	2, 3, 4	RW
P18.3.20	2283	Run Time Reset One-time parameter, set to be 1 will clear run time counter.	2, 3, 4	RW
P18.3.21	483	Damper Start This parameter determines the function of damper. Not available in multi-drive mode. 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 acknowledgement 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 acknowledgement 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
P18.3.22	484	Damper Time Out The timeout time used for an Interlocked Time Start, after which the start sequence must be restarted if no acknowledgement contact is received. Not available in multi-drive mode.	2, 3, 4	RW
P18.3.23	485	Damper Delay The delay time following a Delay Start, after which the frequency converter will be started. Not available in multi-drive mode.	2, 3, 4	RW
P19.1	491	Interval 1 On Time On time for Interval function. It uses 24-hour format. Use to specify a time for a desired function be enabled.	2, 3, 4	RW
P19.2	493	Interval 1 Off Time Off time for Interval function. It uses 24-hour format. Use to specify a time for a desired function be enabled.	2, 3, 4	RW

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Code	Modbus ID	Parameter	Application	RO/RW
P19.3	517	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
P19.4	518	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
P19.5	519	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
P19.6	495	Interval 2 On Time See P19.1.	2, 3, 4	RW
P19.7	497	Interval 2 Off Time See P19.2.	2, 3, 4	RW
P19.8	520	Interval 2 From Day See P19.3.	2, 3, 4	RW
P19.9	521	Interval 2 To Day See P19.4.	2, 3, 4	RW
P19.10	522	Interval 2 Channel See P19.5.	2, 3, 4	RW
P19.11	499	Interval 3 On Time See P19.1.	2, 3, 4	RW
P19.12	501	Interval 3 Off Time See P19.2.	2, 3, 4	RW
P19.13	523	Interval 3 From Day See P19.3.	2, 3, 4	RW
P19.14	524	Interval 3 To Day See P19.4.	2, 3, 4	RW
P19.15	525	Interval 3 Channel See P19.5.	2, 3, 4	RW
P19.16	503	Interval 4 On Time See P19.1.	2, 3, 4	RW
P19.17	505	Interval 4 Off Time See P19.2.	2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P19.18	526	Interval 4 From Day See P19.3.	2, 3, 4	RW
P19.19	527	Interval 4 To Day See P19.4.	2, 3, 4	RW
P19.20	528	Interval 4 Channel See P19.5.	2, 3, 4	RW
P19.21	507	Interval 5 On Time See P19.1.	2, 3, 4	RW
P19.22	509	Interval 5 Off Time See P19.2.	2, 3, 4	RW
P19.23	529	Interval 5 From Day See P19.3.	2, 3, 4	RW
P19.24	530	Interval 5 To Day See P19.4.	2, 3, 4	RW
P19.25	531	Interval 5 Channel See P19.5.	2, 3, 4	RW
P19.26	511	Timer 1 Duration The timer will run when activated by DI.	2, 3, 4	RW
P19.27	532	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
P19.28	513	Timer 2 Duration See P19.26.	2, 3, 4	RW
P19.29	533	Timer 2 Channel See P19.27.	2, 3, 4	RW
P19.30	515	Timer 3 Duration See P19.26.	2, 3, 4	RW
P19.31	534	Timer 3 Channel See P19.27.	2, 3, 4	RW
P20.1.1	1556	FB Data Output 1 Sel Selects fieldbus process data word to pass over fieldbus.	1, 2, 3, 4	RW
P20.1.2	1557	FB Data Output 2 Sel Selects fieldbus process data word to pass over fieldbus.	1, 2, 3, 4	RW
P20.1.3	1558	FB Data Output 3 Sel Selects fieldbus process data word to pass over fieldbus.	1, 2, 3, 4	RW
P20.1.4	1559	FB Data Output 4 Sel Selects fieldbus process data word to pass over fieldbus.	1, 2, 3, 4	RW
P20.1.5	1560	FB Data Output 5 Sel Selects fieldbus process data word to pass over fieldbus.	1, 2, 3, 4	RW
P20.1.6	1561	FB Data Output 6 Sel Selects fieldbus process data word to pass over fieldbus.	1, 2, 3, 4	RW
P20.1.7	1562	FB Data Output 7 Sel Selects fieldbus process data word to pass over fieldbus.	1, 2, 3, 4	RW

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Code	Modbus ID	Parameter	Application	RO/RW
P20.1.8	1563	FB Data Output 8 Sel Selects fieldbus process data word to pass over fieldbus.	1, 2, 3, 4	RW
P20.2.1	586	RS-485 Comm Set This parameter defines the communication protocol for RS-485. 0 = Modbus RTU 1 = BACnet MS/TP 2 = SmartWire-DT	1, 2, 3, 4	RW
P20.2.2	587	Slave Address This parameter defines the slave address for RS-485 communication.	1, 2, 3, 4	RW
P20.2.3	584	Baud Rate This parameter defines communication speed for RS-485 communication.	1, 2, 3, 4	RW
P20.2.4	585	Parity Type This parameter defines parity type for RS-485 communication.	1, 2, 3, 4	RW
P20.2.5	588	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
P20.2.6	589	Slave Busy Shows the status of the Slave device on the network.	1, 2, 3, 4	RO
P20.2.7	590	Parity Error Counts the amount of Parity Errors seen on the RS-485 network.	1, 2, 3, 4	RO
P20.2.8	591	Slave Fault Error response given when slave receives message without communication error, but can't handle it.	1, 2, 3, 4	RO
P20.2.9	592	Last Fault Response Stores the last active fault for viewing over communications.	1, 2, 3, 4	RO
P20.2.10	593	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
P20.2.11	594	BACnet Baud Rate Communication speed of BACnet.	1, 2, 3, 4	RW
P20.2.12	595	MAC Address Selects the BACnet Address that the drive will be located at on Instance node.	1, 2, 3, 4	RW
P20.2.13	596	Instance Number Selects the BACnet Instance value.	1, 2, 3, 4	RW
P20.2.14	598	Comm Timeout BACnet Selects the time it waits before a communication fault occurs over BACnet.	1, 2, 3, 4	RW
P20.2.15	599	BACnet Protocol Status Shows the status of the BACnet protocol.	1, 2, 3, 4	RO
P20.2.16	600	BACnet Fault Code BACnet protocol faults. 0 = None 1 = Sole Master	1, 2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P20.3.1	1500	IP Address Mode This parameter defines the IP address configuration mode for EIP/Modbus TCP. 0 = DHCP with AutoIP 1 = Static IP	1, 2, 3, 4	RW
P20.3.2	1507	Active IP Address The current used IP address.	1, 2, 3, 4	RO
P20.3.3	1509	Active Subnet Mask The current used subnet mask.	1, 2, 3, 4	RO
P20.3.4	1511	Active Default Gateway The current used default gateway.	1, 2, 3, 4	RO
P20.3.5	1513	MAC Address 48 bit hardware address.	1, 2, 3, 4	RO
P20.3.6	1501	Static IP Address The static IP address. This parameter is used for user to configure the IP address, when P20.3.1 is set to be 1.	1, 2, 3, 4	RW
P20.3.7	1503	Static Subnet Mask The static IP address. This parameter is used for user to configure the subnet mask, when P20.3.1 is set to be 1.	1, 2, 3, 4	RW
P20.3.8	1505	Static Default Gateway The static IP address. This parameter is used for user to configure the default gateway, when P20.3.1 is set to be 1.	1, 2, 3, 4	RW
P20.3.9	608	EtherNet/IP Protocol Status Indicates if Ethernet Protocol is active or not. 0 = Stopped 1 = Operational 2 = Faulted	1, 2, 3, 4	RO
P20.3.10	609	Connection Limit Maximum number of connections allowed to the frequency converter.	1, 2, 3, 4	RW
P20.3.11	610	Modbus TCP Unit ID Unit identifier unit value for Modbus TCP.	1, 2, 3, 4	RW
P20.3.12	611	Comm Timeout Selects the time it waits before a communication fault occurs over Ethernet.	1, 2, 3, 4	RW
P20.3.13	612	Protocol Status 0 = Stopped 1 = Operational 2 = Faulted	1, 2, 3, 4	RO
P20.3.14	613	Slave Busy Value indicates frequency converter is communicating.	1, 2, 3, 4	RO
P20.3.15	614	Parity Error This parameter checks the input characters' parity error.	1, 2, 3, 4	RO
P20.3.16	615	Slave Failure Indicates the frequency converter is unable to process message.	1, 2, 3, 4	RO
P20.3.17	616	Last Fault Resp Shows the last active fault that occurred.	1, 2, 3, 4	RO
P20.4.1	2139	Protocol Status Smartwire protocol status.	1, 2, 3, 4	RO

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P20.4.2	2141	SmartWire Baud Rate SmartWire protocol bus speed. 0–125 KBaud 1–250 KBaud	1, 2, 3, 4	RW
P21.1.1	340	Language This parameter offers the ability to control the frequency converter through the keypad in the language of your choice.	1, 2, 3, 4	RW
P21.1.2	142	Application This parameter sets the active application if multiple applications have been loaded.	1, 2, 3, 4	RW
P21.1.3	619	Parameter Sets This parameter allows you to reload the factory default parameter values, and to store and load two customized parameter sets. 0 = No 1 = Load Factory Default parameters 2 = Store parameter set #1 3 = Load parameter set #1 4 = Store parameter set #2 5 = Load parameter set #2	1, 2, 3, 4	RW
P21.1.4	620	Up to Keypad This function uploads all existing parameter groups to the keypad. 0 = No 1 = Yes (All parameters)	1, 2, 3, 4	RW
P21.1.5	621	Down From Keypad This function downloads one or all parameter groups from the keypad to the drive. 0 = No 1 = Yes (All parameters)	1, 2, 3, 4	RW
P21.1.6	623	Param Comparison With the Parameter Comparison function, you can compare the actual parameter values to the values of your customized parameter sets and those loaded to the control keypad. The actual parameter values are first compared to those of the customized parameter Set1. If no differences are detected, a “0” is displayed on the lowermost line of the keypad. If any of the parameter values differ from those of the Set1 parameters, the number of the deviations is displayed together. By pressing the right arrow button once again you will see both the actual value and the value it was compared to. In this display, the value on the Description line (in the middle) is the default value, and the one on the value line (lowermost line) is the edited value. You can also edit the actual value by pushing the Right Arrow button. Actual values can also be compared to Set2, Factory Settings and Keypad Set values.	1, 2, 3, 4	RW
P21.1.7	624	Password The application selection can be protected against unauthorized changes with the Password function. When the password function is enabled, the user will be prompted to enter a password before application changes, parameter value changes, or password changes. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9999. To deactivate the password, reset the parameter value to 0.	1, 2, 3, 4	RW

Code	Modbus ID	Parameter	Application	RO/RW
P21.1.8	625	Parameter Lock This function allows the user to prohibit changes to the parameters. If the parameter lock is activated the text *locked* will appear on the display if you try to edit a parameter value. Note: This function does not prevent unauthorized editing of parameter values.	1, 2, 3, 4	RW
P21.1.9	627	Multimonitor Set The keypad display where can display three actual monitored values at the same time. This parameter determines if the operator is allowed to replace the values monitored with other values.	1, 2, 3, 4	RW
P21.1.10	628	Default Page This parameter sets the view to which the display automatically moves as the Timeout Time expires or when the keypad power is switched on. If the Default Page value is 0, the function is not activated, i.e., the last displayed page remains on the keypad display.	1, 2, 3, 4	RW
P21.1.11	629	Timeout Time The Timeout Time setting defines the time after which the keypad display returns to the Default Page. Note: If the Default Page value is 0 the Timeout Time setting has no effect.	1, 2, 3, 4	RW
P21.1.12	630	Contrast Adjust If the display is not clear, you can adjust the keypad contrast with this parameter.	1, 2, 3, 4	RW
P21.1.13	631	Backlight Time This parameter determines how long the backlight stays on before going out.	1, 2, 3, 4	RW
P21.1.14	632	Fan Control This function allows you to control the PowerXL DG1's cooling fan. You can set the fan to run: 1 = Continuous fan runs continuously 2 = Temperature—based on the temperature of the unit. The fan is switched on automatically when the heat sink temperature reaches 60°C. The fan receives a stop command when the heat sink temperature falls to 55°C. The fan runs for about a minute after receiving the stop command or switching on the power, as well as after changing the value from "Continuous" to "Temperature" 3 = First Start after power up, the fan is stopped until the run command is given and then fan runs continuously. This is mainly made for common DC-bus systems to prevent cooling fans to load charging resistors on power up moment 4 = Calc Temp starting of cooling fan is based on calculated IGBT temperature. When IGBT temp = 40°C, fan starts and when temp falls down to 30°C, fan stops Note: The fan runs continuously, regardless of this setting, when the frequency converter is in RUN state.	1, 2, 3, 4	RW
P21.1.15	633	HMI ACK Timeout This function allows the user to change the timeout of the HMI acknowledgement time. <i>Example:</i> I Transfer delay between the frequency converter and the PC = 600 ms I The value of HMI Acknowledge Timeout is set to 1200 ms (2 x 600, sending delay + receiving delay) I The corresponding setting shall be entered in the [Misc]-part of the file NCDrive.ini: Retries = 5 AckTimeOut = 1200 TimeOut = 6000 It must also be considered that intervals shorter than the HMI Acknowledge Timeout time cannot be used in frequency converter drive monitoring.	1, 2, 3, 4	RW

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
P21.1.16	634	HMI Retry Num With this parameter you can set the number of times the drive will try to receive acknowledgement when it has not been received within the acknowledgement time (HMI Acknowledge Timeout) or if the received acknowledgement is faulty.	1, 2, 3, 4	RW
P21.2.1	640	Keypad Software Version	1, 2, 3, 4	RO
P21.2.2	642	Motor Control Software Version	1, 2, 3, 4	RO
P21.2.3	644	Application Software Version	1, 2, 3, 4	RO
P21.3.1	646	Brake Chopper Stat	1, 2, 3, 4	RO
P21.3.2	647	Brake Resistor	1, 2, 3, 4	RO
P21.3.3	648	Serial Number The Hardware information.	1, 2, 3, 4	RO
P21.4.1	566	Real Time Clock This parameter shows the real time clock, user can also edit it to adjust time.	1, 2, 3, 4	RW
P21.4.2	582	Daylight Saving Daylight saving rule. 0 = Off 1 = EU 2 = US	1, 2, 3, 4	RW
P21.4.3	601	Total MWh Count Megawatt hours total operation time counter.	1, 2, 3, 4	RO
P21.4.4	603	Total Power Day Count Number of days the GMAX has been supplied with power.	1, 2, 3, 4	RO
P21.4.5	606	Total Power Hr Count Number of hours the GMAX has been supplied with power.	1, 2, 3, 4	RO
P21.4.6	604	Trip MWh Count Megawatts hours since last reset.	1, 2, 3, 4	RW
P21.4.7	635	Clear Trip MWh Count Resets megawatts hours counter and clears Energy Meter in the Menu (P21.4.7).	1, 2, 3, 4	RW
P21.4.8	636	Trip Power Day Count Number of days since the last reset.	1, 2, 3, 4	RW
P21.4.9	637	Trip Power Hr Count Number of hours the HVX9000 has been running a motor since the last reset.	1, 2, 3, 4	RW
P21.4.10	639	Clear Trip Power Count Resets the day and hour motor or drive running counter and resets the Motor Run Time in the Menu (P21.4.9 and P21.4.10).	1, 2, 3, 4	RW
M1	1	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
M2	24	Frequency Reference Drive frequency reference value. Motor output frequency should match this value in frequency control mode.	1, 2, 3, 4	RO
M3	2	Motor Speed Motor speed is calculated based on the V/Hz curve that was set up when motor parameters were entered.	1, 2, 3, 4	RO
M4	3	Motor Current Measured output motor current.	1, 2, 3, 4	RO
M5	4	Motor Torque Percent calculated motor torque based on the current draw of the motor and its nameplate values.	1, 2, 3, 4	RO

Code	Modbus ID	Parameter	Application	RO/RW
M6	5	Motor Power Percent calculated motor power based on the current and voltage draw of the motor and its nameplate values.	1, 2, 3, 4	RO
M7	6	Motor Voltage Measured output AC motor voltage.	1, 2, 3, 4	RO
M8	7	DC Link Voltage Measured DC bus voltage.	1, 2, 3, 4	RO
M9	8	Unit Temperature Measured drive heat sink temperature in °C.	1, 2, 3, 4	RO
M10	9	Motor Temperature Calculated motor temperature value in percentage. Value is based on motor nameplate data and the motor status information noted on power up.	1, 2, 3, 4	RO
M11	15	Torque Reference Torque reference percentage used when in torque control mode.	4	RO
M12	10	Analog Input 1 Analog input 1 measured value. Can be a current or voltage input signal.	1, 2, 3, 4	RO
M13	11	Analog Input 2 Analog input 2 measured value. Can be a current or voltage input signal.	1, 2, 3, 4	RO
M14	25	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
M15	575	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
M16	12	DI1, DI2, DI3 Digital input status.	1, 2, 3, 4	RO
M17	13	DI4, DI5, DI6 Digital input status.	1, 2, 3, 4	RO
M18	576	DI7, DI8 Digital input status.	1, 2, 3, 4	RO
M19	14	DO1 Digital output status.	1, 2, 3, 4	RO
M20	557	RO1, RO2, RO3 Relay output status.	1, 2, 3, 4	RO
M21	558	TC1, TC2, TC3 Timer channel status.	2, 3, 4	RO
M22	559	Interval Time interval 1 status.	1, 2, 3, 4	RO
M23	560	Interval 2 Time interval 2 status.	2, 3, 4	RO
M24	561	Interval 3 Time interval 3 status.	2, 3, 4	RO
M25	562	Interval 4 Time interval 4 status.	2, 3, 4	RO
M26	563	Interval 5 Time interval 5 status.	2, 3, 4	RO

Appendix A—Description of Parameters

Code	Modbus ID	Parameter	Application	RO/RW
M27	569	Timer 1 Timer 1 value in seconds.	2, 3, 4	RO
M28	571	Timer 2 Timer 2 value in seconds.	2, 3, 4	RO
M29	573	Timer 3 Timer 3 value in seconds.	2, 3, 4	RO
M30	16	PID1 Set Point PID1 reference value level.	2, 3, 4	RO
M31	18	PID1 Feedback PID1 actual value feedback level.	2, 3, 4	RO
M32	20	PID1 Error Value PID1 difference between set point and feedback value levels.	2, 3, 4	RO
M33	22	PID1 Output PID1 output percentage to the motor.	2, 3, 4	RO
M34	23	PID1 Status PID1 status indication. Indicates if drive is stopped, running in PID mode, or in PID sleep mode.	2, 3, 4	RO
M35	32	PID2 Set Point PID2 reference value level.	3, 4	RO
M36	34	PID2 Feedback PID2 actual value feedback level.	3, 4	RO
M37	36	PID2 Error Value PID2 difference between set point and feedback value levels.	3, 4	RO
M38	38	PID2 Output PID2 output percentage to the motor.	3, 4	RO
M39	39	PID2 Status PID2 status indication. Indicates if drive is stopped, running in PID mode, or in PID sleep mode.	3, 4	RO
M40	26	Running Motors Number of auxiliary motors currently running.	2, 3, 4	RO
M41	27	PT100 Temperature PT100 thermistor temperature value in °C.	1, 2, 3, 4	RO
M42	28	Last Active Fault Last active fault value. See fault codes for the value shown here.	1, 2, 3, 4	RO
M43	583	RTC Battery Status Real-time clock battery status.	1, 2, 3, 4	RO
M44	1686	Instance Motor Power Measured Instantaneous motor power draw in kW.	1, 2, 3, 4	RO
M45	2119	Energy Savings Displayed energy value based off of format chosen.	1, 2, 3, 4	RO
M46	30	Multi-Monitoring Displays 3 monitoring values in a single screen. The values are selectable via the keypad menu.	1, 2, 3, 4	RO

Appendix B—Faults and Warning Codes

Under this menu, you can find Active faults, History faults and Fault codes.

Table 162. 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 163. 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 ⓘ = 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
1	Over Current	Fault		AC drive has detected too high a current (>4*I _H) 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
2	Over Voltage	Fault		The DC-link voltage has exceeded the limits defined: - Too short of 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
3	Earth Fault	Configurable (1)	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
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
6	Emergency Stop	Fault		- STO terminal open in control board - Emergency signal from DI is activated	- Closed STO terminal - Remove signal from DI
7	Saturation Trip	Fault		- Short circuit in motor cables - IGBT module is damaged	Check cables and connections Reset the fault and restart Verify that EMC screw is installed Should the fault re-occur, contact the distributor near to you

Appendix B—Faults and Warning Codes

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy
9	UnderVoltage	Configurable (1)	Fault	DC link voltage is under the voltage limits defined: • Most probable cause: Too low of a supply voltage • AC drive internal fault • Defective 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
10	Input Phase Spv	Configurable (1)	Fault	• Input line phase is missing	Check supply voltage, fuses and cable
11	Output Phase Spv	Configurable (1)	Fault	Current measurement has detected that there is no current in one motor phase	Check motor cable and motor
12	BrakeChopperSpv	Fault		• No brake resistor installed • Brake resistor is broken • Brake chopper failure	Check brake resistor and cabling. If these are OK, the brake chopper is faulty. Contact the distributor near you.
13	Drive UnderTemp	Configurable (1)	Warning	Too low temperature measured in power Unit's heat sink or board. Heat sink temperature is under -10°C	
14	Drive OverTemp	Fault		Too high temperature measured in power unit 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
15	Motor Stalled	Configurable (1)	No Action	• Motor is stalled	Check motor and load
16	Motor OverTemp	Configurable (1)	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
17	Motor UnderLoad	Configurable (1)	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
18	IP Address Conflict	Configurable (1)	Warning	IP setting issue.	Check settings for IP address, verify no duplicates are on the network.
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.
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.
21	Serial 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.
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.
26	Start-up Prevent	Fault		The time when Interlock signal activates is over setting time.	Stop drive and resend start command.
29	Thermistor Fault	Configurable (1)	Fault	Option board or control board thermistor resistor larger than 4.7 k	Thermistor open or short, over temperature
32	Fan Cooling	Fault		Fan is damaged or stalled.	Check fan and fan connected wires. Verify 24 Vdc is supplied to fan.
36	Compatibility Fault	Fault		The control board doesn't match with the power board.	Cycle power to drive. Try updating software. If issue continues, contact a Distributor near you.
37	Device Change	Warning		Power board or option card change.	Alarm will reset
38	Device Added	Warning		Power board or option board added.	Device is ready for use Old parameter settings will be used

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy
39	Device Removed	Fault		Option board removed from slot, or power board removed from control board.	Device will no longer be available in drive.
40	Device Unknown	Fault		Unknown device connected (power board/option board)	Check eeprom connection. Check board connection on slot A/B Cycle power to drive.
41	IGBT Temperature	Fault		IGBT temperature is too high.	• Check output loading • Check motor size • Decrease switching frequency
50	AIN<4mA(4to20mA)	Configurable (1)	No Action	Loss of analog input signal (dropped below 4 mA)	Verify analog input current reference value on either AI1 or AI2. Check cabling.
51	External Fault	Configurable (1)	Fault	Digital input is activated for external fault input.	Check digital input settings and verify input level. There could be an external device causing fault.
52	Keypad Communication Fault	Configurable (1)	Fault	Connection lost between keypad and drive control section when control place and reference are set to Keypad.	Check keypad connection and possible keypad cable.
54	OPT Card Fault	Configurable (1)	Fault	Defective option card or option card slot	Check option card and option card slot connections. Check Board Status on Keypad for exact cause of fault. Contact distributor near you.
55	Real time clock fault	Configurable (1)	Warning	• Communication between MCU and RTC chip isn't normal • The power of RTC chip isn't normal • The real time isn't normal	Check the RTC chip, power cycle to drive. If issue continues contact distributor near you.
56	PT100 Fault	Configurable (1)	Fault	Temperature is beyond the limit of sensing capacity of PT100	Pt100 short, open or over temperature, check PT100 temperature probe.
57	Motor ID fault	Fault		The Motor parameters Identification run was not completed successfully	Check motor size Verify the input and output wiring is connected properly.
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
59	Possible power wiring error detected	Fault		Power wiring may connected to output of drive or not properly torqued	Verify power input wiring is connected to L1, L2 and L3 terminals and they are properly torqued.
60	Control Board OverTemp	Fault		Control board is over +85 °C or under –30 °C	Check NTC resistor Check control board temperature
61	Internal-ctrl Supply	Fault		+24V port voltage is over 27 V or under 17 V	Check voltage range of +24 V on terminals 12 to 13. If voltage is out of range, contact distributor near you.
62	Too Many Speed Search Restarts	Fault		Speed searching failed when performing flying start.	Check motor parameters' setting and motor connections.
63	Current Unbalance	Fault		Output current is unbalanced.	Check motor wiring and voltage output of drive. If issue continues, contact distributor near you.
64	Replace Battery	Configurable (1)	Warning	RTC battery voltage is too low.	Check the RTC battery voltage. Contact distributor near you for replacement battery.
65	Replace Fan	Configurable (1)	Warning	Fan life is less than 2 months	Check the fan. Clean out any contamination. Contact distributor near you for replacement fan.
66	Safety Torque Off	Fault		STO was triggered and STO input is open.	Reset STO Trigger and verify wiring. Reset fault after input is enabled.
67	Current limit control	Warning		The output current has reached the current limit value	Check the load Set the acceleration time longer

Appendix B—Faults and Warning Codes

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy
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
69	System Fault	Fault		Thermistor SPI communication error.	Check thermistor chip.
70	System Fault	Fault		MCU sent wrong parameters to DSP.	Restart the drive. Should the fault re-occur, contact the distributor near to you.
71	System Fault	Fault		MCU and DSP communication error.	Restart the drive. Should the fault re-occur, contact the distributor near to you.
72	Power Board EEPROM Fault	Fault		Power board eeprom fault, memory lost in eeprom when drive is initialized.	Cycle power to drive. Try updating software to latest revision. If issue continues, contact distributor near you.
73	FRAM Fault	Fault		FRAM chip is broken.	Contact distributor near you.
74	FRAM Fault	Fault		CRC check fault when accessing fram data.	Reset drive to factory defaults. If issue continues, contact distributor near you.
75	Power Board EEPROM Fault	Fault		eeprom chip or I2c circuit is broken.	Contact distributor near you.
76	Power Board EEPROM Fault	Fault		CRC check fault when accessing eeprom data.	Reset drive to factory defaults. If issue continues, contact distributor near you.
77	Serial Flash Fault	warning		External serial flash chip is broken.	Contact distributor near you.
82	BypassOverLoad	Fault		Over load fault when drive is in bypass mode	Check motor connections
83	FieldBus Fault	Configurable (1)	Fault	Loss of communication with Modbus RTU when the control place and reference signal are set to Fieldbus and the Fieldbus signal is lost or there is an issue with communication settings.	Check RS485 communication wiring. Verify drive parameters are set correctly. Check master programming to verify proper addressing.
84	FieldBus Fault	Configurable (1)	Fault	Loss of communication with Modbus TCP when the control place and reference signal are set to Fieldbus and the Fieldbus signal is lost or there is an issue with communication settings.	Check Ethernet communication wiring. Verify drive parameters are set correctly. Check master programming to verify proper addressing.
85	FieldBus Fault	Configurable (1)	Fault	Loss of communication with BACnet when the control place and reference signal are set to Fieldbus and the Fieldbus signal is lost or there is an issue with communication settings.	Check RS485 communication wiring. Verify drive parameters are set correctly. Check BACnet master configuration programming to verify proper addressing.
86	FieldBus Fault	Configurable (1)	Fault	Loss of communication with EtherNet/IP when the control place and reference signal are set to Fieldbus and the Fieldbus signal is lost or there is an issue with communication settings.	Check Ethernet communication wiring. Verify drive parameters are set correctly. Check EIP master configuration programming to verify proper addressing.
87	FieldBus Fault	Configurable (1)	Fault	Loss of communication with PROFIBUS master in Slot A when the control place and reference signal are set to Fieldbus and the Fieldbus signal is lost or there is an issue with communication settings.	Check PROFIBUS/CANOpen/DeviceNet communication wiring. Verify drive parameters are set correctly. Check PROFIBUS/CANOpen/DeviceNet master configuration programming to verify proper addressing.
88	FieldBus Fault	Configurable (1)	Fault	Loss of communication with PROFIBUS master in Slot B when the control place and reference signal are set to Fieldbus and the Fieldbus signal is lost or there is an issue with communication settings.	Check PROFIBUS/CANOpen/DeviceNet communication wiring. Verify drive parameters are set correctly. Check PROFIBUS/CANOpen/DeviceNet master configuration programming to verify proper addressing.
89	Under Voltage	Fault		The DC link voltage has reached the drive's under voltage stop limit value.	Check the input voltage.

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy
90	Drive UnderTemp	Warning/Fault		• Cold weather mode is not enabled, and unit temperature is less than -10°C. • Cold weather mode is enabled, Under Temp Fault Override is not set, and unit temperature is less than -30°C. • Cold weather mode is enabled, Under Temp Fault Override is not set, and unit temperature is between -20°C and -30°C. The temp is less than -20°C when cold weather start time out.	If unit temp is between -20°C and -10°C, start the motor in cold weather mode. If unit temp is less than -20°C, warm the unit to above -20°C for proper operation using cold weather mode. If is it still less than -20°C when cold weather mode time out, try a higher output voltage in cold weather mode.
91	Option Card Fault	Fault		External supply on the DeviceNet communication connector is not present.	Check voltage and wiring of power supply of the DeviceNet communication.
92	External Fault 2	Configurable (1)	Fault	Digital input is activated for external fault input.	Check digital input settings and verify input level. There could be an external device causing fault.
93	External Fault 3	Configurable (1)	Fault	Digital input is activated for external fault input.	Check digital input settings and verify input level. There could be an external device causing fault.

Eaton is dedicated to ensuring that reliable, efficient and safe power is available when it's needed most. With unparalleled knowledge of electrical power management across industries, experts at Eaton deliver customized, integrated solutions to solve our customers' most critical challenges.

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