PowerXL DG1 Series VFD

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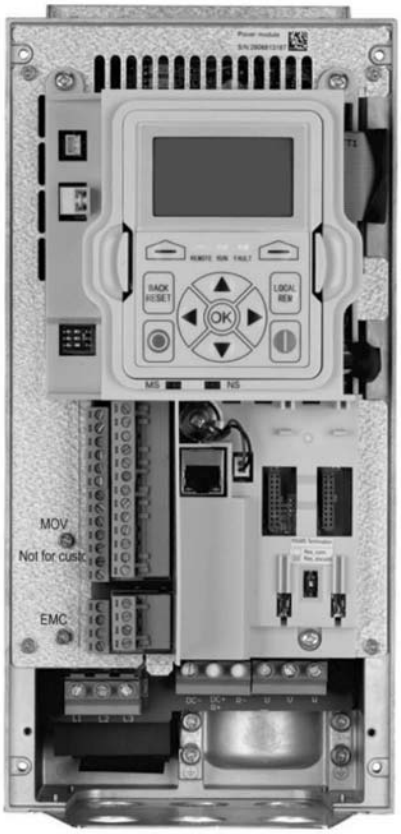
Application manual



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Cover Photo: Eaton PowerXL® DG1 Series Drives

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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 mm^2 Cu or 16 mm^2 Al, through its total run

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

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

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

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

Do not perform any voltage withstand tests on any part of PowerXL 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 capacitives ou inductives ne compromettent pas les fonctions d'automatisation
- Installer les appareils d'automatisation et les éléments de fonctionnement associés de manière à ce qu'ils soient bien protégés contre tout fonctionnement accidentel
- Des dispositifs de sécurité matériels et logiciels appropriés doivent être utilisés en rapport avec l'interface des E/S afin qu'un circuit ouvert sur le côté signal ne résulte pas en états indéfinis dans les dispositifs d'automatisation
- Assurer une isolation électrique fiable sur le côté tension extra basse de l'alimentation 24 V. Utiliser uniquement des blocs d'alimentation conformes à la norme CEI 60364-4-41 (VDE 0100, partie 410) ou HD384.4.41 S2
- Les écarts entre la tension d'entrée et la tension nominale ne doivent pas dépasser les limites de tolérance indiquées dans les spécifications, au risque de provoquer un mauvais fonctionnement et une utilisation dangereuse du système
- Les dispositifs d'arrêt d'urgence conformes à la norme CEI/EN 60204-1 doivent être efficace dans tous les modes de fonctionnement des dispositifs d'automatisation. Le déverrouillage des dispositifs d'arrêt d'urgence ne doit pas entraîner un redémarrage
- Les dispositifs conçus pour un montage dans des boîtiers ou armoires de commande ne doivent être utilisés et contrôlés qu'après avoir été installés et avec le boîtier fermé. Les unités de bureau ou portatives ne doivent être utilisées et contrôlées que dans leurs boîtiers fermés
- Des mesures doivent être prises pour assurer un bon redémarrage des programmes interrompus après une chute ou une panne de tension. Ceci ne doit pas causer des états de fonctionnement dangereux, même pour un court laps de temps. Si nécessaire, des dispositifs d'arrêt d'urgence doivent être utilisés
- Quand des défaillances du système d'automatisation peuvent entraîner des blessures ou des dommages matériels, des mesures externes doivent être appliquées pour assurer un état de fonctionnement sans danger en cas de panne ou de mauvais fonctionnement (par exemple au moyen de disjoncteurs séparés, de verrouillages mécaniques, etc.)
- En fonction de leur degré de protection, les entraînements à fréquence variable peuvent contenir des pièces métalliques sous tension, des composants rotatifs ou en mouvement et des surfaces brûlantes, pendant le fonctionnement et immédiatement après l'arrêt
- Le retrait des protections requises, une installation incorrecte ou un mauvais fonctionnement du moteur ou de l'entraînement à fréquence variable peuvent causer la défaillance de l'appareil et entraîner des blessures graves et des dommages importants
- La réglementation nationale applicable en matière de sécurité et de prévention des accidents s'applique à tous les travaux effectués sur les entraînements à fréquence variable sous tension
- L'installation électrique doit être effectuée conformément aux réglementations applicables (par exemple, en ce qui concerne les sections transversales des câbles, les fusibles, la mise à la terre de protection)
- Le transport, l'installation, la mise en service et les travaux de maintenance doivent être effectués uniquement par un personnel qualifié (IEC 60364, HD 384 et règles de sécurité du travail)
- Les installations contenant des entraînements à fréquence variable doivent être équipées de dispositifs de surveillance et de protection, conformément aux réglementations applicables en matière de sécurité. Les modifications des entraînements à fréquence variable réalisées à l'aide du logiciel d'exploitation sont autorisées
- Toutes les protections et les portes doivent être maintenues fermées pendant le fonctionnement

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

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

Définitions et symboles

AVERTISSEMENT

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

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

AVERTISSEMENT

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

MISE EN GARDE

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

Haute tension dangereuse

AVERTISSEMENT

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

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

AVERTISSEMENT

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

Prêter attention aux avertissements signalant des dangers !

DANGER
5 MIN

AVERTISSEMENT

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

AVERTISSEMENT

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

Avertissements et mises en garde

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

Avant d'ouvrir les couvercles de l'entraînement :

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

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

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

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

⚠ AVERTISSEMENT

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

⚠ AVERTISSEMENT

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

Prêter attention aux avertissements signalant des dangers !

Surface brûlante – Risque de brûlure. NE PAS TOUCHER !

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

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

⚠ MISE EN GARDE

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

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

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

⚠ MISE EN GARDE

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

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

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

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

Sécurité du moteur et de l'équipement

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

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

⚠ MISE EN GARDE

Fonctionnement incorrect de l'entraînement :

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

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

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

Chapter 1—PowerXL 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 variable frequency drive (VFD). To provide for safe installation and operation of the equipment, read the safety guidelines at the beginning of this manual and follow the procedures outlined in the following chapters before connecting power to the DG1 Series VFD. Keep this operating manual handy and distribute to all users, technicians and maintenance personnel for reference.

Receiving and inspection

The DG1 Series VFD has met a stringent series of factory quality requirements before shipment. It is possible that packaging or equipment damage may have occurred during shipment. After receiving your DG1 Series VFD, 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 VFD 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 VFD, the RTC battery (already mounted in the drive) must be connected to the control board.

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

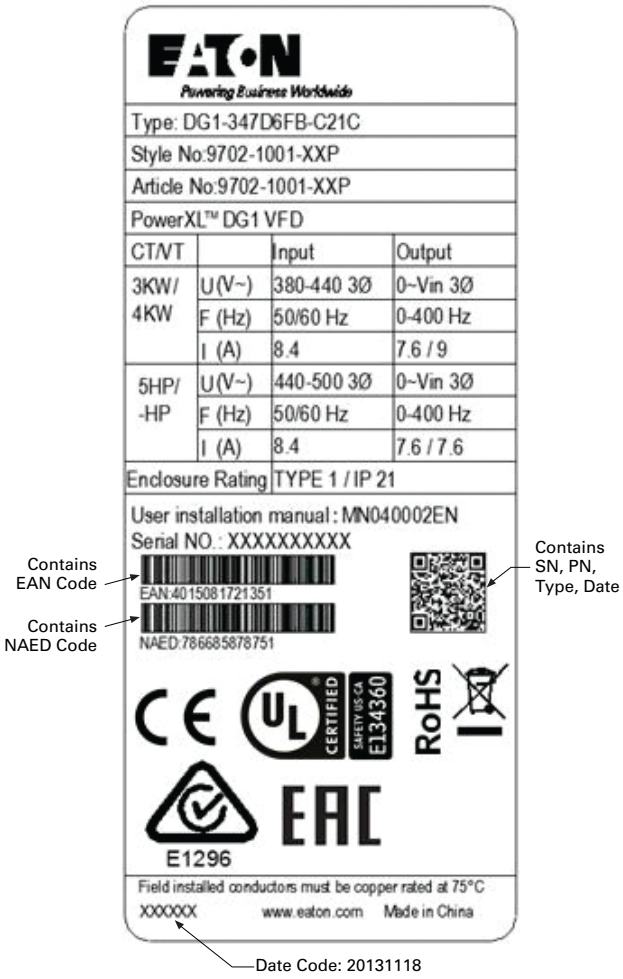
Figure 1. RTC battery connection

Table 1. Common abbreviations

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

Rating label

Figure 2. Rating label

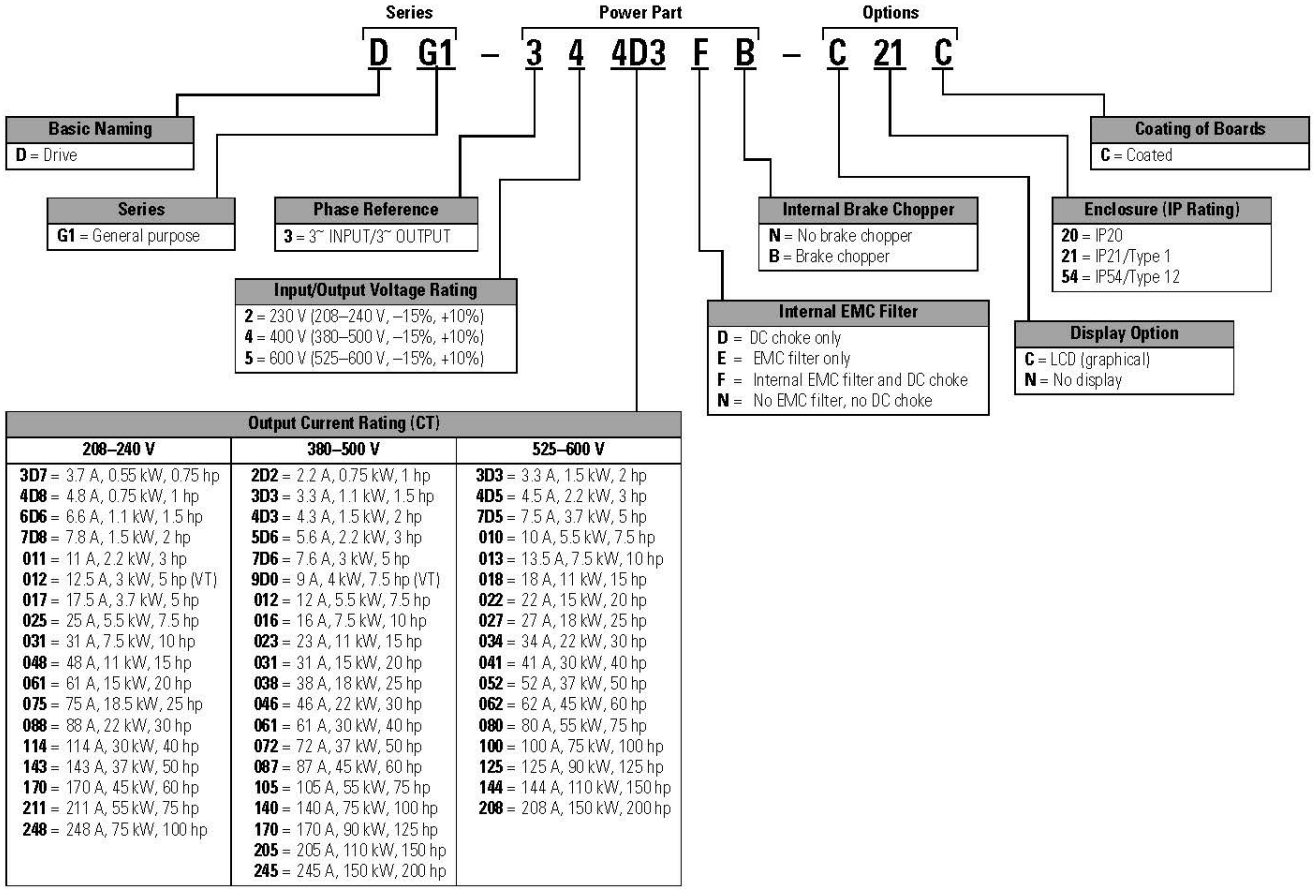


Carton labels (U.S. and Europe)

Same as rating label shown above.

Catalog number system

Figure 3. Catalog numbering system



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

Power ratings and product selection

DG1 series drives—208–240 Volt

Table 2. Type 1/IP21

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

Table 3. Type 12/IP54

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

Note:

DG1 series drives—380–500 volt

Table 4. Type 1/IP21

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

Table 5. Type 12/IP54

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

Note:

DG1 series drives—600 volt①

Table 6. Type 1/IP21

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

Table 7. Type 12/IP54

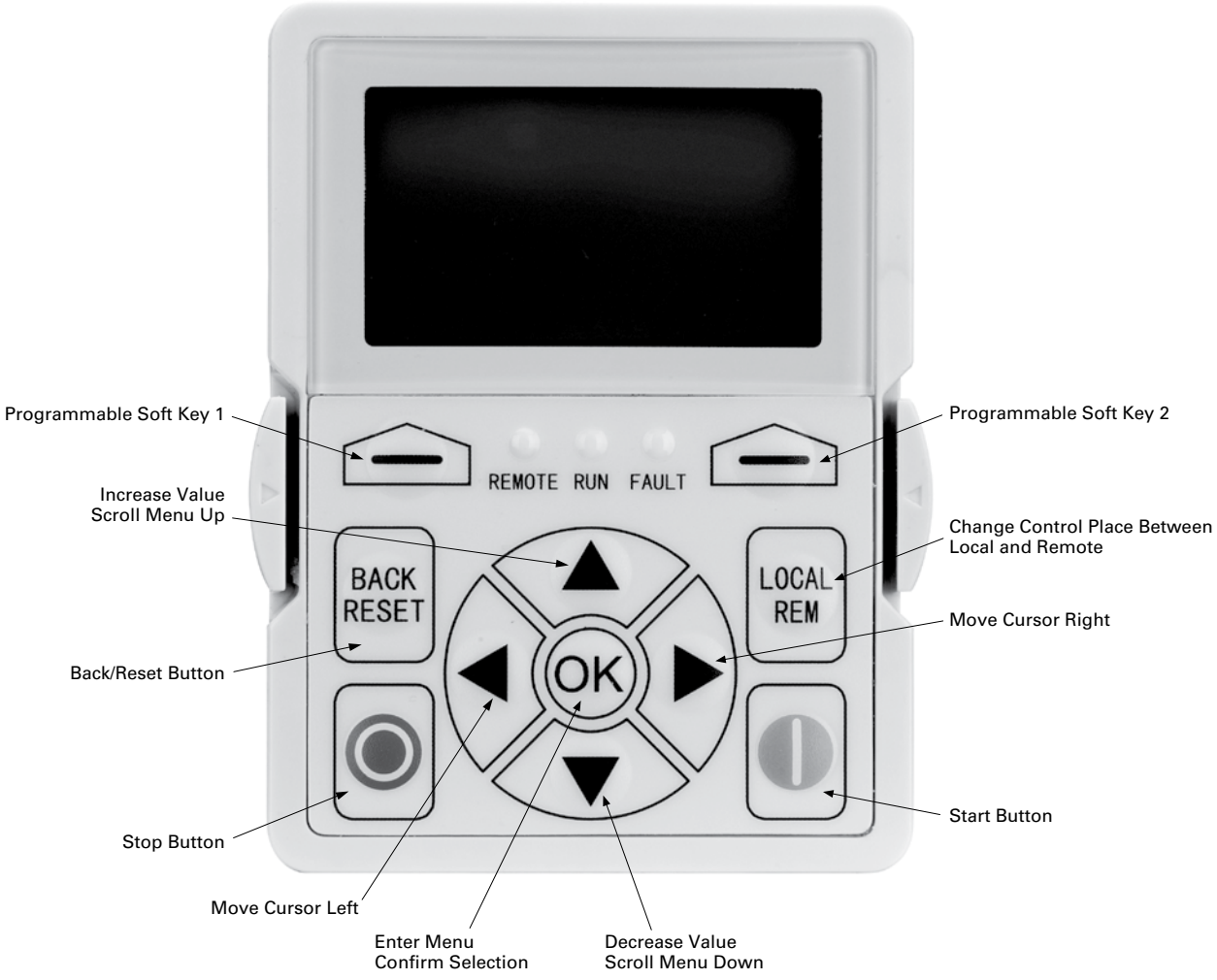
	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)			
Frame size	**600 V, 60 Hz kW rating**	**600 V, 60 Hz hp**	**Current A**	**600 V, 60 Hz kW rating**	**600 V, 60 Hz hp**	**Current A**	**Catalog number**
FR1	1.5	2	3.3	2.2	3	4.5	**DG1-353D3FB-C54C**
	2.2	3	4.5	3.7	5	7.5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

Note:

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. Jog can enabled via press OK Key and Soft2 Key(When the Soft2Key is Jog) and disabled via release any one of the two keys. • Favorite, this shall add this parameter to the Favorite menu. • Delete, this shall delete this parameter from the Favorite menu.
	Back/Reset	**Back/Reset:** This button has three integrated functions. The button operates as backward button during normal mode. In edit mode, it is used as cancel operate. It is also used to reset faults when faults occur. • Backs up one step. • Cancels Modify in edit mode. • Resets the active faults (all the active faults shall be reset by pressing this button more than 2 seconds in any page). • Hold Stop and Back Reset for 5 seconds to return drive to factory default • At Main Menu page by hitting Back/Reset takes to Default Page.
	Local/Remote	**Local/Remote:** When HOA Source select is Keypad, the state will switch between local, remote and off. The Control location will correspond to the local and remote shall be selected within the application.
 	Up Down	**Up and down arrows:** • Move either up or down a menu list to select the desired menu item. • Editing a parameter bit by bit, while the active digit is scrolled. • Increase/decrease the reference value of the selected parameter. • In parameter comparison mode, scroll through the parameters of which current value is different from comparison parameter value. • In parameter page when in read mode, move to the previous or next brother parameter of this parameter.

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

LED lights

Table 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).
Remote	**Local/Remote:** Local: If the local control place is selected, the light will be off. Remote: If the remote control place is selected, the light will be on.

LCD display

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

Overview

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

Figure 5. General view of LCD

The lines definition is as below:

The first line is State line, shows:

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

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

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

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

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

Welcome page

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

Figure 6. Welcome page

Upgrade page

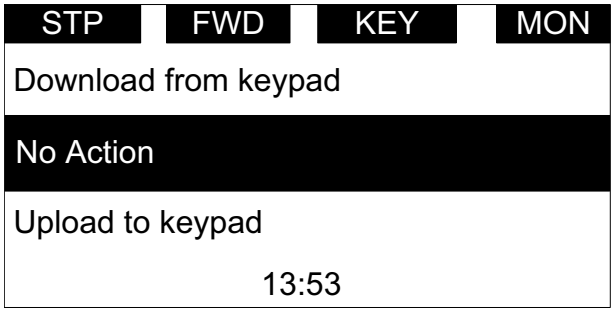
After welcome page, keypad will check whether there is different keypad firmware version in MCU's serial flash. If yes, then ask user whether to upgrade the keypad.

Figure 7. Upgrade page

Auto backup page

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

Figure 8. Auto backup page



Soft key description

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

Table 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

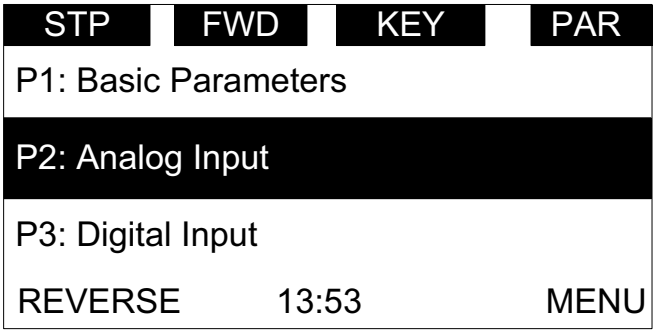
***Note:** if P21.1.18 or P21.1.19 is set to hidden it will hide this value.

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

Figure 9. Main menu

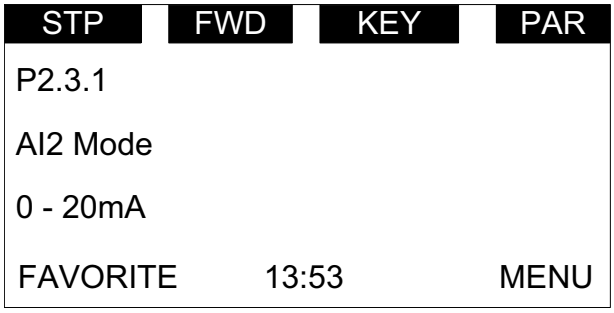
2. For the parameter group, the two soft keys "REVERSE/FORWARD" and "MENU" shall be shown. See **Figure 10**

Figure 10. Parent node page



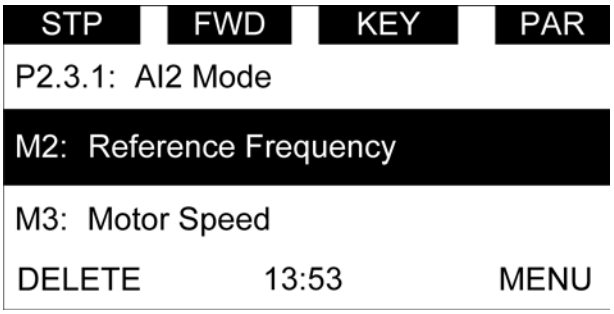
3. For the parameter menu, if this parameter hasn't been added into the favorite list, two soft keys "FAVORITE" and "MENU" shall be shown. If it has been added into the favorite list, only one soft key "MENU" is shown in the right

Figure 11. Parameter page



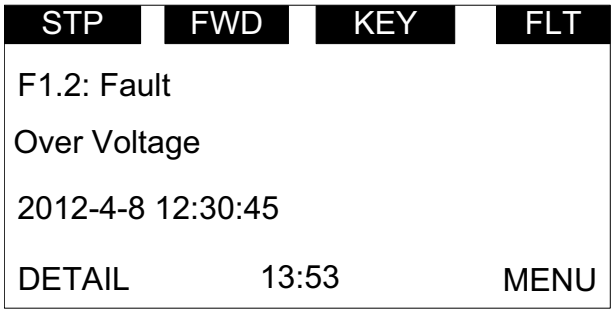
4. If one parameter has been added to the favorite list, it shall appear in the favorite menu. Then when you enter into the favorite menu, two soft keys "DELETE" and "MENU" shall be shown, and "DELETE" means you can delete the selected parameter from favorite list. See **Figure 12**

Figure 12. Parameter page from favorite menu



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

Figure 13. Fault page



Chapter 3—Menu overview

Main menu page

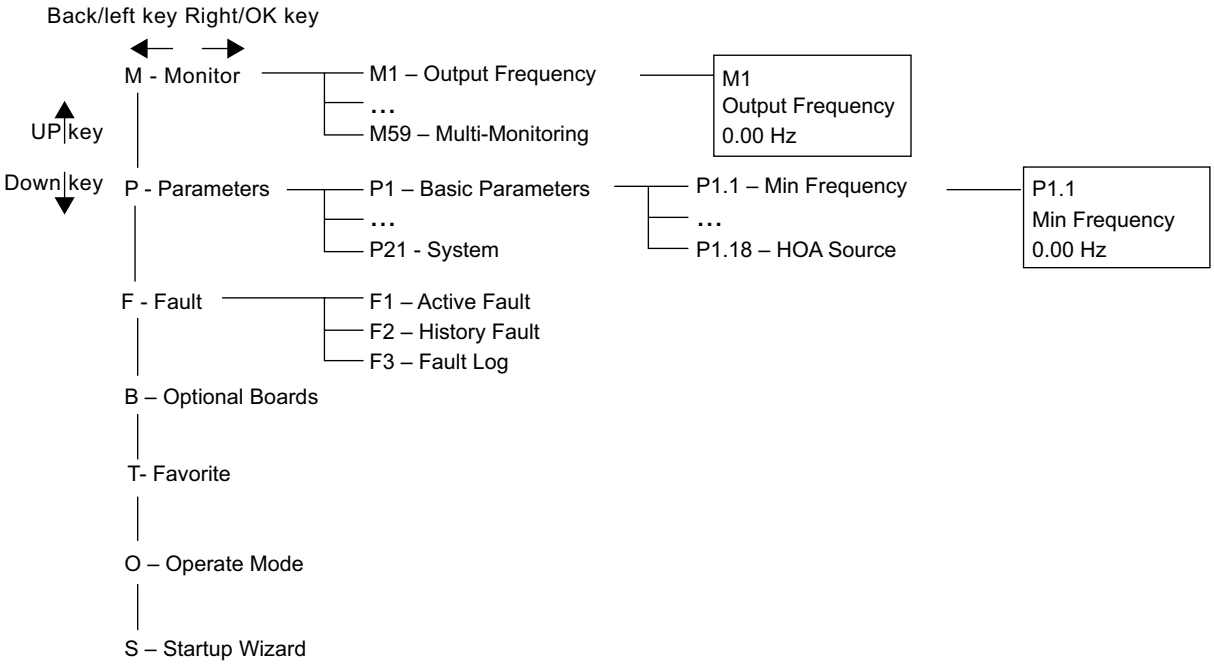
The data on the keypad are arranged in menus and sub-menus. The first menu level consists of M, P, F, B, T, O and S, and it is called the Main Menu.

Figure 14. Main menu page

Menu navigation

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

Figure 15. Main menu navigation



Menu structure

Table 11. Keypad menus

Item	Description	
Monitor	M1—Output Frequency	M31—PID1 Feedback
	M2—Freq Reference	M32—PID1 Error Value
	M3—Motor Speed	M33—PID1 Output
	M4—Motor Current	M34—PID1 Status
	M5—Motor Torque	M35—PID2 Set Point
	M6—Motor Power	M36—PID2 Feedback
	M7—Motor Voltage	M37—PID2 Error Value
	M8—DC-link Voltage	M38—PID2 Output
	M9—Unit Temperature	M39—PID2 Status
	M10—Motor Temperature	M40—Running Motors
	M11—Torque Reference	M41—PT100 Temp
	M12—Analog Input 1	M42—Last Active Fault
	M13—Analog Input 2	M43—RTC Battery Status
	M14—Analog Output 1	M44—Instance Motor Power
	M15—Analog Output 2	M45—Energy Savings
	M16—DI1, DI2, DI3	M46—Control Board DIDO Status
	M17—DI4, DI5, DI6	M47—SlotA DIDO Status
	M18—DI7, DI8	M48—SlotB DIDO Status
	M19—DO1, Virtual RO1, Virtual RO2	M49—Application Status Word
	M20—RO1, RO2, RO3	M50—Standard Status Word
	M21—TC1, TC2, TC3	M51—Output
	M22—Interval 1	M52—Reference
	M23—Interval 2	M53—Total MWh Count
	M24—Interval 3	M54—Total Power Day Count
	M25—Interval 4	M55—Total Power Hr Count
	M26—Interval 5	M56—Trip MWh Count
	M27—Timer 1	M57—Trip Power Day Count
	M28—Timer 2	M58—Trip Power Hr Count
	M29—Timer 3	M59—Multi-Monitoring
	M30—PID1 Set Point	

Item	Description
Parameters	P1—Basic Parameters
	P2—Analog Input
	P3—Digital Input
	P4—Analog Output
	P5—Digital Output
	P6—Logic Function
	P7—Drive Control
	P8—Motor Control
	P9—Protections
	P10—PID Controller1
	P11—PID Controller2
	P12—Preset Speed
	P13—Torque Control
	P14—Brake
	P15—Fire Mode
	P16—Second Motor Para
	P17—Bypass
	P18—Pump Parameters
	P19—Real Time Clock
	P20—Communication
	P21—System

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

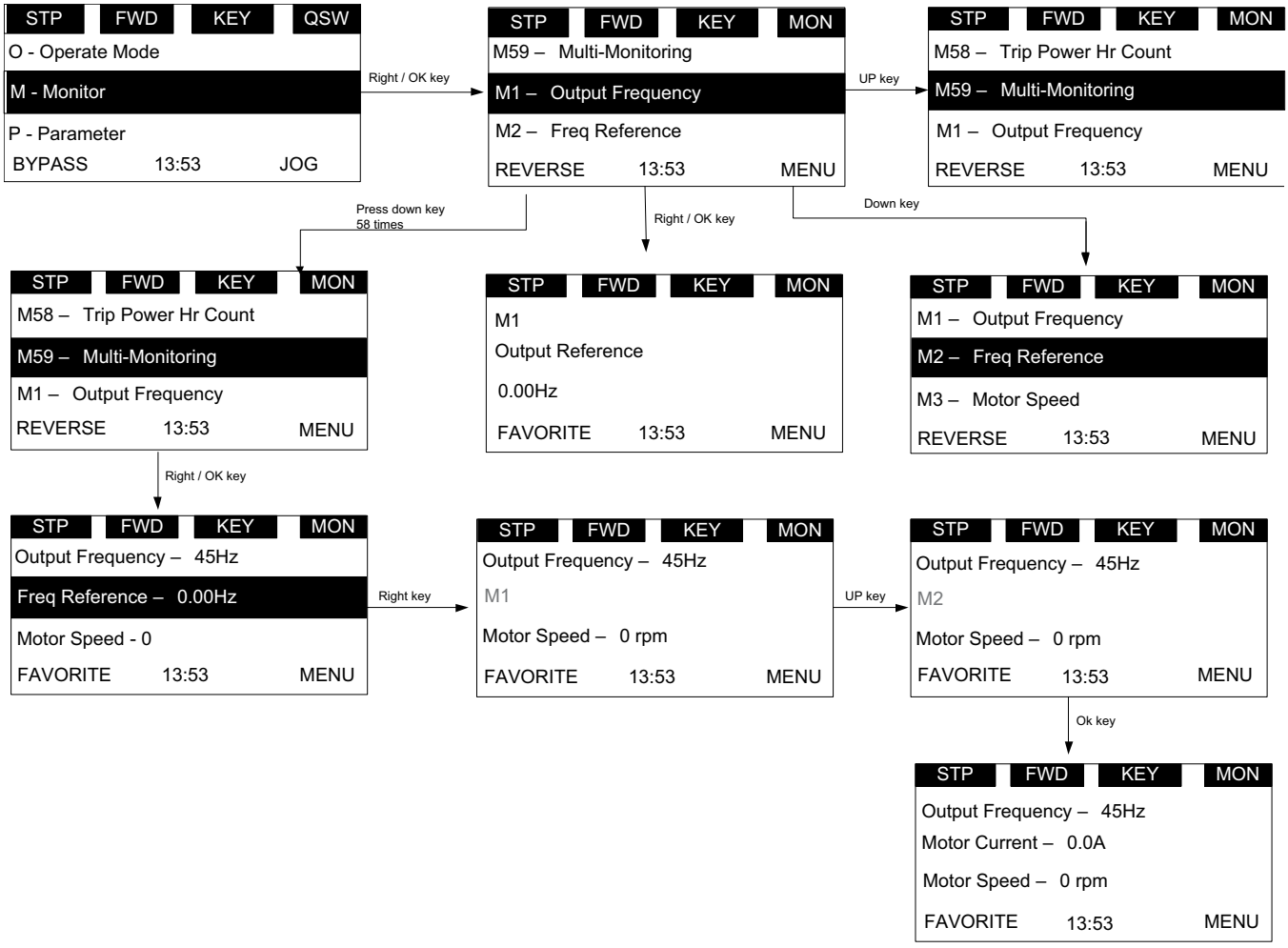
Note: Will vary depending on application selected.

M—Monitor

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

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

Figure 16. M—Monitor



F—Fault

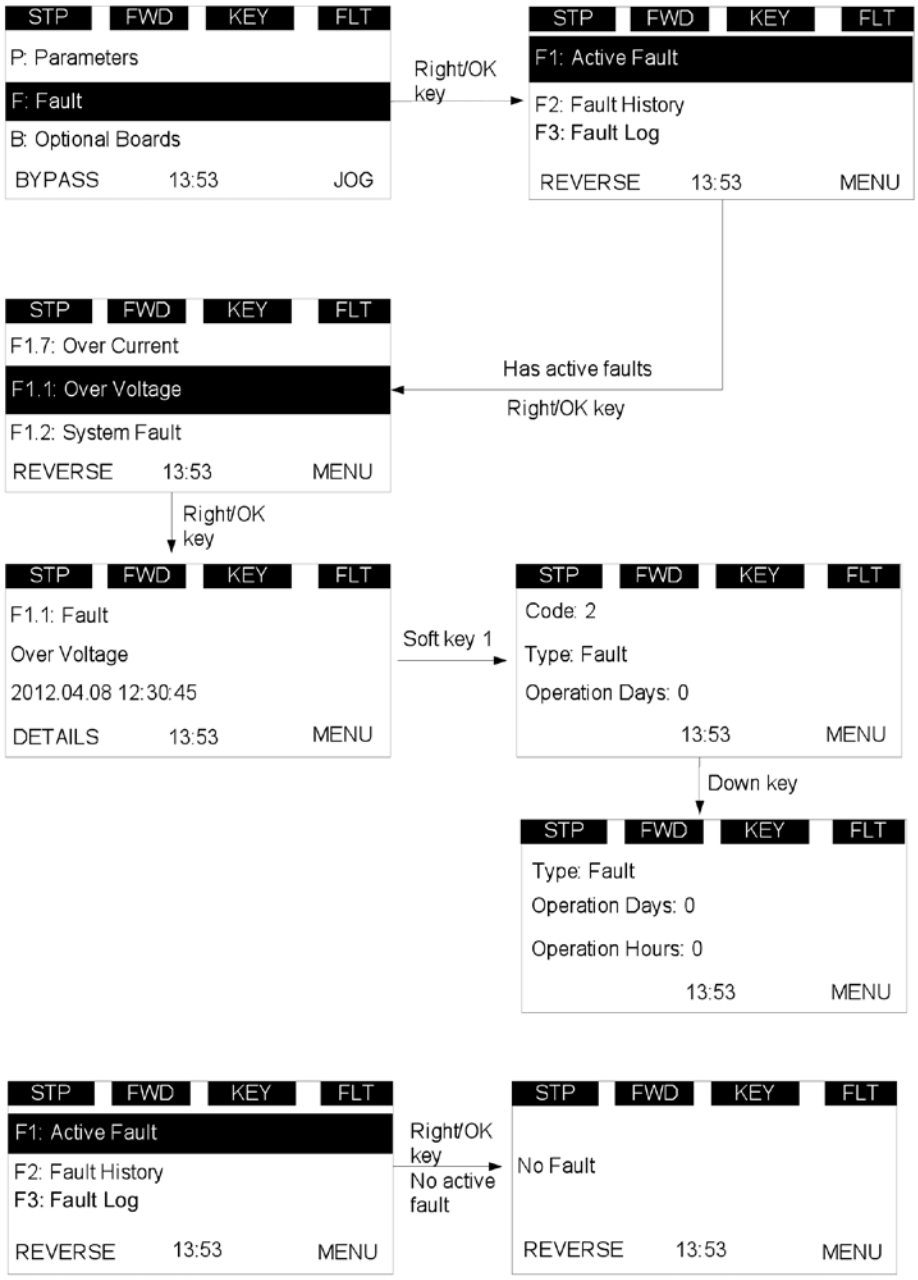
There are three fault pages. The first one is F1 active faults; the second one will pop-up automatically when fault occurs; the third one is F2 fault history.

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

Active fault

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

Figure 17. Active faults

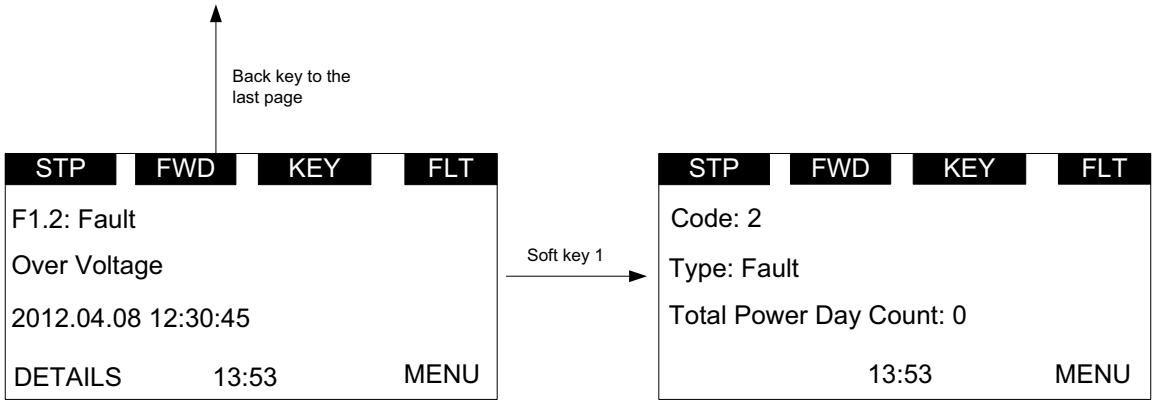


After the DETAIL soft key is pressed, the following detail information about the fault shall be shown: fault code, type, power day count, power hour count, frequency, current, voltage, power, torque, DC voltage, unit temperature, run status, direction, warning, zero speed, Mwh count, at reference.

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.

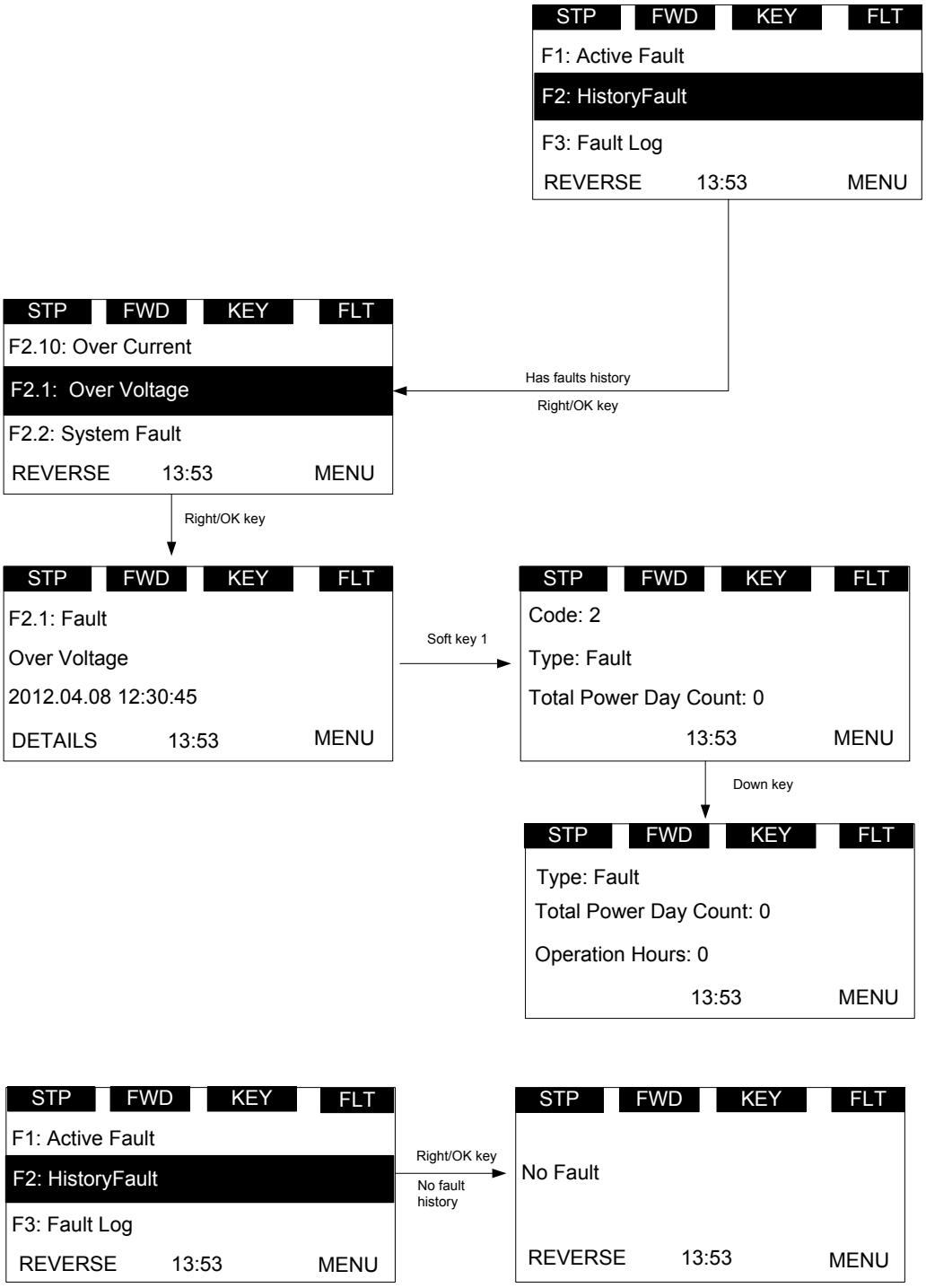
The page for active faults and pop-up faults are the same, except one: the response to the "Back" key. In active faults page, if the Back key is pressed, it returns to the last level menu. In pop-up faults page, it returns to the last page.

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).

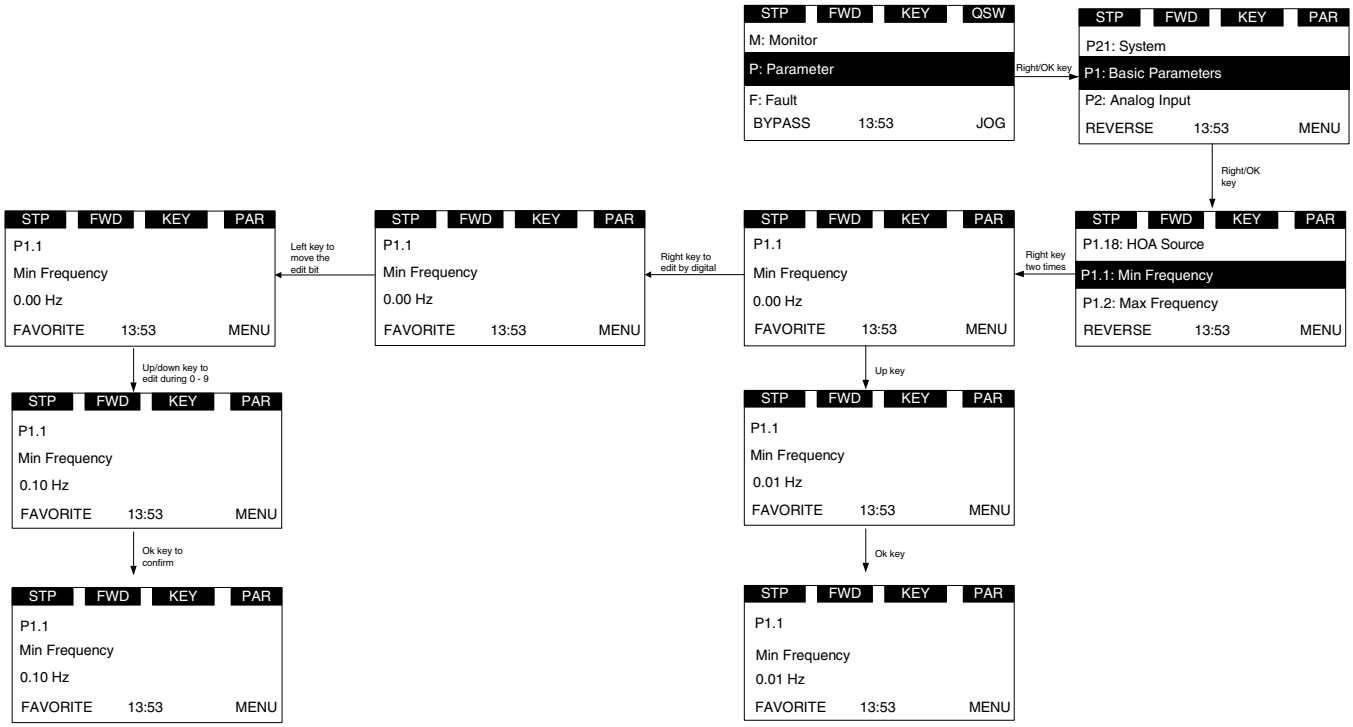
In parameter page, the parameter name shall be shown in the third line (such as Min Frequency).

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



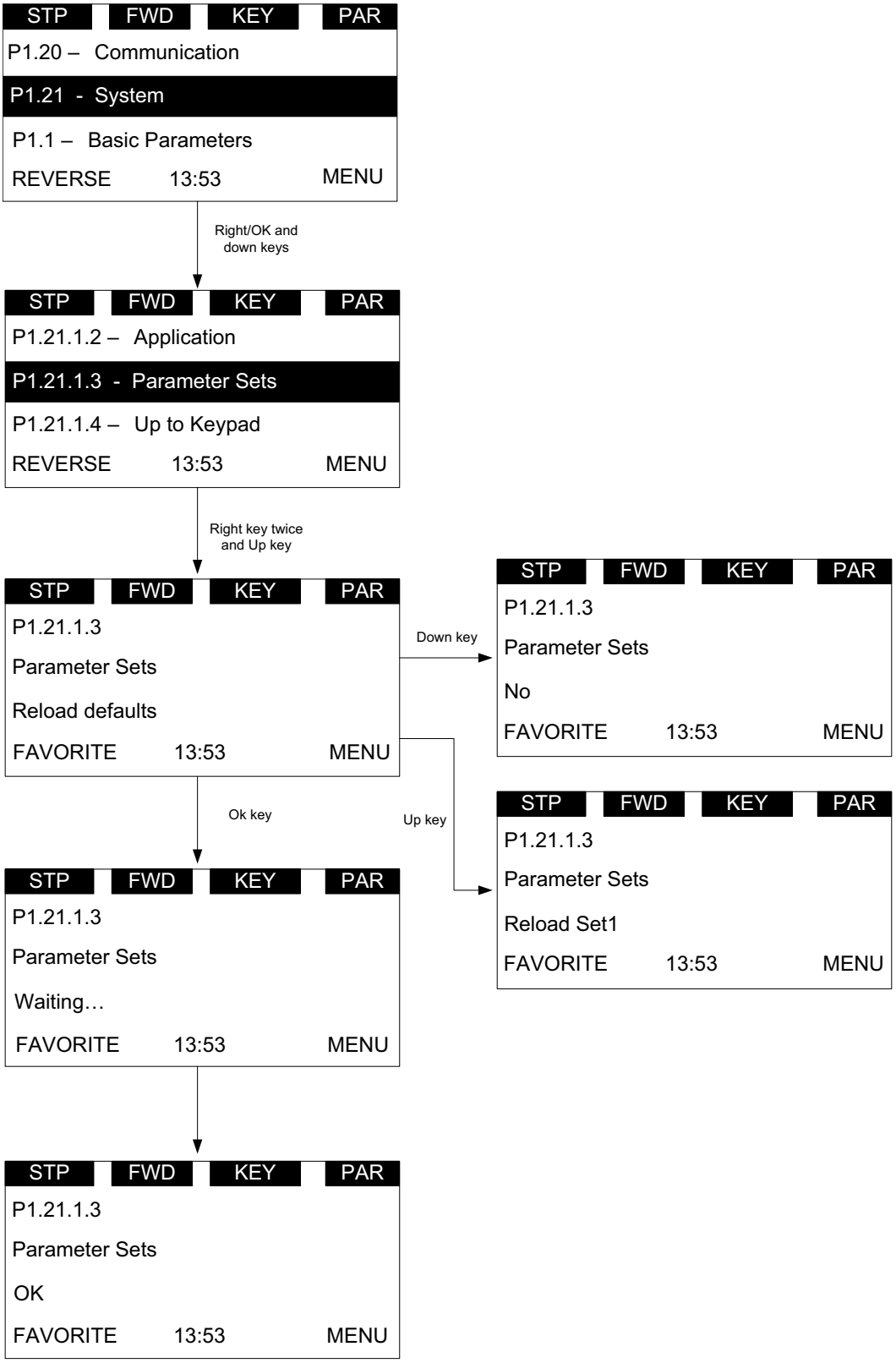
There are several special pages:

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

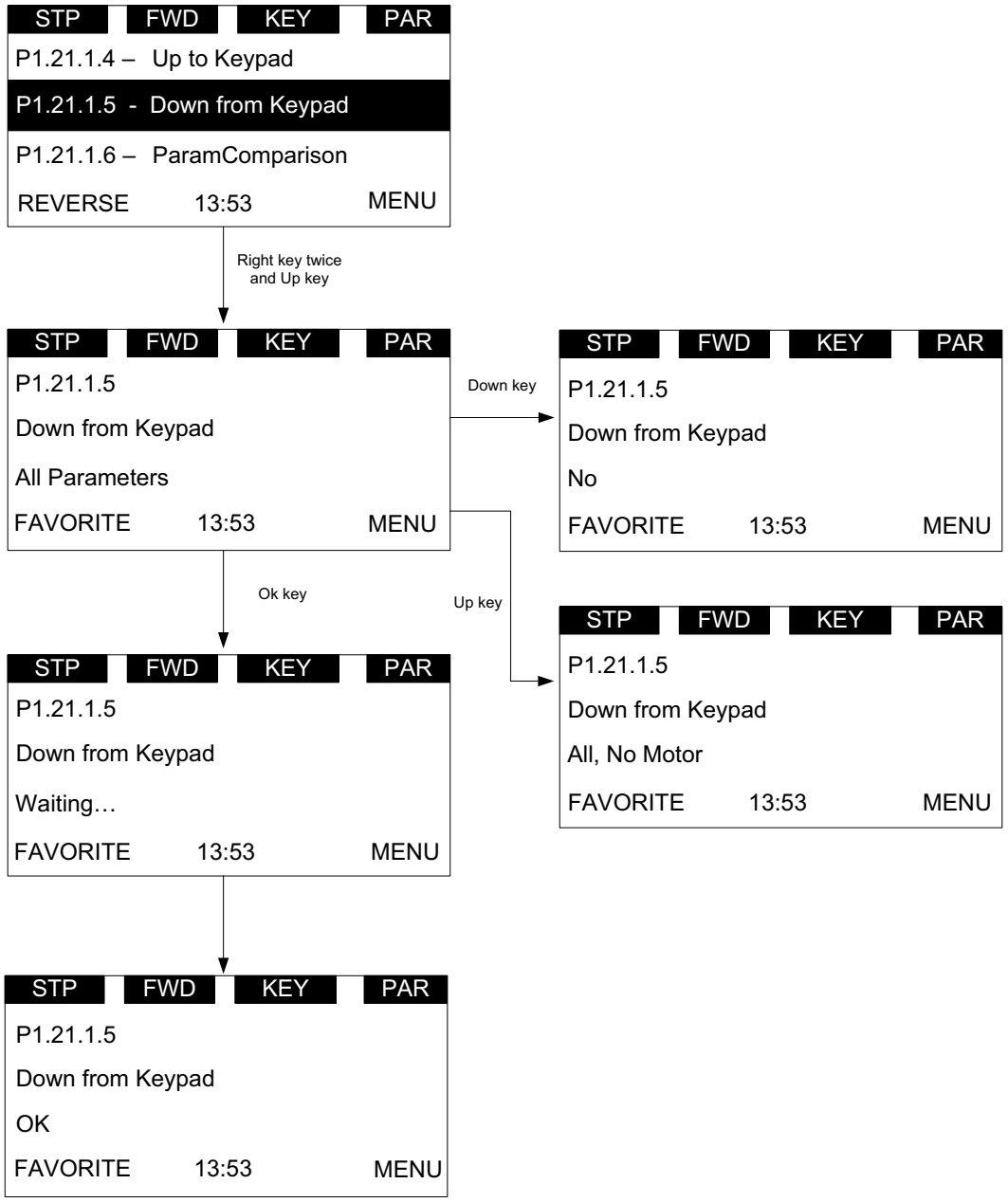


2. P21.1.4 Up to keypad and P21.1.5 Down from keypad

   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.

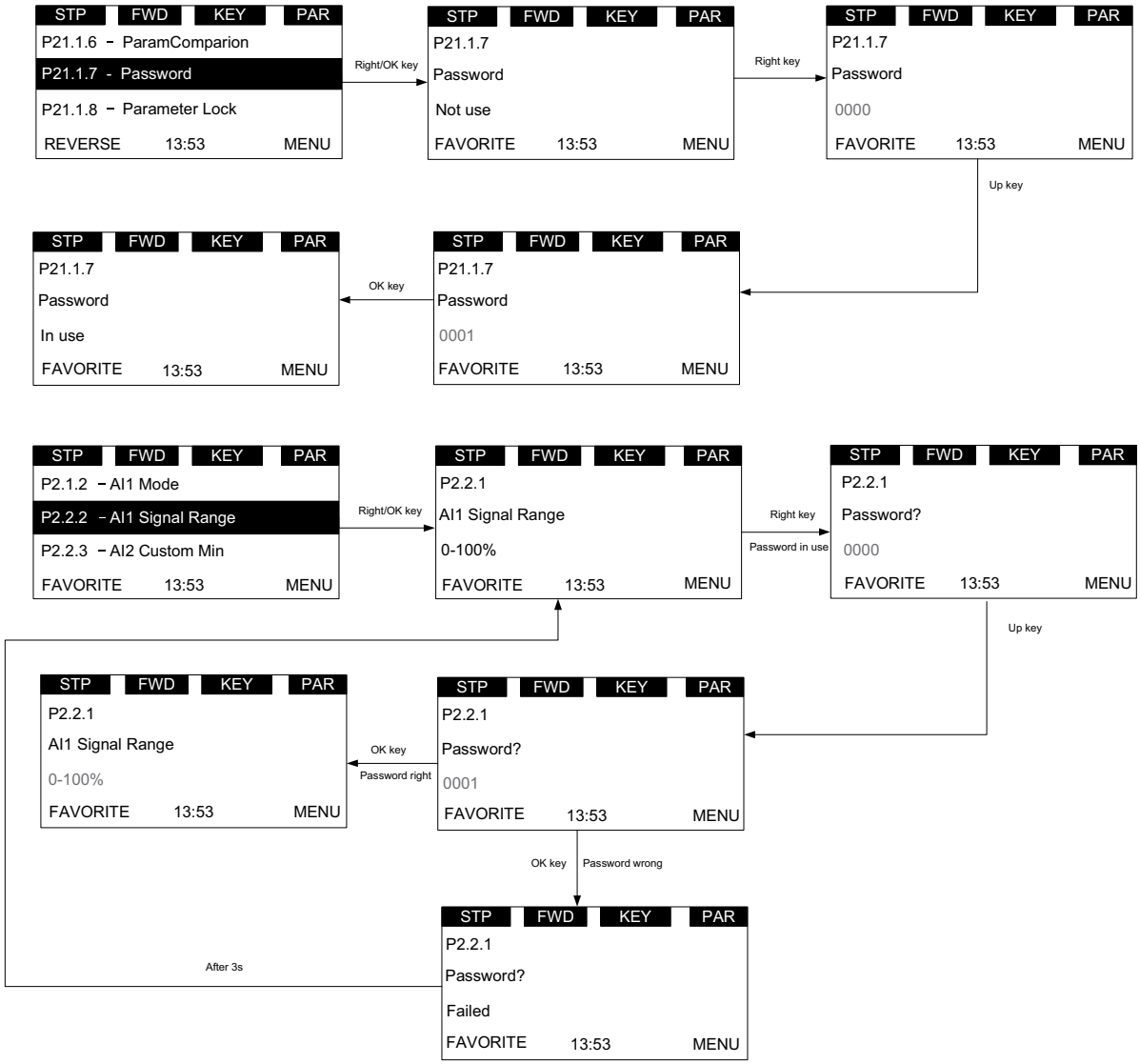
   Enter the password setting page. If the password is 0000, then the "Not use" shall be shown. If the password is not 0000, then the "in use" shall be shown.

   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

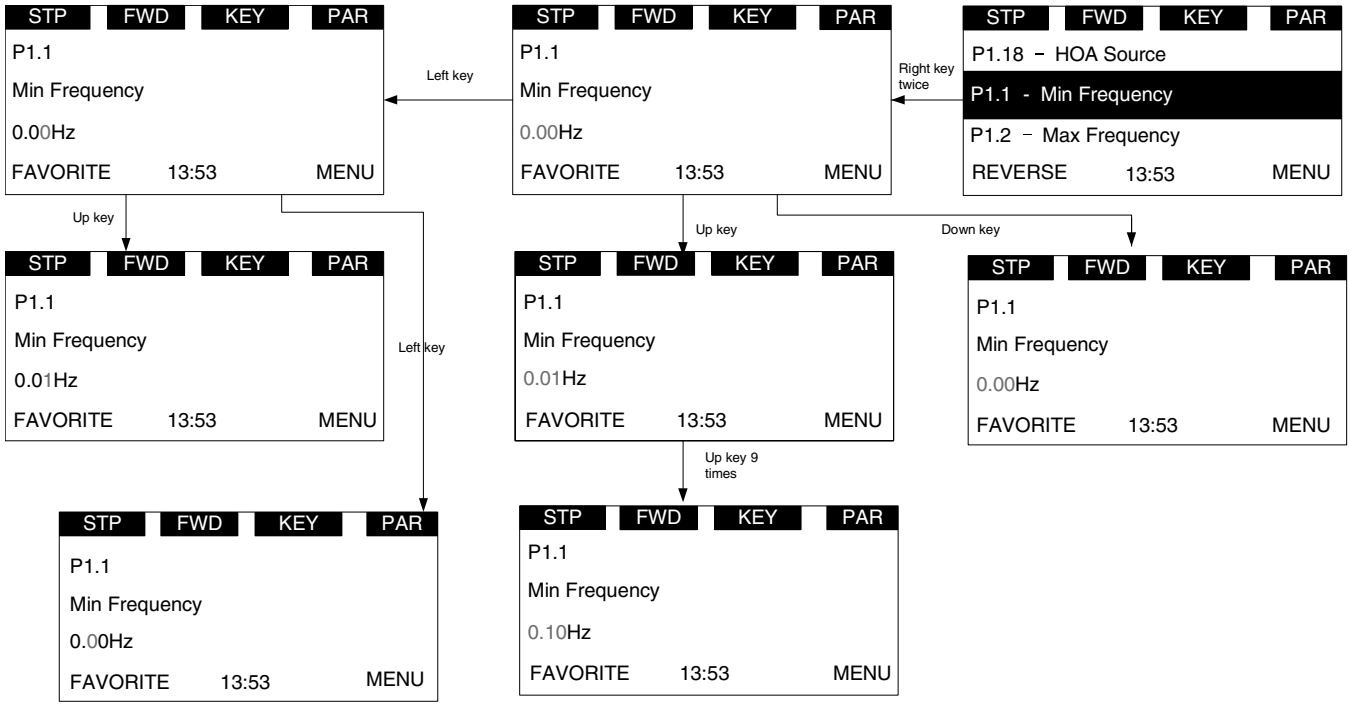
This topic shows the methods to edit value, and what will happen to edit value when password is in use and parameter lock is enabled.

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.

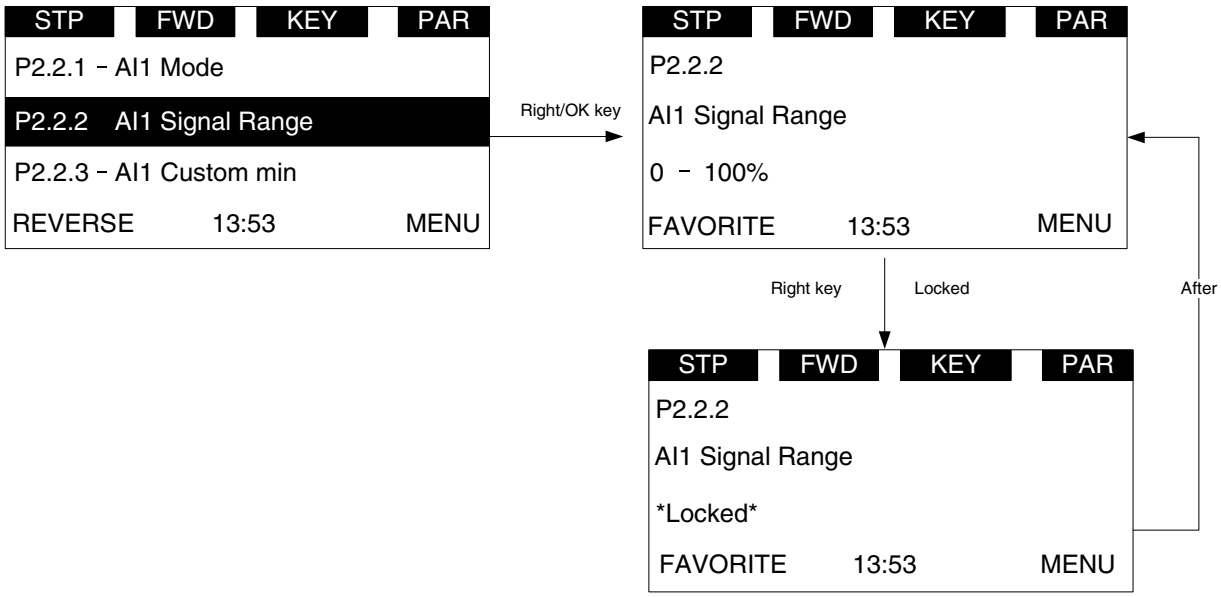
User shall use Left/Right key to change the current editable bit. When editing one number, it increases/decreases circularly, for example, pressing Up key can change to 9 from 0.

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

Table 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 Start 2 3 = Fieldbus
17	Local Reference	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 8 = Motor Pot 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 - AI2 12 = AI2 - AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = MIN(AI1,AI2) 16 = MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output
18	Remote 1 Control Place	0 = Keypad 1 = I/O terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
19	Remote 1 Reference	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 8 = Motor Pot 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 - AI2 12 = AI2 - AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = MIN(AI1,AI2) 16 = MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output

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

Application macro Mini-Wizard

Multi-Pump and fan control Mini-Wizard

Table 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 Pumps	Min: 1 Max: 5
29	PID Bandwidth	Min: 0% Max: 100%
30	Add/Remove Delay	Min: 0 s Max: 3600 s
31	Interlock Enable	0 = Disabled 1 = Enabled

PID Mini-Wizard

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

Table 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.

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

Force open/force close selection

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

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

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

Example:

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

DIGIN selection

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

Example:

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

Option board digIN selection

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

Example:

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

Timer channel selection

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

Example:

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

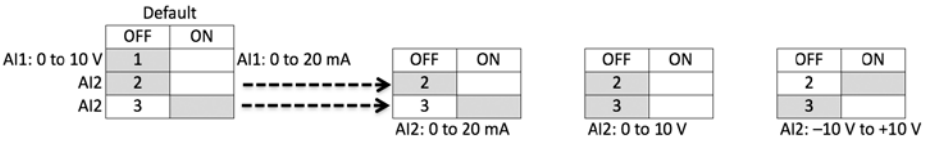
Force open/force close selection

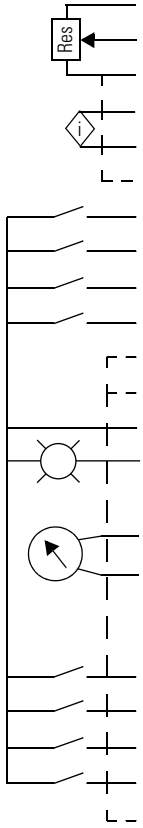
The standard options are DigIn: Force Open - indication that the parameter function is always going to be open, that being said depending on the logic of the function this could mean the function is always not active or always active. When the selection of a function is DigIN: Force Closed - indication that the parameter function is always going to be closed, that being said again depending on the location of the function this could mean the function is always active or not active. Examples of these options would be P3.2 Start Signal 1, when set to "Force Open" and the drive is looking at I/O terminals for control, in this case the drive would never start since this Function is always Open. If this function is set to "F.

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



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

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

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, Virtual RO1, Virtual RO2				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	Instant Motor Power			kW	0.000	1686	
M45	Energy Savings			Varies	0	2120	

Table 17. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M46	Control board DIDO Status				0	2209	Bit 0 = DIN1 Status Bit 1 = DIN2 Status Bit 2 = DIN3 Status Bit 3 = DIN4 Status Bit 4 = DIN5 Status Bit 5 = DIN6 Status Bit 6 = DIN7 Status Bit 7 = DIN8 Status Bit 8 = DO1 Status Bit 9 = RO1 Status Bit 10 = RO2 Status Bit 11 = RO3 Status Bit 12 = Slot A with Board Bit 13 = Slot B with Board Bit 14 -15 = Not used
M47	SlotA DIDO Status				0	2210	Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used
M48	SlotB DIDO Status				0	2211	Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used

Table 17. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M49	App Status Word				0	29	Bit 0 = MC Ready Bit 1 = MC_Run Bit 2 = MC_Fault Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning/AR-Fault Bit 7 = MC_ZeroSpeed Bit 8 = I/O Control Indicate Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Indicator Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 = Run Bypass Bit 14 = Ext Brake Control Bit 15 = Bypass Mode
M50	Standard Status Word				0	2414	Bit 0 = P20.1.9 (default = Ready) Bit 1 = P20.1.10 (default = Run) Bit 2 = P20.1.11 (default = Fault) Bit 3 = P20.1.12 (default = Fault Invert) Bit 4 = P20.1.13 (default = Warning) Bit 5 = P20.1.14 (default = Reversed) Bit 6 = P20.1.15 (default = At Speed) Bit 7 = P20.1.16 (default = Zero Frequency) Bit 8 - 15 = Not Used
M51	Output				0	2447	
M52	Reference				0	2449	
M53	Total MWh Count				Varies	601	
M54	Total Power Day Count				Varies	603	
M55	Total Power Hr Count				Varies	606	
M56	Trip MWh Count				Varies	604	
M57	Trip Power Day Count				Varies	636	
M58	Trip Power Hr Count				Varies	637	
M59	Multi-Monitoring				1, 2, 3	30	

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	

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

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ①②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2 ①②	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 Start 2 3 = Keypad
P1.12 ②	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.13 ②	Bumpless Enable				0	2464	0 = Disabled 1 = Enabled
P1.14 ①②	Local Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 9 = Max Frequency 10 = AI1 + AI2 11 = AI1–AI2 12 = AI2–AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = Min (AI1, AI2) 16 = MAX(AI1,AI2)
P1.15 ①②	Remote1 Reference				1	137	See P1.14
P1.16 ①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled
P1.17 ②	Run Delay Time	0	32500	s	0	2423	
P1.18 ②	HOA Source	0	2		0	2465	0 = Disable 1 = I/O Terminal 2 = Keypad

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

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1	AI Ref Scale Min Value	0.00	Par. P2.1.2	Hz	0	144	
P2.1.2	AI Ref Scale Max Value	Par. P2.1.1	400.00	Hz	0	145	
P2.2.1 ②	AI1 Mode	0	1		1	222	0 = 0–20 mA 1 = 0–10 V
P2.2.2 ②	AI1 Signal Range	0	2		0	175	0 = 0–100% / 0–20 mA / 0–10 V 1 = 20–100% / 4–20 mA / 2–10 V 2 = Customized
P2.2.3 ②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.2.4 ②	AI1 Custom Max	Par. P2.2.3	100.00	%	100.00	177	
P2.2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.2.6 ②	AI1 Signal Invert	0	1		0.00	181	0 = Not Inverted 1 = Inverted
P2.2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.2.10 ②	AI1 Joystick Offset	–50.00	50.00	%	0.00	133	
P2.3.1 ②	AI2 Mode	0	2		1	222	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V
P2.3.2 ②	AI2 Signal Range	0	2		0	175	0 = 0–100% / 0–20 mA / 0–10 V 1 = 20–100% / 4–20 mA / 2–10 V 2 = Customized
P2.3.3 ②	AI2 Custom Min	0.00	Par. P2.2.4	%	0.00	176	
P2.3.4 ②	AI2 Custom Max	Par. P2.2.3	100.00	%	100.00	177	
P2.3.5 ②	AI2 Filter Time	0.00	10.00	s	0.10	174	
P2.3.6 ②	AI2 Signal Invert	0	1		0.00	181	"0 = Not Inverted 1 = Inverted"
P2.3.7 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.3.8 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	179	
P2.3.9 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	180	
P2.3.10 ②	AI2 Joystick Offset	-50.00	50.00	%	0.00	133	
P2.4.1 ②	Fine Tuning Input	0	5		0	2484	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot A: AI1 5 = Fieldbus
P2.4.2 ②	Fine Tuning Min	0.00	100.00	%	0.00	2485	
P2.4.3 ②	Fine Tuning Max	0.00	100.00	%	0.00	2486	

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

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	IO Terminal 1Start/Stop Logic				0	143	0 = Forward–Reverse 1 = Start–Reverse 2 = Start–Enable 3 = Start Pulse–Stop Pulse
P3.2 ②⑤	IO Terminal 1Start 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 31 = RO1 Function 32 = RO2 Function 33 = RO3 Function 34 = Virtual RO1 Function 35 = Virtual RO2 Function
P3.3 ②⑤	IO Terminal 1Start Signal 2				3	191	See P3.2
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②③	Reverse				0	198	See P3.2
P3.6 ②③	Ext. Fault 1 NO				4	192	See P3.2
P3.7 ②③	Ext. Fault 1 NC				1	193	See P3.2
P3.8 ②④	Fault Reset				5	200	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.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Table 21. Digital input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.9 ②③	Run Enable				1	194	See P3.2
P3.10 ②③	Preset Speed B0				6	205	See P3.2
P3.11 ②③	Preset Speed B1				7	206	See P3.2
P3.12 ②③	Preset Speed B2				0	207	See P3.2
P3.15 ②③	Accel/Decel Time Set				0	195	See P3.2
P3.16 ②③	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②④	No Access To Param				0	215	See P3.2
P3.21 ②③	Remote Control				9	196	See P3.2
P3.22 ②③	Local Control				0	197	See P3.2
P3.23 ②③	Remote1/2 Select				0	209	See P3.2
P3.26 ②③	DC Brake Enable				0	202	See P3.2
P3.32 ②③	Jog Enable				0	199	See P3.2
P3.36 ②③	AI Ref Source Select				0	208	See P3.2
P3.42 ②③	Emergency Stop				1	747	See P3.2
P3.45 ①②	IO Terminal 2 Start Stop Logic				0	2206	See P3.1
P3.46 ②⑤	IO Terminal 2 Start Signal 1				2	2207	See P3.2
P3.47 ②⑤	IO Terminal 2 Start Signal 2				3	2208	See P3.2
P3.48 ②③	Ext. Fault 2 NO				0	2293	See P3.2
P3.49 ②③	Ext. Fault 2 NC				1	2294	See P3.2
P3.50 ②③	Ext. Fault 3 NO				0	2295	See P3.2
P3.51 ②③	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 11 = Rod Breakage
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 11 = Rod Breakage

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Table 21. Digital input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 11 = Rod Breakage
P3.55 ②④	Parameter Set1/2 Sel				0	2312	See P3.2
P3.56 ②④	Deragging Enable				0	2394	see P3.2
P3.57 ②③	Off Control				0	2395	see P3.2

Table 22. Analog output—P4

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	0 = 0–20 mA 1 = 0–10 V
P4.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0–Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 19 = AI1 20 = AI2 21 = Output Freq (–2 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 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 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.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Table 22. Analog output—P4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
							35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current(-2 to +2N)
P4.3 ②	AO1 Minimum				1	149	0 = 0 V / 0 mA 1 = 2 V / 4 mA
P4.4 ②	AO1 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	AO1 Scale	10	1000	%	100	150	
P4.6 ②	AO1 Inversion				0	148	0 = Not Inverted 1 = Inverted
P4.7 ②	AO1 Offset	–100.00	100.00	%	0.00	173	
P4.8 ②	AO2 Mode				0	228	See P4.1
P4.9 ②	AO2 Function				4	229	See P4.2
P4.10 ②	AO2 Minimum				1	232	See P4.3
P4.11 ②	AO2 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	AO2 Scale	10	1000	%	100	233	
P4.13 ②	AO2 Inversion				0	231	See P4.6
P4.14 ②	AO2 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.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Table 23. Digital output—P5

Code	Parameter	Min.	Min.	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 58 = 2th Stage Ramp Frequency Active 59 = STO Fault 60 = Run Bypass/Drive 61 = Bypass Overload
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	Virtual RO1 Function				0	2465	See P5.1
P5.6 ②	Virtual RO2 Function				0	2466	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 23. Digital output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.7 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 1 Supv Val	0.00	Par. P1.2	Hz	0.00	155	
P5.9 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10 ②	Freq Limit 2 Supv Val	0.00	Par. P1.2	Hz	0.00	158	
P5.11 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Torque Limit Supv Val	–1000.0	1000.0	%	100.0	160	
P5.13 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.14 ②	Ref Limit Supv Val	0.00	Par. P1.2	Hz	0.00	162	
P5.17 ②	Temp Limit Supv				0	165	See P5.13
P5.18 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.19 ②	Power Limit Supv				0	167	See P5.13
P5.20 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.21 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.22 ②	AI Limit Supv				0	171	See P5.13
P5.23 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.32 ②	RO1 On Delay	0	320	s	0	2111	
P5.33 ②	RO1 Off Delay	0	320	s	0	2112	
P5.34 ②	RO2 On Delay	0	320	s	0	2113	
P5.35 ②	RO2 Off Delay	0	320	s	0	2114	
P5.36 ②	RO3 On Delay	0	320	s	0	2115	
P5.37 ②	RO3 Off Delay	0	320	s	0	2116	
P5.38 ②	RO3 Reverse				0	2117	0 = No 1 = Yes
P5.39 ②	Motor Current 1 Supv				0	2189	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.40 ②	Motor Current 1 Supv Value	0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190	
P5.41 ②	Motor Current 2 Supv				0	2191	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.42 ②	Motor Current 2 Supv Value	0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192	
P5.43 ②	Second AI Supv Select				0	2193	0 = AI1 1 = AI2
P5.44 ②	Second AI Limit Supv				0	2194	See P5.13

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
P5.45 ②	Second AI Limit Supv Val	0	100	%	0	2195	
P5.46 ②	Motor Current 1 Supv Hyst	0.1	1	A	0.1	2196	
P5.47 ②	Motor Current 2 Supv Hyst	0.1	1	A	0.1	2197	
P5.48 ②	AI Supv Hyst	1	10	%	1	2198	
P5.49 ②	Second AI Supv Hyst	1	10	%	1	2199	
P5.50 ②	Freq Limit 1 Supv Hyst	0.1	1	Hz	0.1	2200	
P5.51 ②	Freq Limit 2 Supv Hyst	0.1	1	Hz	0.1	2201	
P5.52 ②	Torque Limit Supv Hyst	1	5	%	1	2202	
P5.53 ②	Ref Limit Supv Hyst	0.1	1	Hz	0.1	2203	
P5.54 ②	Temp Limit Supv Hyst	1	10	?	1	2204	
P5.55 ②	Power Limit Supv Hyst	0.1	10	%	0.1	2205	

Table 24. Drive control—P7

Code	Parameter	Min.	Min.	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 P1.14
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	

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, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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			Varies	0	2122	
P7.26 ②	Data Type				0	2123	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P7.27 ②	Energy Savings Reset				0	2124	0 = No Action 1 = Reset
P7.28 ②	2th Stage Ramp Frequency	P1.1	P1.2	Hz	30	2447	
P7.29 ②	Change Phase Sequence Motor	0	1		0	2515	0 = Change Disable 1 = Change Enable

Table 25. Motor control—P8

Code	Parameter	Min.	Min.	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 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 26. Protections—P9

Code	Parameter	Min.	Min.	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
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	1.00	300.00	s	1.00	321	
P9.25 ②	Trail Time	0.00	600.00	s	30.00	322	
P9.26 ②	Start Function				0	323	0 = Flying Start 1 = Ramp
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
P9.36 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 ②	Cold Weather Mode				0	2126	0 = Disable 1 = Enable

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
P9.35 ①②	PT100 Fault Response				2	337	See P9.11
P9.40 ②	Cold Weather Voltage Level	0	20	%	2	2127	
P9.41②	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				31	2160	0 = DigIN: NormallyOpen 1 = DigIN: NormallyClosed 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = Slot A PT100 Temp Channel 1 33 = Slot A PT100 Temp Channel 2 34 = Slot A PT100 Temp Channel 3 35 = Slot A Max PT100 Temp 36 = Slot B PT100 Temp Channel 1 37 = Slot B PT100 Temp Channel 2 38 = Slot B PT100 Temp Channel 3 39 = Slot B Max PT100 Temp 40 = Slot A and Slot B Max PT100 Temp

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
P9.48 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	
P9.56 ②	STO Fault Response				2	2429	0 = No Action 1 = Warning 2 = Fault
P9.57 ②	Fault Reset Start	0	1		0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset

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	

Communication P20

Table 29. FB Process Data Input Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1	FB Process Data Input 1 Sel				2541	2533	
P20.1.2	FB Process Data Input 2 Sel				2542	2534	
P20.1.3	FB Process Data Input 3 Sel				2550	2535	
P20.1.4	FB Process Data Input 4 Sel				103	2536	
P20.1.5	FB Process Data Input 5 Sel				104	2537	
P20.1.6	FB Process Data Input 6 Sel				107	2538	
P20.1.7	FB Process Data Input 7 Sel				0	2539	
P20.1.8	FB Process Data Input 8 Sel				0	2540	

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. FB Process Data Output Sel—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1	FB Process Data Output 1 Sel				1	1556	
P20.2.2	FB Process Data Output 2 Sel				2	1557	
P20.2.3	FB Process Data Output 3 Sel				3	1558	
P20.2.4	FB Process Data Output 4 Sel				4	1559	
P20.2.5	FB Process Data Output 5 Sel				5	1560	
P20.2.6	FB Process Data Output 6 Sel				6	1561	
P20.2.7	FB Process Data Output 7 Sel				7	1562	
P20.2.8	FB Process Data Output 8 Sel				28	1563	
P20.2.9	Standard Status Word Bit0 Function Select				1	2415	See P3.2
P20.2.10	Standard Status Word Bit1 Function Select				1	2416	See P3.3
P20.2.11	Standard Status Word Bit2 Function Select				1	2417	See P3.4
P20.2.12	Standard Status Word Bit3 Function Select				1	2418	See P3.5
P20.2.13	Standard Status Word Bit4 Function Select				1	2419	See P3.6
P20.2.14	Standard Status Word Bit5 Function Select				1	2420	See P3.7
P20.2.15	Standard Status Word Bit6 Function Select				1	2421	See P3.8
P20.2.16	Standard Status Word Bit7 Function Select				1	2422	See P3.9

RS485 Bus P20.3

Table 31. Basic Setting— P20.3.1

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

Table 32. Modbus RTU— P20.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.2.1	Slave Address	1	247		1	587	
P20.3.2.2	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.2.3	Parity Type				0	585	0 = None 1 = Odd 2 = Even
P20.3.2.4	Modbus RTU Protocol Status				0	588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.3.2.5	Slave Busy				0	589	0 = Not Busy 1 = Busy
P20.3.2.6	Parity Error				0	590	
P20.3.2.7	Slave Fault				0	591	
P20.3.2.8	Last Fault Response				0	592	
P20.3.2.9	Comm Timeout Modbus RTU			ms	10000	593	
P20.3.2.10	Modbus RTU Fault Response	0	1		0	2516	0 = In Fieldbus Control 1 = In All Control

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 33. BACnet MS/TP— P20.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.1	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.3.2	MSTP MS/TP Device Address	0	127		1	595	
P20.3.3.3	MSTP Instance Number	0	4194302		0	596	
P20.3.3.4	MSTP Comm Timeout MSTP			ms	10000	598	
P20.3.3.5	MSTP Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.3.3.6	MSTP Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud Rate Fault
P20.3.3.7	MSTP Fault Response	0	1		0	2526	0 = In Fieldbus Control 1 = In All Control

Table 34. Ethernet IP—P20.4

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

Table 35. Modbus TCP—P20.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.5.1	Connection Limit				5	609	
P20.5.2	Modbus TCP Unit ID				1	610	
P20.5.3	Comm Timeout Modbus TCP			ms	10000	611	
P20.5.4	Modbus TCP Protocol Status				0	612	0 = Stopped 1 = Operational 2 = Faulted
P20.5.5	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.5.6	Parity Error				0	614	
P20.5.7	Slave Failure				0	615	
P20.5.8	Last Fault Response				0	616	
P20.5.9	Modbus TCP Fault Response	0	1		0	2517	0 = In Fieldbus Control 1 = In All Control

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 36. 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 4 = Keypad Reference
P21.1.11	Timeout Time	0	65535	s	30	629	
P21.1.12	Contrast Adjust	5	18		12	630	
P21.1.13	Backlight Time	1	65535	min	10	631	
P21.1.14	Fan Control				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	
P21.1.17	Startup Wizard	0	1		1	626	0 = No 1 = Yes
P21.1.18	Jog Soft Key Hidden	0	1		0	2412	0 = Disable 1 = Enable
P21.1.19	Reverse Softkey Hidden	0	1		0	2413	0 = Disable 1 = Enable

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 37. Basic setting—P21.1 , continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.20	Output Display Unit				45	2426	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 = deg 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 = deg F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m 45 = Hz
P21.1.21	Output Display Unit Min	-60000.00	Par P21.1.22	varies	0.00	2462	
P21.1.22	Output Display Unit Max	Par P21.1.21	60000.00	varies	60	2427	

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 38. 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 39. Application Info—P21.3

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

Table 40. 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

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

I/O controls

- "Terminal To Function" (TTF) Programming

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

- "Function To Terminal" (FTT) Programming

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

The parameters of the Multi-Pump and Fan Control Application are explained on **Page 150** of this manual, "Description of Parameters." The explanations are arranged according to the parameter

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

Force open/force close selection

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

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

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

Example:

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

DIGIN selection

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

Example:

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

Option board DigIN selection

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

Example:

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

Timer channel selection

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

Example:

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

Force open/force close selection

The standard options are DigIn: Force Open - indication that the parameter function is always going to be open, that being said depending on the logic of the function this could mean the function is always not active or always active. When the selection of a function is DigIN: Force Closed - indication that the parameter function is always going to be closed, that being said again depending on the location of the function this could mean the function is always active or not active. Examples of these options would be P3.2 Start Signal 1, when set to "Force Open" and the drive is looking at I/O terminals for control, in this case the drive would never start since this Function is always Open. If this function is set to "F.

Control examples

Single Drive

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

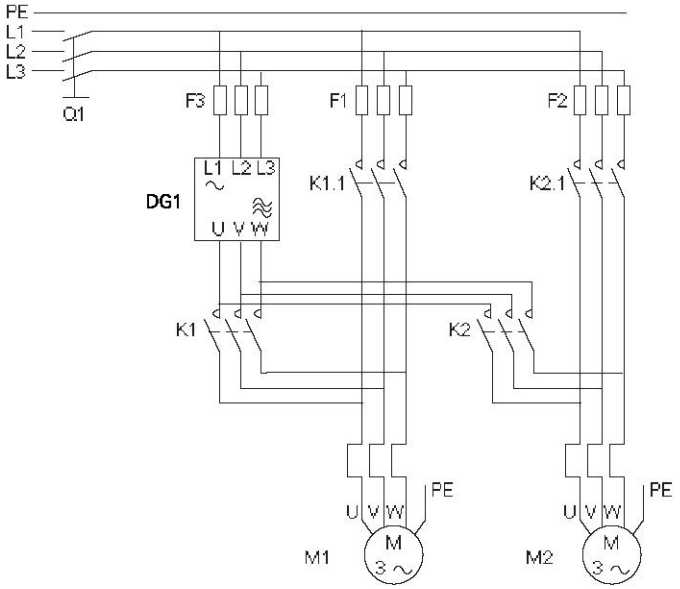


Figure 28. Two-Pump autochange system principal control diagram

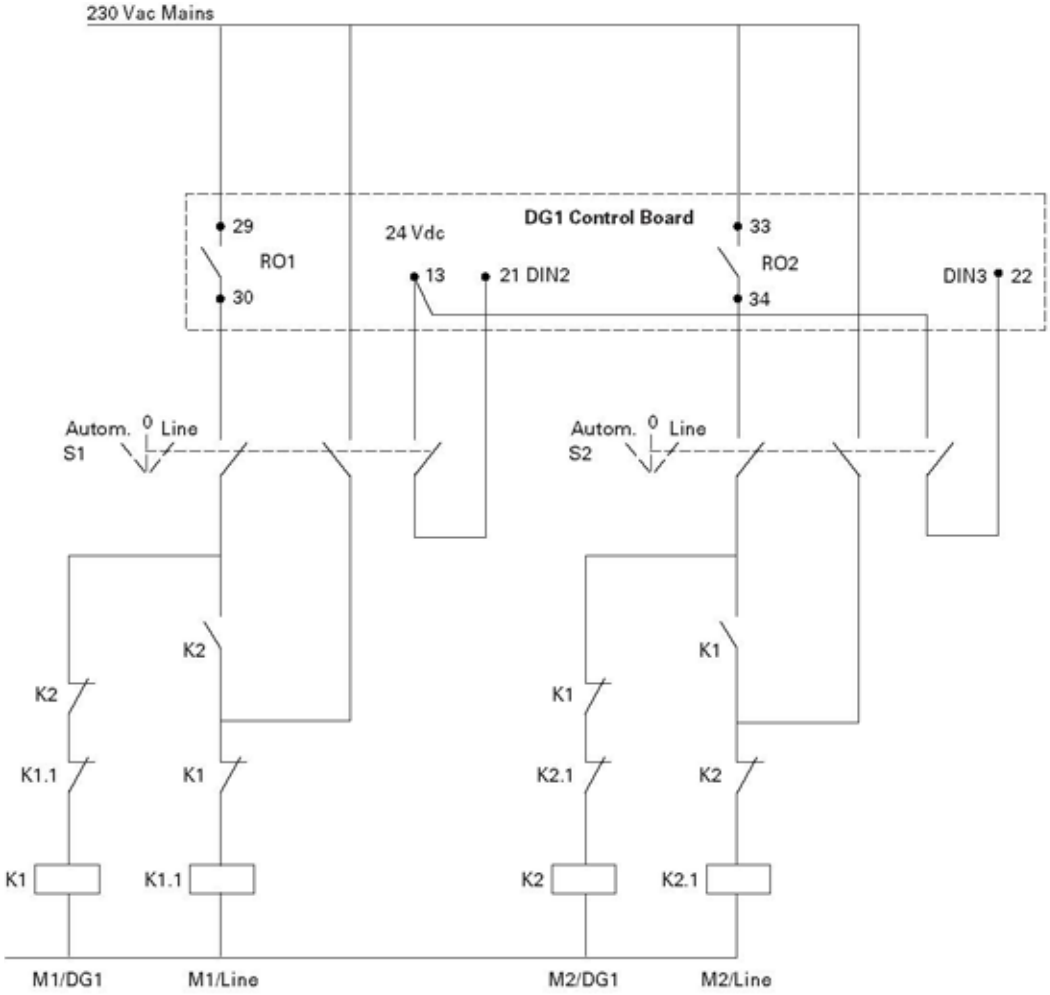


Figure 29. Example of Three-Pump autochange, main diagram

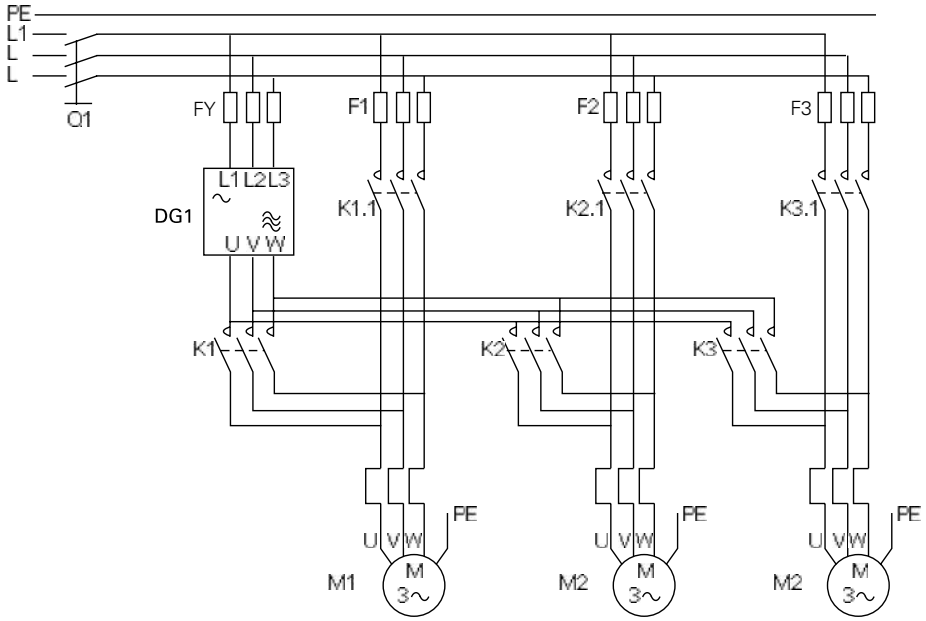


Figure 30. Three-Pump autochange system principal control diagram

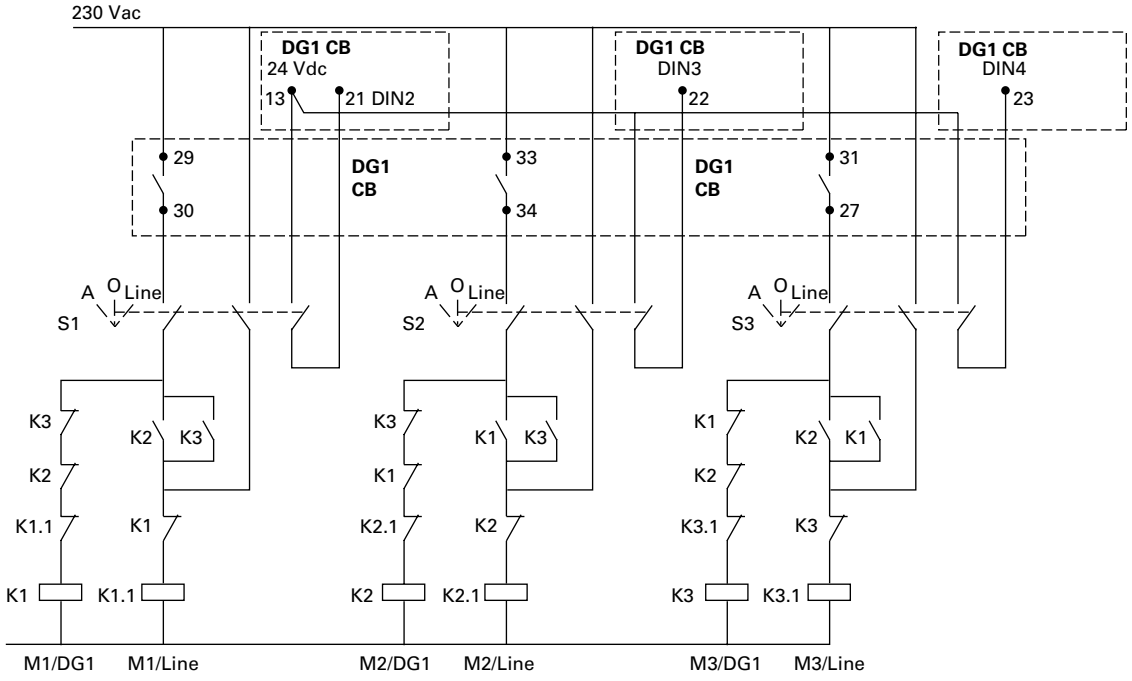


Figure 31. Example of the function of the PFC application with three auxiliary drives

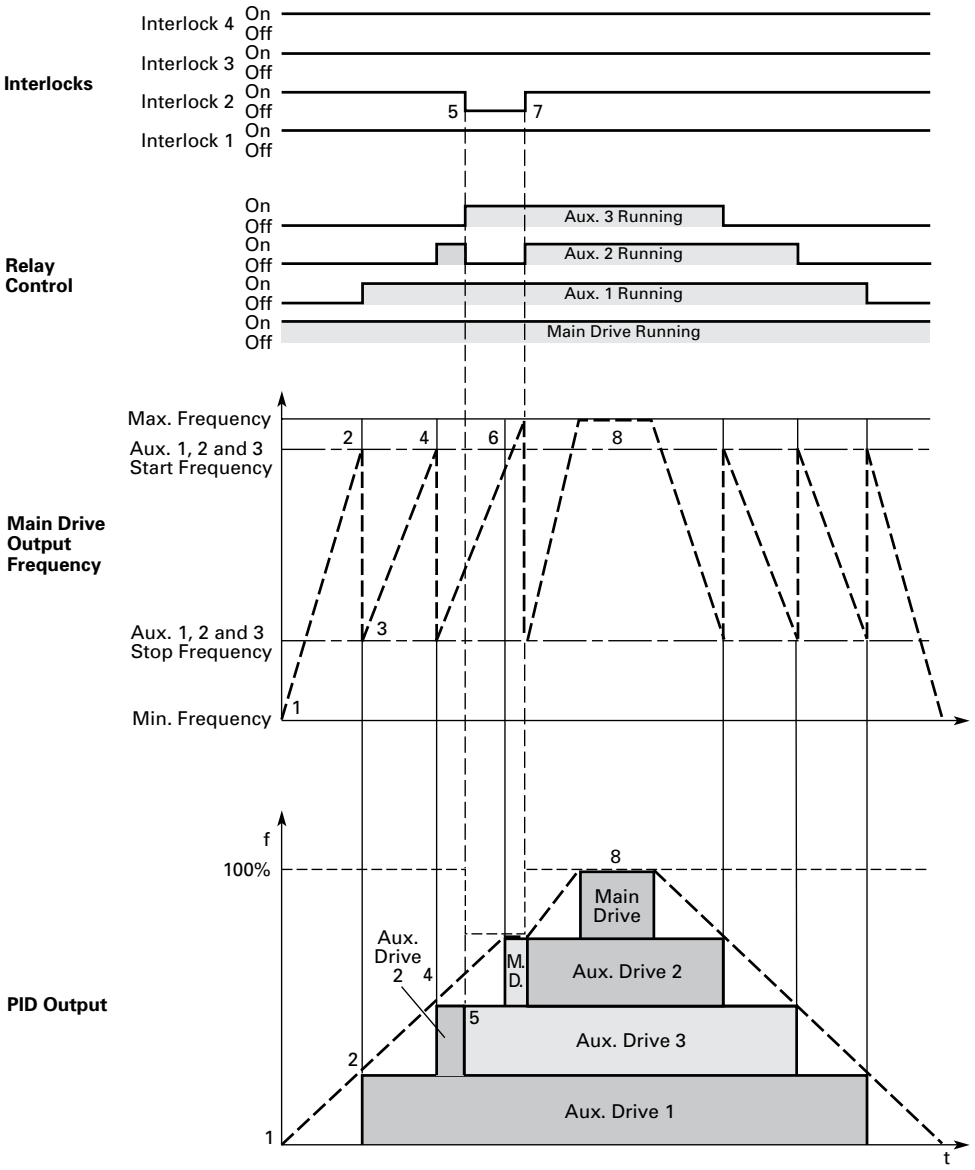


Figure 32. Multi Pump control curve

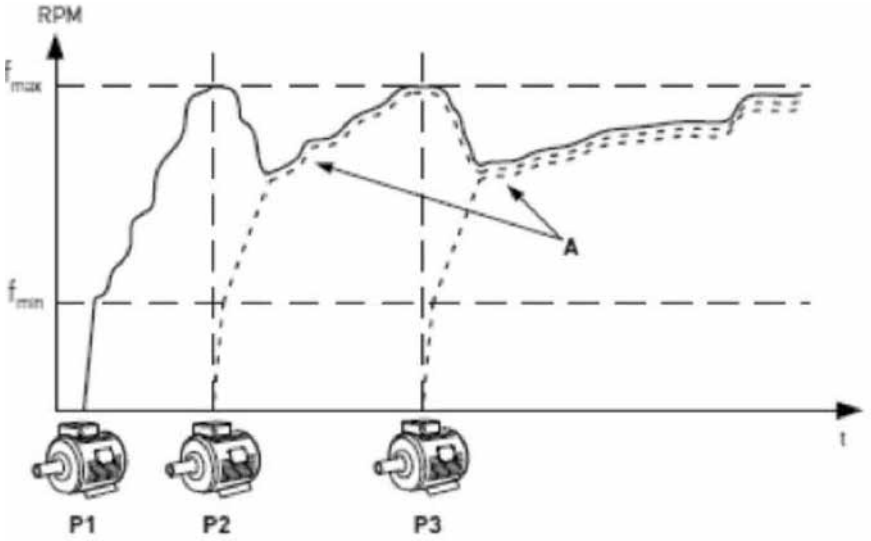


Figure 33. Multi-Drive/Multi-Pump layout

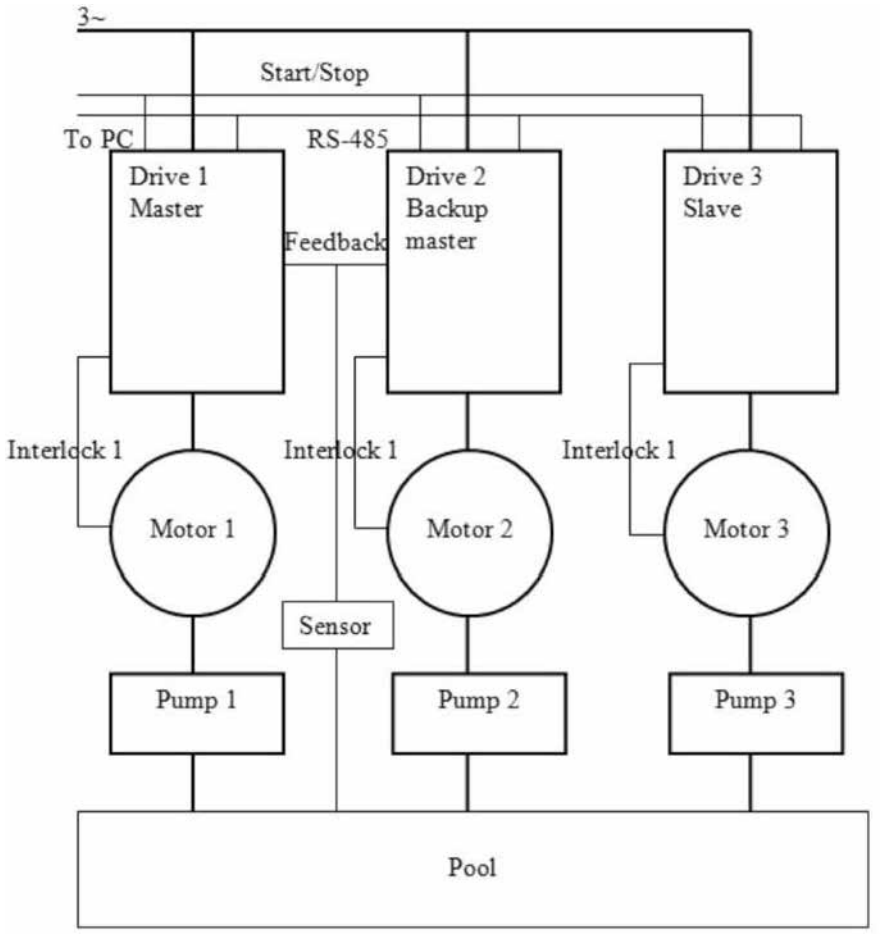


Figure 34. PowerXL drives with 10 V supply with a 0–10 V transducer

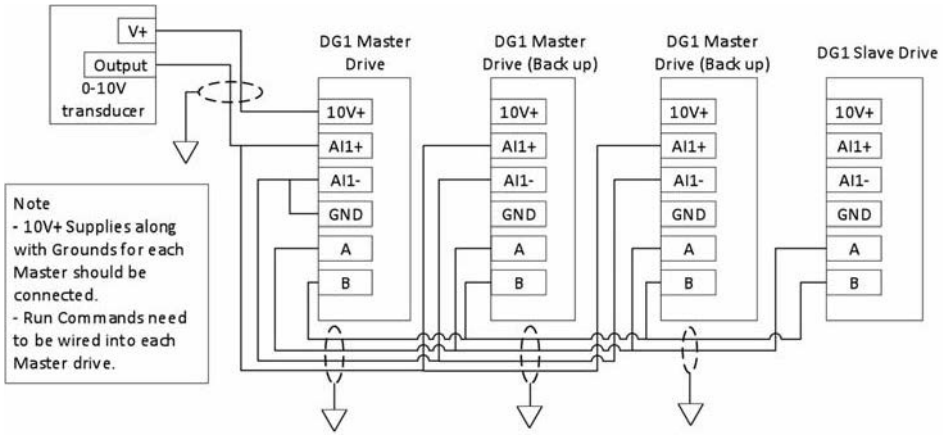


Figure 35. PowerXL drives with 10 V supply with a 4–20 mA transducer

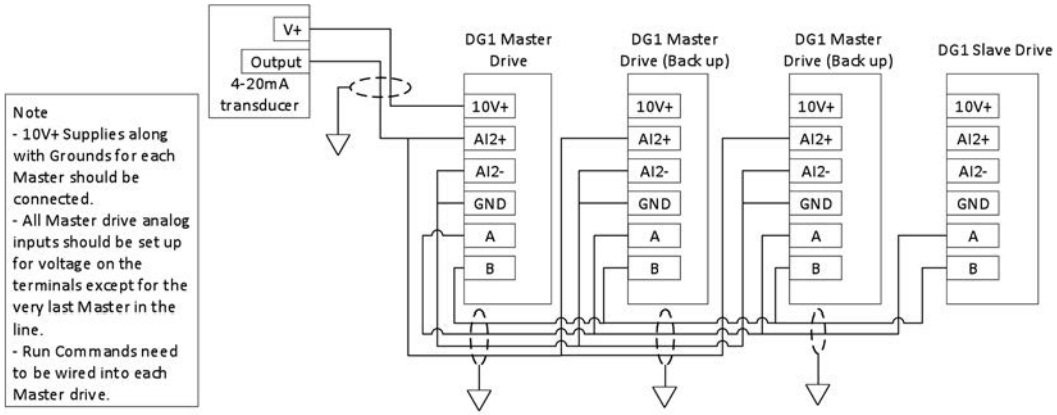


Figure 36. PowerXL drives with Ext supply with a 4–20 mA transducer

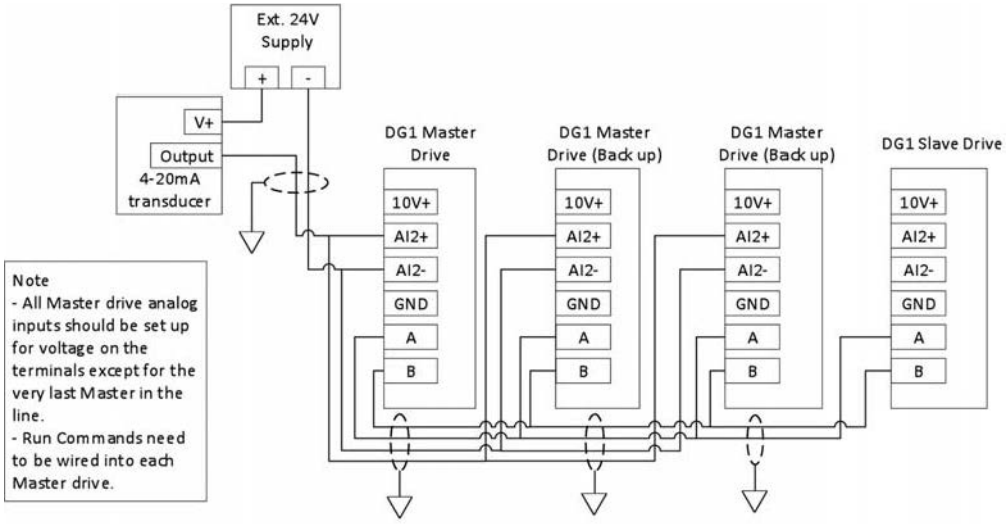
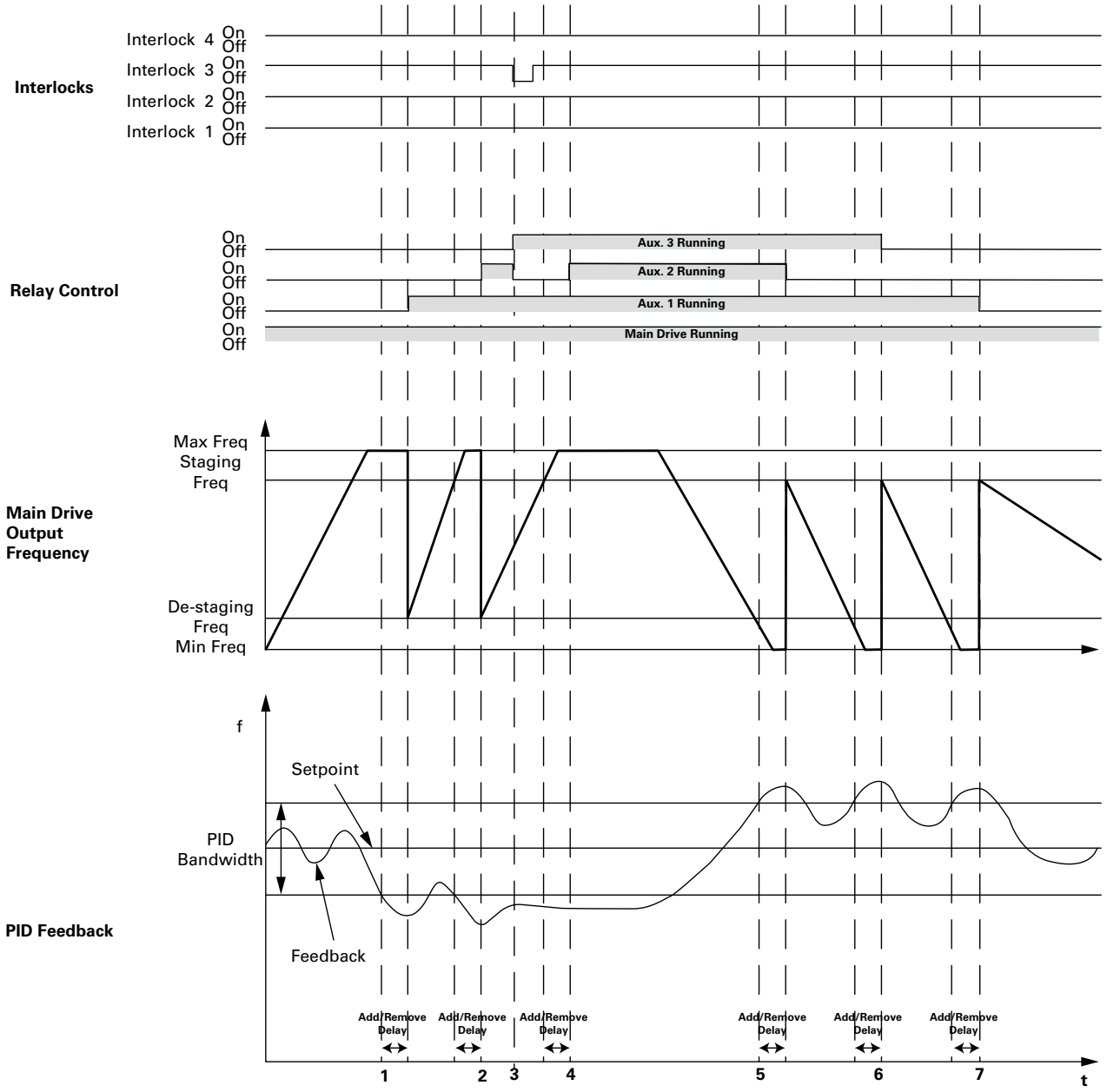


Figure 37. Bandwidth feedback

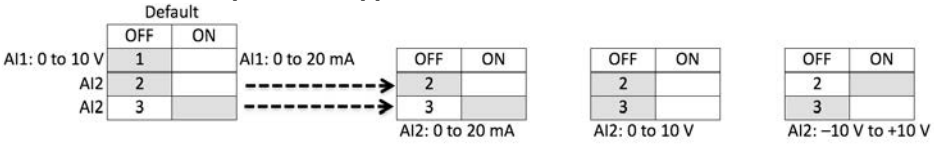


1. Feedback out of bandwidth, output frequency over staging frequency, start delay counter; delay times out, and interlock 2 is ok, add aux 1 motor by closing its corresponding relay.
2. As above, add aux 2 motor.
3. Aux 2's interlock lost, add aux 3 as backup immediately.
4. Add aux 2 motor again since 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 41. Multi-Pump and fan application default I/O connection



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

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

Table 42. 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 Port①	
Upload/Download Parameters	Two-Wire Twisted Pair
Upgrade Drive Firmware	Two-Wire Twisted Pair
Modbus RTU Communications	Two-Wire Twisted Pair
BACnet MS/TP Communications	Two-Wire Twisted Pair
SmartWire-DT Communications	Two-Wire Shielded Cable

① Shielded wire recommended.

Pump and fan application—parameters list

On the next pages you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given on **Page 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 43. 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, Virtual RO1, Virtual RO2				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 43. 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 246** in **Appendix B**
M43	RTC Battery Status					583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = Over Voltage
M44	Instant Motor Power			kW	0.000	1686	
M45	Energy Savings			Varies		2120	
M46	Control board DIDO Status				0	2209	Bit 0 = DIN1 Status Bit 1 = DIN2 Status Bit 2 = DIN3 Status Bit 3 = DIN4 Status Bit 4 = DIN5 Status Bit 5 = DIN6 Status Bit 6 = DIN7 Status Bit 7 = DIN8 Status Bit 8 = DO1 Status Bit 9 = RO1 Status Bit 10 = RO2 Status Bit 11 = RO3 Status Bit 12 = Slot A with Board Bit 13 = Slot B with Board Bit 14 -15 = Not used
M47	SlotA DIDO Status				0	2210	Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used
M48	SlotB DIDO Status				0	2211	Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 43. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M49	App Status Word				0	29	Bit 0 = MC Ready Bit 1 = MC_Run Bit 2 = MC_Fault Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning/AR-Fault Bit 7 = MC_ZeroSpeed Bit 8 = I/O Control Indicate Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Indicator Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 = Run Bypass Bit 14 = Ext Brake Control Bit 15 = Bypass Mode
M50	Standard Status Word				0	2414	Bit 0 = P20.1.9 (default = Ready) Bit 1 = P20.1.10 (default = Run) Bit 2 = P20.1.11 (default = Fault) Bit 3 = P20.1.12 (default = Fault Invert) Bit 4 = P20.1.13 (default = Warning) Bit 5 = P20.1.14 (default = Reversed) Bit 6 = P20.1.15 (default = At Speed) Bit 7 = P20.1.16 (default = Zero Frequency) Bit 8 - 15 = Not Used
M51	Output				0	2447	
M52	Reference				0	2449	
M53	Total MWh Count				Varies	601	
M54	Total Power Day Count				Varies	603	
M55	Total Power Hr Count				Varies	606	
M56	Trip MWh Count				Varies	604	
M57	Trip Power Day Count				Varies	636	
M58	Trip Power Hr Count				Varies	637	
M59	Multi-Monitoring				0, 1, 2	30	

Table 44. 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	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 45. Basic parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ①②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2 ①②	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 Start 2 3 = Keypad
P1.12	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.13 ②	Bumpless Enable				0	2464	0 = Disabled 1 = Enabled
P1.14 ①②	Local Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 9 = Max Frequency 10 = AI1 + AI2 11 = AI1–AI2 12 = AI2–AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = Min (AI1, AI2) 16 = MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output
P1.15 ①②	Remote1 Reference				1	137	See P1.14
P1.16 ①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled
P1.17 ②	Run Delay Time	0	32500	s	0	2423	
P1.18 ②	HOA Source	0	2		0	2465	0 = Disable 1 = I/O Terminal 2 = Keypad

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 46. Analog input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1	AI Ref Scale Min Value	0.00	Par. P2.1.2	Hz	0	144	
P2.1.2	AI Ref Scale Max Value	Par. P2.1.1	400.00	Hz	0	145	
P2.2.1 ②	AI1 Mode	0	1		1	222	0 = 0–20 mA 1 = 0–10 V
P2.2.2 ②	AI1 Signal Range	0	2		0	175	0 = 0–100% / 0–20 mA / 0–10 V 1 = 20–100% / 4–20 mA / 2–10 V 2 = Customized
P2.2.3 ②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.2.4 ②	AI1 Custom Max	Par. P2.2.3	100.00	%	100.00	177	
P2.2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.2.6 ②	AI1 Signal Invert	0	1		0.00	181	0 = Not Inverted 1 = Inverted
P2.2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.2.10 ②	AI1 Joystick Offset	–50.00	50.00	%	0.00	133	
P2.3.1 ②	AI2 Mode	0	2		1	222	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V
P2.3.2 ②	AI2 Signal Range	0	2		0	175	0 = 0–100% / 0–20 mA / 0–10 V 1 = 20–100% / 4–20 mA / 2–10 V 2 = Customized
P2.3.3 ②	AI2 Custom Min	0.00	Par. P2.2.4	%	0.00	176	
P2.3.4 ②	AI2 Custom Max	Par. P2.2.3	100.00	%	100.00	177	
P2.3.5 ②	AI2 Filter Time	0.00	10.00	s	0.10	174	
P2.3.6 ②	AI2 Signal Invert	0	1		0.00	181	0 = Not Inverted 1 = Inverted
P2.3.7 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.3.8 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	179	
P2.3.9 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	180	
P2.3.10 ②	AI2 Joystick Offset	-50.00	50.00	%	0.00	133	
P2.4.1 ②	Fine Tuning Input	0	5		0	2484	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot A: AI1 5 = Fieldbus
P2.4.2 ②	Fine Tuning Min	0.00	100.00	%	0.00	2485	
P2.4.3 ②	Fine Tuning Max	0.00	100.00	%	0.00	2486	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 47. Digital input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	IO Terminal 1Start/Stop Logic				0	143	0 = Forward–Reverse 1 = Start–Reverse 2 = Start–Enable 3 = Start Pulse–Stop Pulse
P3.2 ②⑤	IO Terminal 1Start 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 31 = RO1 Function 32 = RO2 Function 33 = RO3 Function 34 = Virtual RO1 Function 35 = Virtual RO2 Function
P3.3 ②⑤	IO Terminal 1Start Signal 2				3	191	See P3.2
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②③	Reverse				0	198	See P3.2
P3.6 ②③	Ext. Fault 1 NO				4	192	See P3.2
P3.7 ②③	Ext. Fault 1 NC				1	193	See P3.2
P3.8 ②④	Fault Reset				5	200	See P3.2
P3.9 ②③	Run Enable				1	194	See P3.2
P3.10 ②③	Preset Speed B0				6	205	See P3.2
P3.11 ②③	Preset Speed B1				7	206	See P3.2
P3.12 ②③	Preset Speed B2				0	207	See P3.2
P3.13 ②③	PID1 Control Enable				1	550	See P3.2
P3.15 ②③	Accel/Decel Time Set				0	195	See P3.2
P3.16 ②③	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②④	No Access To Param				0	215	See P3.2
P3.21 ②③	Remote Control				9	196	See P3.2
P3.22 ②③	Local Control				0	197	See P3.2

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.23 ②③	Remote1/2 Select				0	209	See P3.2
P3.24 ②③	Second Motor Para Select				0	217	See P3.2
P3.25 ②④	Bypass Start				0	218	See P3.2
P3.26 ②③	DC Brake Enable				0	202	See P3.2
P3.27 ②③	Smoke Mode				0	219	See P3.2
P3.28 ②③	Fire Mode				0	220	See P3.2
P3.29 ②③	Fire Mode Ref Select				0	221	See P3.2
P3.30 ②③	PID1 Set Point Select				0	351	See P3.2
P3.32 ②③	Jog Enable				0	199	See P3.2
P3.33 ②④	Start Timer 1				0	224	See P3.2
P3.34 ②④	Start Timer 2				0	225	See P3.2
P3.35 ②④	Start Timer 3				0	226	See P3.2
P3.36 ②③	AI Ref Source Select				0	208	See P3.2
P3.37 ②③	Motor Interlock 1				0	210	See P3.2
P3.38 ②③	Motor Interlock 2				0	211	See P3.2
P3.39 ②③	Motor Interlock 3				0	212	See P3.2
P3.40 ②③	Motor Interlock 4				0	213	See P3.2
P3.41 ②③	Motor Interlock 5					214	See P3.2
P3.42 ②③	Emergency Stop				1	747	See P3.2
P3.43 ②③	Bypass Overload				0	1246	See P3.2
P3.44 ②④	Fire Mode Reverse				0	2118	See P3.2
P3.45 ①②	IO Terminal 2 Start Stop Logic				0	2206	See P3.1
P3.46 ②⑤	IO Terminal 2 Start Signal 1				2	2207	See P3.2
P3.47 ②⑤	IO Terminal 2 Start Signal 2				3	2208	See P3.2
P3.48 ②③	Ext. Fault 2 NO				0	2293	See P3.2
P3.49 ②③	Ext. Fault 2 NC				1	2294	See P3.2
P3.50 ②③	Ext. Fault 3 NO				0	2295	See P3.2
P3.51 ②③	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 11 = Rod Breakage
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 11 = Rod Breakage

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Table 47. Digital input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 11 = Rod Breakage
P3.55 ②④	Parameter Set1/2 Sel				0	2312	See P3.2
P3.56 ②④	Deragging Enable				0	2394	see P3.2
P3.57 ②③	Off Control				0	2395	see P3.2

Table 48. Analog output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	0 = 0–20 mA 1 = 0–10 V
P4.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0–Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 9 = PID1 Setpoint 10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 19 = AI1 20 = AI2 21 = Output Freq (–2 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 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2 35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current(-2 to +2N)
P4.3 ②	AO1 Minimum				1	149	0 = 0 V / 0 mA 1 = 2 V / 4 mA
P4.4 ②	AO1 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	AO1 Scale	10	1000	%	100	150	
P4.6 ②	AO1 Inversion				0	148	0 = Not Inverted 1 = Inverted
P4.7 ②	AO1 Offset	–100.00	100.00	%	0.00	173	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Table 48. Analog output—P4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.8 ②	AO2 Mode				0	228	See P4.1
P4.9 ②	AO2 Function				4	229	See P4.2
P4.10 ②	AO2 Minimum				1	232	See P4.3
P4.11 ②	AO2 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	AO2 Scale	10	1000	%	100	233	
P4.13 ②	AO2 Inversion				0	231	See P4.6
P4.14 ②	AO2 Offset	–100.00	100.00	%	0.00	234	

Table 49. 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 57 = Pre-Charge Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault 60 = Run Bypass/Drive 61 = Bypass Overload

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 49. Digital output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	Virtual RO1 Function				0	2465	See P5.1
P5.6 ②	Virtual RO2 Function				0	2466	See P5.1
P5.7 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 1 Supv Val	0.00	Par. P1.2	Hz	0.00	155	
P5.9 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10 ②	Freq Limit 2 Supv Val	0.00	Par. P1.2	Hz	0.00	158	
P5.11 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Torque Limit Supv Val	–1000.0	1000.0	%	100.0	160	
P5.13 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.14 ②	Ref Limit Supv Val	0.00	Par. P1.2	Hz	0.00	162	
P5.17 ②	Temp Limit Supv				0	165	See P5.13
P5.18 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.19 ②	Power Limit Supv				0	167	See P5.13
P5.20 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.21 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.22 ②	AI Limit Supv				0	171	See P5.13
P5.23 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.24 ②	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P5.25 ②	PID1 Superv Upper Limit	Par. P10.5	Par. P10.6	Varies	0.00	1347	
P5.26 ②	PID1 Superv Lower Limit	Par. P10.5	Par. P10.6	Varies	0.00	1349	
P5.27 ②	PID1 Superv Delay	0	3000	s	0	1351	
P5.32 ②	RO1 On Delay	0	320	s	0	2111	
P5.33 ②	RO1 Off Delay	0	320	s	0	2112	
P5.34 ②	RO2 On Delay	0	320	s	0	2113	
P5.35 ②	RO2 Off Delay	0	320	s	0	2114	
P5.36 ②	RO3 On Delay	0	320	s	0	2115	
P5.37 ②	RO3 Off Delay	0	320	s	0	2116	
P5.38 ②	RO3 Reverse				0	2117	0 = No 1 = Yes
P5.39 ②	Motor Current 1 Supv				0	2189	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.40 ②	Motor Current 1 Supv Value	0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190	
P5.41 ②	Motor Current 2 Supv				0	2191	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.42 ②	Motor Current 2 Supv Value	0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192	
P5.43 ②	Second AI Supv Select				0	2193	0 = AI1 1 = AI2

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 49. Digital output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.44 ②	Second AI Limit Supv				0	2194	See P5.13
P5.45 ②	Second AI Limit Supv Val	0	100	%	0	2195	
P5.46 ②	Motor Current 1 Supv Hyst	0.1	1	A	0.1	2196	
P5.47 ②	Motor Current 2 Supv Hyst	0.1	1	A	0.1	2197	
P5.48 ②	AI Supv Hyst	1	10	%	1	2198	
P5.49 ②	Second AI Supv Hyst	1	10	%	1	2199	
P5.50 ②	Freq Limit 1 Supv Hyst	0.1	1	Hz	0.1	2200	
P5.51 ②	Freq Limit 2 Supv Hyst	0.1	1	Hz	0.1	2201	
P5.52 ②	Torque Limit Supv Hyst	1	5	%	1	2202	
P5.53 ②	Ref Limit Supv Hyst	0.1	1	Hz	0.1	2203	
P5.54 ②	Temp Limit Supv Hyst	1	10	deg C	1	2204	
P5.55 ②	Power Limit Supv Hyst	0.1	10	%	0.1	2205	

Table 50. 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 P1.14
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 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	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 50. Drive control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.26 ②	Data Type				0	2123	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P7.27 ②	Energy Savings Reset				0	2124	0 = No Action 1 = Reset
P7.28 ②	2th Stage Ramp Frequency	P1.1	P1.2	Hz	30	2447	
P7.29 ②	Change Phase Sequence Motor	0	1	0	0	2515	0 = Change Disable 1 = Change Enable

Table 51. 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	0	32000	s	0	1622	

Table 52. 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
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	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 52. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	1.00	300.00	s	1.00	321	
P9.25 ②	Trail Time	0.00	600.00	s	30.00	322	
P9.26 ②	Start Function				0	323	0 = Flying Start 1 = Ramp
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 ②	Cold Weather Mode				0	2126	0 = Disable 1 = Enable
P9.40 ②	Cold Weather Voltage Level	0	20	%	2	2127	
P9.41 ②	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

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 52. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.47 ②	Preheat Temp Source				31	2160	0 = DigIN: NormallyOpen 1 = DigIN: NormallyClosed 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = Slot A PT100 Temp Channel 1 33 = Slot A PT100 Temp Channel 2 34 = Slot A PT100 Temp Channel 3 35 = Slot A Max PT100 Temp 36 = Slot B PT100 Temp Channel 1 37 = Slot B PT100 Temp Channel 2 38 = Slot B PT100 Temp Channel 3 39 = Slot B Max PT100 Temp 40 = Slot A and Slot B Max PT100 Temp
P9.48 ②	Preheat Enter Temp	0.0	19.9	°C	10.0	2161	
P9.49 ②	Preheat Quit Temp	20.0	40.0	°C	20.0	2162	
P9.50 ②	Preheat Output Voltage	0.0	20.0	%	2.0	2163	
P9.51 ②	PID Feedback AI loss Response				0	2401	0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Frequency 4 = Warning: Analog ->Net
P9.52 ②	PID Feedback AI Loss Pre Freq	0.00	400.00	Hz	0.00	2402	
P9.53 ②	PID Feedback AI Loss Pipe Fill Level	0.0	1000.0	A	0.0	2403	
P9.54 ②	PID Feedback AI Loss PreFreq Timeout	0	6000	s	0	2404	
P9.55 ②	PID Feedback AI Loss Attemps	0	10		1	2405	
P9.56 ②	STO Fault Response				2	2429	0 = No Action 1 = Warning 2 = Fault
P9.57 ②	Fault Reset Start	0	1		0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 53. 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 40 = PA 41 = WC 42 = HG 43 = ft 44 = m
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	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 53. 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 16 = Multi Drive Network 17=FB PID1 Set Point 1 18=FB PID1 Set Point 2
P10.15 ②	PID1 Set Point 1 Min	–200.00	200.00	%	0.00	1313	
P10.16 ②	PID1 Set Point 1 Max	–200.00	200.00	%	100.00	1314	
P10.17 ①②	PID1 Set Point 1 Sleep Enable				0	1315	0 = Disabled 1 = Enabled
P10.18	PID1 Setpoint 1 Sleep Unit				0	2396	0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck
P10.19 ②	PID1 Setpoint 1 Sleep Level	Par P10.5	Par P10.6	varies	0.00	2453	
P10.20 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.21 ②	PID1 Set Point 1 Wake Up Level	–99999.99	99999.99	varies	0.00	1318	
P10.22 ②	PID1 Set Point 1 Boost	–2.0	2.0		1.0	1320	
P10.23 ①②	PID1 Set Point 2 Source				2	1321	See P10.14
P10.24 ②	PID1 Set Point 2 Min	–200.00	200.00	%	0.00	1322	
P10.25 ②	PID1 Set Point 2 Max	–200.00	200.00	%	100.00	1323	
P10.26 ①②	PID1 Set Point 2 Sleep Enable				0	1324	0 = Disabled 1 = Enabled
P10.27	PID1 Setpoint 2 Sleep Unit				0	2397	0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck
P10.28 ②	PID1 Setpoint 2 Sleep Level	Par P10.5	Par P10.6	varies	0.00	2454	
P10.29②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.30 ②	PID1 Set Point 2 Wake Up Level	–99999.99	99999.99	varies	0.00	1327	
P10.31 ②	PID1 Set Point 2 Boost	–2.0	2.0		1.0	1329	
P10.32 ①②	PID1 Feedback Function				0	1330	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1–Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1–Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2)
P10.33 ②	PID1 Feedback Gain	–1000.0	1000.0	%	100.0	1331	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 53. PID controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.34 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 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21=FB PID1 Feedback 1 22=FB PID1 Feedback 2
P10.35 ②	PID1 Feedback 1 Min	–200.00	200.00	%	0.00	1333	
P10.36 ②	PID1 Feedback 1 Max	–200.00	200.00	%	100.00	1334	
P10.37 ①②	PID1 Feedback 2 Source				0	1335	See P10.34
P10.38 ②	PID1 Feedback 2 Min	–200.00	200.00	%	0.00	1336	
P10.39 ②	PID1 Feedback 2 Max	–200.00	200.00	%	100.00	1337	
P10.40 ①②	PID1 Feedforward Func				0	1338	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)
P10.41 ②	PID1 Feedforward Gain	–1000.0	1000.0	%	100.0	1339	
P10.42 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB 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 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21=FB PID1 Feedforward 1 22=FB PID1 Feedforward 2
P10.43 ②	PID1 Feedforward 1 Min	–200.00	200.00	%	0.00	1341	
P10.44 ②	PID1 Feedforward 1 Max	–200.00	200.00	%	100.00	1342	
P10.45 ①②	PID1 Feedforward 2 Source				0	1343	See P10.42
P10.46 ②	PID1 Feedforward 2 Min	–200.00	200.00	%	0.00	1344	
P10.47 ②	PID1 Feedforward 2 Max	–200.00	200.00	%	100.00	1345	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 53. PID controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.48 ②	PID1 Set Point 1 Comp Enable				0	1352	0 = Disabled 1 = Enabled
P10.49 ②	PID1 Set Point 1 Comp Max	–200.00	200.00	%	0.00	1353	
P10.50 ②	PID1 Set Point 2 Comp Enable				0	1354	0 = Disabled 1 = Enabled
P10.51 ②	PID1 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1355	
P10.52 ②	PID1 Wake Up Action	0	3		0	2466	0 = Below Wake Up Level 1 = Above Wake Up Level 2 = Below Wake Up Level(PID ref.) 3 = Above Wake Up Level(PID ref.)

Table 54. 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 55. 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 56. Fire mode—P15

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P15.1 ①②	Fire Mode Function				0	535	0 = Closing Contact 1 = Opening Contact
P15.2 ①②	Fire Mode Ref Select Function				0	536	0 = Fire mode Min Frequency 1 = Fire Mode Ref 2 = Fieldbus Ref 3 = AI1 4 = AI2 5 = AI1+AI2 6 = PID1 Control Output 7 = PID2 Control Output
P15.3 ②	Fire Mode 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	
P15.7 ②	Fire Mode Test Enable				0	2445	0 = Disable 1 = Enable

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 57. 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 58. Bypass—P17

Basic Settings

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1.1 ①②	Bypass Enable				0	1418	0 = Disabled 1 = Enabled
P17.1.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.1.3 ①②	Auto Bypass				0	542	0 = Disabled 1 = Enabled
P17.1.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.1.5 ①②	Overcurrent Bypass Enable				0	547	0 = Disabled 1 = Enabled
P17.1.6 ①②	IGBT Fault Bypass Enable				0	546	0 = Disabled 1 = Enabled
P17.1.7 ①②	4 mA Fault Bypass Enable				0	548	0 = Disabled 1 = Enabled
P17.1.8 ①②	Undervoltage Bypass Enable				0	545	0 = Disabled 1 = Enabled
P17.1.9 ①②	Overvoltage Bypass Enable				0	549	0 = Disabled 1 = Enabled
P17.2.1 ②	Redundant Drive Enable	0	1		0	2476	0 =Disbaled 1 = Enabled
P17.2.2 ②	Drive ID	0	5		0	2278	
P17.2.3 ②	Redundant Run Time Enable	0	1		0	2477	0 =Disbaled 1 = Enabled
P17.2.4 ②	Redundant Run Time Reset	0	1		0	2478	0 = Not Reset 1 = Reset
P17.2.5 ②	Redundant RunTime Limit	0.0	300000.0	h	0.0	2479	

Table 59. Basic settings—P18.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.1 ②	Multi-Pump Mode				0	2279	0 = Disable 1 = Single Drive Control 2 = Multi Drive Network
P18.1.2 ②	Drive ID	0	5		0.00	2278	
P18.1.3 ②	PID Bandwidth	0	100	Varies	10	343	
P18.1.4 ②	Staging Frequncy	Par P1.1	400		Par P1.2	2315	
P18.1.5 ②	De-Staging Frequency	0	Par P1.2		Par P1.1	2316	
P18.1.6 ②	Add/Remove Delay	0	3600	s	10	344	
P18.1.7 ②	Interlock Enable				0	350	0 = Disable 1 = Enable
P18.1.8 ②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 59. Basic settings—P18.1 continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.9 ②	Damper Time Out	1	32500	s	5	484	
P18.1.10 ②	Damper Delay	1	32500	s	5	485	
P18.1.11 ②	Derag Cycles	0	10		3	2468	0 = Off 1 = Start 2 = Stop 3 = Start and Stop 4 = Digital Input;
P18.1.12 ②	Derag at Start/Stop	0	4		0	2469	
P18.1.13 ②	Deragging Run Time	0	3600	s	0	2470	
P18.1.14 ②	Derag Speed	Par. P1.1	Par. P1.2	Hz	5	2471	
P18.1.15 ②	Derag Off Delay	1	600	s	10	2472	

Multi-Pump com status P18.2

Table 60. Operation mode P18.2.1

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

Table 61. Multi Pump status P18.2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.2.1	Drive 1				0	2219	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.2	Drive 2				0	2231	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.3	Drive 3				0	2243	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.4	Drive 4				0	2245	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.5	Drive 5				0	2267	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 62. Network status P18.2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.3.1	Drive 1				0	2220	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.2	Drive 2				0	2232	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.3	Drive 3				0	2244	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.4	Drive 4				0	2246	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.5	Drive 5				0	2268	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error

Multi-Pump measurement P18.3

Table 63. Last fault code P18.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.1.1	Drive 1				0	2221	
P18.3.1.2	Drive 2				0	2233	
P18.3.1.3	Drive 3				0	2245	
P18.3.1.4	Drive 4				0	2257	
P18.3.1.5	Drive 5				0	2269	

Table 64. Output frequency P18.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.2.1	Drive 1			Hz	0	2222	
P18.3.2.2	Drive 2			Hz	0	2234	
P18.3.2.3	Drive 3			Hz	0	2246	
P18.3.2.4	Drive 4			Hz	0	2258	
P18.3.2.5	Drive 5			Hz	0	2270	

Table 65. Motor voltage P18.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.3.1	Drive 1			V	0	2223	
P18.3.3.2	Drive 2			V	0	2235	
P18.3.3.3	Drive 3			V	0	2247	
P18.3.3.4	Drive 4			V	0	2259	
P18.3.3.5	Drive 5			V	0	2271	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 66. Motor current P18.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.4.1	Drive 1			A	0	2224	
P18.3.4.2	Drive 2			A	0	2236	
P18.3.4.3	Drive 3			A	0	2248	
P18.3.4.4	Drive 4			A	0	2260	
P18.3.4.5	Drive 5			A	0	2272	

Table 67. Motor torque P18.3.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.5.1	Drive 1			%	0	2225	
P18.3.5.2	Drive 2			%	0	2237	
P18.3.5.3	Drive 3			%	0	2249	
P18.3.5.4	Drive 4			%	0	2261	
P18.3.5.5	Drive 5			%	0	2273	

Table 68. Motor power P18.3.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.6.1	Drive 1			%	0	2226	
P18.3.6.2	Drive 2			%	0	2238	
P18.3.6.3	Drive 3			%	0	2250	
P18.3.6.4	Drive 4			%	0	2262	
P18.3.6.5	Drive 5			%	0	2274	

Table 69. Motor speed P18.3.7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.7.1	Drive 1			RPM	0	2227	
P18.3.7.2	Drive 2			RPM	0	2239	
P18.3.7.3	Drive 3			RPM	0	2251	
P18.3.7.4	Drive 4			RPM	0	2263	
P18.3.7.5	Drive 5			RPM	0	2275	

Table 70. Motor run time P18.3.8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.8.1	Drive 1			h	0	2228	
P18.3.8.2	Drive 2			h	0	2240	
P18.3.8.3	Drive 3			h	0	2252	
P18.3.8.4	Drive 4			h	0	2264	
P18.3.8.5	Drive 5			h	0	2276	

Table 71. Multi-Pump single drive - P18.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.4.1 ②	Number of Pumps	1	5		1	342	
P18.4.2 ②	Include Frequency Converter				1	346	0 = Disable 1 = Enable
P18.4.3 ②	Auto-Change Enable				0	345	0 = Disable 1 = Enable
P18.4.4 ②	Auto-Change Interval	0	3000	h	48	347	
P18.4.5 ②	Auto-Change Freq Limit	Par. P1.1	Par P1.2	Hz	25	349	
P18.4.6 ②	Auto-Change Pump Limit	0	5		1	348	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 71. Multi-Pump single drive - P18.4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.4.7 ②	Pipe Fill Aux Pump Select				0	2441	0=Disabled 1=Aux Motor 1 2=Aux Motor 2 3=Aux Motor 3 4=Aux Motor 4
P18.4.8 ②	Pipe Fill Aux Pump Run Time	0.0	3600.0	min	0.0	2442	
P18.4.9 ②	Pipe Fill Aux Pump Operation				0	2443	0 = Automatic 1 = Stop
P18.4.10 ②	Pipe Fill Aux Pump Delay	0.0	600.0	min	2.0	2444	

Table 72. Multi-Pump multi drive - P18.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.5.1 ②	Number of Drives	1	5		1	2451	
P18.5.2 ②	Regulation Source				0	2284	0 = Network 1 = PID Controller 1
P18.5.3 ②	Recovery Method				0	2285	0 = Automatic 1 = Stop
P18.5.4 ②	Callback Source				0	2286	0 = No Action 1 = Safety Torque Off
P18.5.5 ②	Add/Remove Drive Selection				0	2311	0 = Drive ID 1 = Run Time
P18.5.6 ②	Run Time Enable				0	2280	0 = Disable 1 = Enable
P18.5.7 ②	Run Time Limit	0	300000	h	0	2281	
P18.5.8 ②	Run Time Reset				0.0	2283	0 = No Action 1 = Reset
P18.5.9 ②	Master Drive Mode	0	2		0	2473	0 = Follow PID 1 = Fixed Speed 2 = Turn Off
P18.5.10 ②	Master Fixed Speed	Par. P1.1	Par. P1.2	Hz	50.00	2474	
P18.5.11 ②	Master Fixed Speed Delay	0	1000	s	5	2475	

Table 73. Protections - P18.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.6.1 ②	Pipe Fill Loss Detection Method				0	2406	0 = Motor Current 1 = Motor Power 2 = Motor Torque
P18.6.2 ②	Pipe Fill Loss Level	0.0	1000.0	%	0.0	2407	
P18.6.3 ②	Pipe Fill Loss Time	0	600	s	0	2408	
P18.6.4 ②	Pipe Fill Loss Frequency	0.00	Par P1.2	Hz	0.00	2409	
P18.6.5 ②	Pipe Fill Loss Response				0	2410	0 = No Action 1 = Warning 2 = Fault
P18.6.6 ②	Pipe Fill Loss Attempts	0	10		1	24011	
P18.6.7 ②	Prime Pump Enable				0	2430	See P3.2
P18.6.8 ②	Prime Pump Level	0.00	6000.00	%	0.00	2431	
P18.6.9 ②	Prime Pump Frequency	Par P1.1	Par P1.2	Hz	0.00	2433	
P18.6.10 ②	Prime Pump Delay Time	0.0	3600.0	min	0.0	2434	
P18.6.11 ②	Prime Pump Loss of Prime Level	0.0	1000.0	%	0.0	2435	
P18.6.12 ②	Prime Pump Level 2	0.00	6000.00	%	0.00	2436	
P18.6.13 ②	Prime Pump Frequency 2	Par P1.1	Par P1.2	Hz	0.00	2438	
P18.6.14 ②	Prime Pumpe Delay Time 2	0.0	3600.0	min	0.0	2439	
P18.6.15 ②	Prime Pumpe Loss of Prime Level 2	0.0	1000.0	%	0.0	2440	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 74. 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
P19.32 ②	Interval 1 Setting	0	1		0	2487	0 = Weekly 1 = Daily
P19.33 ②	Interval 2 Setting	0	1		0	2488	0 = Weekly 1 = Daily
P19.34 ②	Interval 3 Setting	0	1		0	2489	0 = Weekly 1 = Daily
P19.35 ②	Interval 4 Setting	0	1		0	2490	0 = Weekly 1 = Daily
P19.36 ②	Interval 5 Setting	0	1		0	2491	0 = Weekly 1 = Daily

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Communication P20

Table 75. FB Process Data Input Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1	FB Process Data Input 1 Sel				2541	2533	
P20.1.2	FB Process Data Input 2 Sel				2542	2534	
P20.1.3	FB Process Data Input 3 Sel				2550	2535	
P20.1.4	FB Process Data Input 4 Sel				103	2536	
P20.1.5	FB Process Data Input 5 Sel				104	2537	
P20.1.6	FB Process Data Input 6 Sel				107	2538	
P20.1.7	FB Process Data Input 7 Sel				0	2539	
P20.1.8	FB Process Data Input 8 Sel				0	2540	

Table 76. FB Process Data Output Sel—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1	FB Process Data Output 1 Sel				1	1556	
P20.2.2	FB Process Data Output 2 Sel				2	1557	
P20.2.3	FB Process Data Output 3 Sel				3	1558	
P20.2.4	FB Process Data Output 4 Sel				4	1559	
P20.2.5	FB Process Data Output 5 Sel				5	1560	
P20.2.6	FB Process Data Output 6 Sel				6	1561	
P20.2.7	FB Process Data Output 7 Sel				7	1562	
P20.2.8	FB Process Data Output 8 Sel				28	1563	
P20.2.9	Standard Status Word Bit0 Function Select				1	2415	See P3.2
P20.2.10	Standard Status Word Bit1 Function Select				1	2416	See P3.3
P20.2.11	Standard Status Word Bit2 Function Select				1	2417	See P3.4
P20.2.12	Standard Status Word Bit3 Function Select				1	2418	See P3.5
P20.2.13	Standard Status Word Bit4 Function Select				1	2419	See P3.6
P20.2.14	Standard Status Word Bit5 Function Select				1	2420	See P3.7
P20.2.15	Standard Status Word Bit6 Function Select				1	2421	See P3.8
P20.2.16	Standard Status Word Bit7 Function Select				1	2422	See P3.9

RS485 Bus P20.3

Table 77. Basic Setting— P20.3.1

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

Table 78. Modbus RTU—P20.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.2.1	Slave Address	1	247		1	587	
P20.3.2.2	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 78. Modbus RTU—P20.3.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.2.3	Parity Type				0	585	0 = None 1 = Odd 2 = Even
P20.3.2.4	Modbus RTU Protocol Status				0	588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.3.2.5	Slave Busy				0	589	0 = Not Busy 1 = Busy
P20.3.2.6	Parity Error				0	590	
P20.3.2.7	Slave Fault				0	591	
P20.3.2.8	Last Fault Response				0	592	
P20.3.2.9	Comm Timeout Modbus RTU			ms	10000	593	
P20.3.2.10	Modbus RTU Fault Response	0	1		0	2516	0 = In Fieldbus Control 1 = In All Control

Table 79. BACnet MS/TP—P20.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.1	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.3.2	MSTP MS/TP Device Address	0	127		1	595	
P20.3.3.3	MSTP Instance Number	0	4194302		0	596	
P20.3.3.4	MSTP Comm Timeout MSTP			ms	10000	598	
P20.3.3.5	MSTP Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.3.3.6	MSTP Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud Rate Fault
P20.3.3.7	MSTP Fault Response	0	1		0	2526	0 = In Fieldbus Control 1 = In All Control

Table 80. Ethernet IP—P20.4

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

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 80. Ethernet IP—P20.4, continued

P20.3.14	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.3.15	Modbus TCP Parity Error				0	614	
P20.3.16	Slave Faliure				0	615	
P20.3.17	Last Fault Response				0	616	
P20.3.18	Modbus TCP Fault Response	0	1		0	2517	0 = In Fieldbus Control 1 = in all Control
P20.3.19	EIP Fault Response	0	1		0	2518	0 = In Fieldbus Control 1 = in all Control

Table 81. Modbus TCP—P20.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.5.1	Connection Limit				5	609	
P20.5.2	Modbus TCP Unit ID				1	610	
P20.5.3	Comm Timeout Modbus TCP			ms	10000	611	
P20.5.4	Modbus TCP Protocol Status				0	612	0 = Stopped 1 = Operational 2 = Faulted
P20.5.5	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.5.6	Parity Error				0	614	
P20.5.7	Slave Failure				0	615	
P20.5.8	Last Fault Response				0	616	
P20.5.9	Modbus TCP Fault Response	0	1		0	2517	0 = In Fieldbus Control 1 = In All Control

Table 82. 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

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 82. Basic setting—P21.1, continued

P21.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu 4 = Keypad Reference
P21.1.11	Timeout Time	0	65535	s	30	629	
P21.1.12	Contrast Adjust	5	18		12	630	
P21.1.13	Backlight Time	1	65535	min	10	631	
P21.1.14	Fan Control				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	
P21.1.17	Startup Wizard	0	1		1	626	0 = No 1 = Yes
P21.1.18	Jog Soft Key Hidden	0	1		0	2412	0 = Disable 1 = Enable
P21.1.19	Reverse Softkey Hidden	0	1		0	2413	0 = Disable 1 = Enable
P21.1.20	Output Display Unit				45	2426	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 = deg 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/in^2 38 = HP 39 = deg F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m 45 = Hz
P21.1.21	Output Display Unit Min	-60000.00	Par P21.1.22	varies	0.00	2462	
P21.1.22	Output Display Unit Max	Par P21.1.21	60000.00	varies	60	2427	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 83. 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 84. Application info—P21.3

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

Table 85. 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

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

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.

Force Open/Force Close Selection

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

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

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

Example:

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

DIGIN Selection

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

Example:

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

Option Board DigIN Selection

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

Example:

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

Timer Channel Selection

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

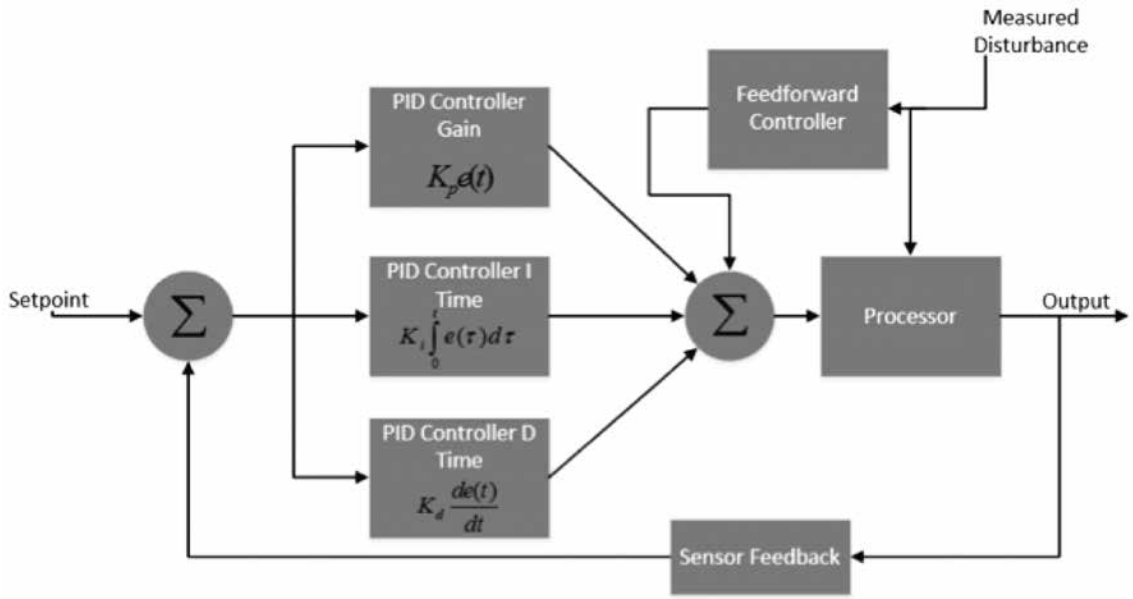
Example:

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

Force Open/Force Close Selection

The standard options are DigIn: Force Open - indication that the parameter function is always going to be open, that being said depending on the logic of the function this could mean the function is always not active or always active. When the selection of a function is DigIN: Force Closed - indication that the parameter function is always going to be closed, that being said again depending on the location of the function this could mean the function is always active or not active. Examples of these options would be P3.2 Start Signal 1, when set to "Force Open" and the drive is looking at I/O terminals for control, in this case the drive would never start since this Function is always Open. If this function is set to "F".

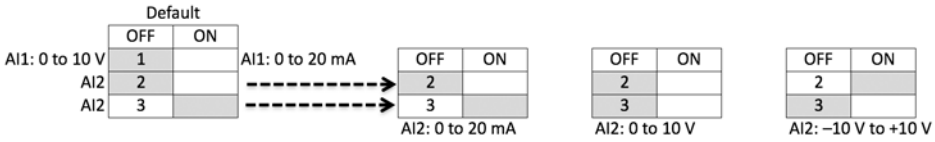
Figure 38. PID Controller Flowchart



Control I/O Configuration

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

Table 86. Multi-PID Application Default I/O Configuration



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

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

Table 87. 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 Port①	
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 88. 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, Virtual RO1, Virtual RO2				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	
M34	PID1 Status				0	23	0 = Stopped 1 = Running 2 = Sleep Mode

Table 88. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	Instant Motor Power			kW	0.000	1686	
M45	Energy Savings			Varies		2120	
M46	Control board DIDO Status				0	2209	Bit 0 = DIN1 Status Bit 1 = DIN2 Status Bit 2 = DIN3 Status Bit 3 = DIN4 Status Bit 4 = DIN5 Status Bit 5 = DIN6 Status Bit 6 = DIN7 Status Bit 7 = DIN8 Status Bit 8 = DO1 Status Bit 9 = RO1 Status Bit 10 = RO2 Status Bit 11 = RO3 Status Bit 12 = Slot A with Board Bit 13 = Slot B with Board Bit 14 -15 = Not used
M47	SlotA DIDO Status				0	2210	Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used
M48	SlotB DIDO Status				0	2211	Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used

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 88. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M49	App Status Word				0	29	Bit 0 = MC Ready Bit 1 = MC_Run Bit 2 = MC_Fault Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning/AR-Fault Bit 7 = MC_ZeroSpeed Bit 8 = I/O Control Indicate Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Indicator Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 = Run Bypass Bit 14 = Ext Brake Control Bit 15 = Bypass Mode
M50	Standard Status Word				0	2414	Bit 0 = P20.1.9 (default = Ready) Bit 1 = P20.1.10 (default = Run) Bit 2 = P20.1.11 (default = Fault) Bit 3 = P20.1.12 (default = Fault Invert) Bit 4 = P20.1.13 (default = Warning) Bit 5 = P20.1.14 (default = Reversed) Bit 6 = P20.1.15 (default = At Speed) Bit 7 = P20.1.16 (default = Zero Frequency) Bit 8 - 15 = Not Used
M51	Output				0	2447	
M52	Reference				0	2449	
M53	Total MWh Count				Varies	601	
M54	Total Power Day Count				Varies	603	
M55	Total Power Hr Count				Varies	606	
M56	Trip MWh Count				Varies	604	
M57	Trip Power Day Count				Varies	636	
M58	Trip Power Hr Count				Varies	637	
M59	Multi-Monitoring				0, 1, 2	30	

Table 89. 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	

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. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ①②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2 ①②	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	
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 Start 2 3 = Keypad
P1.12	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.13 ②	Bumpless Enable				0	2464	0 = Disabled 1 = Enabled
P1.14 ①②	Local Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 9 = Max Frequency 10 = AI1 + AI2 11 = AI1–AI2 12 = AI2–AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = Min (AI1, AI2) 16 = MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output
P1.15 ①②	Remote1 Reference				1	137	See P1.14
P1.16 ①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled
P1.17 ②	Run Delay Time	0	32500	s	0	2423	
P1.18 ②	HOA Source	0	2		0	2465	0 = Disable 1 = I/O Terminal 2 = Keypad

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. Analog Input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1	AI Ref Scale Min Value	0.00	Par. P2.1.2	Hz	0	144	
P2.1.2	AI Ref Scale Max Value	Par. P2.1.1	400.00	Hz	0	145	
P2.2.1 ②	AI1 Mode	0	1		1	222	0 = 0–20 mA 1 = 0–10 V
P2.2.2 ②	AI1 Signal Range	0	2		0	175	0 = 0–100% / 0–20 mA / 0–10 V 1 = 20–100% / 4–20 mA / 2–10 V 2 = Customized
P2.2.3 ②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.2.4 ②	AI1 Custom Max	Par. P2.2.3	100.00	%	100.00	177	
P2.2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.2.6 ②	AI1 Signal Invert	0	1		0.00	181	0 = Not Inverted 1 = Inverted
P2.2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.2.10 ②	AI1 Joystick Offset	–50.00	50.00	%	0.00	133	
P2.3.1 ②	AI2 Mode	0	2		1	222	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V
P2.3.2 ②	AI2 Signal Range	0	2		0	175	0 = 0–100% / 0–20 mA / 0–10 V 1 = 20–100% / 4–20 mA / 2–10 V 2 = Customized
P2.3.3 ②	AI2 Custom Min	0.00	Par. P2.2.4	%	0.00	176	
P2.3.4 ②	AI2 Custom Max	Par. P2.2.3	100.00	%	100.00	177	
P2.3.5 ②	AI2 Filter Time	0.00	10.00	s	0.10	174	
P2.3.6 ②	AI2 Signal Invert	0	1		0.00	181	0 = Not Inverted 1 = Inverted
P2.3.7 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.3.8 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	179	
P2.3.9 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	180	
P2.3.10 ②	AI2 Joystick Offset	-50.00	50.00	%	0.00	133	
P2.4.1 ②	Fine Tuning Input	0	5		0	2484	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot A: AI1 5 = Fieldbus
P2.4.2 ②	Fine Tuning Min	0.00	100.00	%	0.00	2485	
P2.4.3 ②	Fine Tuning Max	0.00	100.00	%	0.00	2486	

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 92. Digital Input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	IO Terminal 1 Start/Stop Logic				0	143	0 = Forward–Reverse 1 = Start–Reverse 2 = Start–Enable 3 = Start Pulse–Stop Pulse
P3.2 ②⑤	IO Terminal 1 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 31 = RO1 Function 32 = RO2 Function 33 = RO3 Function 34 = Virtual RO1 Function 35 = Virtual RO2 Function
P3.3 ②⑤	IO Terminal 1 Start Signal 2				3	191	See P3.2
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②③	Reverse				0	198	See P3.2
P3.6 ②③	Ext. Fault 1 NO				4	192	See P3.2
P3.7 ②③	Ext. Fault 1 NC				1	193	See P3.2
P3.8 ②④	Fault Reset				5	200	See P3.2
P3.9 ②③	Run Enable				1	194	See P3.2
P3.10 ②③	Preset Speed B0				6	205	See P3.2
P3.11 ②③	Preset Speed B1				7	206	See P3.2
P3.12 ②③	Preset Speed B2				0	207	See P3.2
P3.13 ②③	PID1 Control Enable				1	550	See P3.2
P3.14 ②③	PID2 Control Enable				1	553	See P3.2
P3.15 ②③	Accel/Decel Time Set				0	195	See P3.2
P3.16 ②③	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②④	No Access To Param				0	215	See P3.2
P3.21 ②③	Remote Control				9	196	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.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Table 92. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.22 ②③	Local Control				0	197	See P3.2
P3.23 ②③	Remote1/2 Select				0	209	See P3.2
P3.24 ②③	Second Motor Para Select				0	217	See P3.2
P3.25 ②④	Bypass Start				0	218	See P3.2
P3.26 ②③	DC Brake Enable				0	202	See P3.2
P3.27 ②③	Smoke Mode				0	219	See P3.2
P3.28 ②③	Fire Mode				0	220	See P3.2
P3.29 ②③	Fire Mode Ref Select				0	221	See P3.2
P3.30 ②③	PID1 Set Point Select				0	351	See P3.2
P3.31 ②③	PID2 Set Point Select				0	352	See P3.2
P3.32 ②③	Jog Enable				0	199	See P3.2
P3.33 ②④	Start Timer 1				0	224	See P3.2
P3.34 ②④	Start Timer 2				0	225	See P3.2
P3.35 ②④	Start Timer 3				0	226	See P3.2
P3.36 ②③	AI Ref Source Select				0	208	See P3.2
P3.37 ②③	Motor Interlock 1				0	210	See P3.2
P3.38 ②③	Motor Interlock 2				0	211	See P3.2
P3.39 ②③	Motor Interlock 3				0	212	See P3.2
P3.40 ②③	Motor Interlock 4				0	213	See P3.2
P3.41 ②③	Motor Interlock 5				0	214	See P3.2
P3.42 ②③	Emergency Stop				1	747	See P3.2
P3.43 ②③	Bypass Overload				0	1246	See P3.2
P3.44 ②④	Fire Mode Reverse				0	2118	See P3.2
P3.45 ①②	IO Terminal 2 Start Stop Logic				0	2206	See P3.1
P3.46 ②⑤	IO Terminal 2 Start Signal 1				2	2207	See P3.2
P3.47 ②⑤	IO Terminal 2 Start Signal 2				3	2208	See P3.2
P3.48 ②③	Ext. Fault 2 NO				0	2293	See P3.2
P3.49 ②③	Ext. Fault 2 NC				1	2294	See P3.2
P3.50 ②③	Ext. Fault 3 NO				0	2295	See P3.2
P3.51 ②③	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 11 = Rod Breakage

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Table 92. 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 11 = Rod Breakage
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 11 = Rod Breakage
P3.55 ②④	Parameter Set1/2 Sel				0	2312	See P3.2
P3.56 ②④	Deragging Enable				0	2394	see P3.2
P3.57 ②③	Off Control				0	2395	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.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Table 93. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	0 = 0–20 mA 1 = 0–10 V
P4.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0–Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 9 = PID1 Setpoint 10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 14 = PID2 Setpoint 15 = PID2 Feedback 1 16 = PID2 Feedback 2 17 = PID2 Control Error Value 18 = PID2 Control Output 19 = AI1 20 = AI2 21 = Output Freq (–2 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 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2 35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current(-2 to +2N)
P4.3 ②	AO1 Minimum				1	149	0 = 0 V / 0 mA 1 = 2 V / 4 mA
P4.4 ②	AO1 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	AO1 Scale	10	1000	%	100	150	
P4.6 ②	AO1 Inversion				0	148	0 = Not Inverted 1 = Inverted
P4.7 ②	AO1 Offset	–100.00	100.00	%	0.00	173	
P4.8 ②	AO2 Mode				0	228	See P4.1
P4.9 ②	AO2 Function				4	229	See P4.2
P4.10 ②	AO2 Minimum				1	232	See P4.3
P4.11 ②	AO2 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	AO2 Scale	10	1000	%	100	233	
P4.13 ②	AO2 Inversion				0	231	See P4.6
P4.14 ②	AO2 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 94. 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 57 = Pre-Charge Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault 60 = Run Bypass/Drive 61 = Bypass Overload
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	Virtual RO1 Function				0	2465	See P5.1
P5.6 ②	Virtual RO2 Function				0	2466	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 94. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.7 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 1 Supv Val	0.00	Par. P1.2	Hz	0.00	155	
P5.9 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10 ②	Freq Limit 2 Supv Val	0.00	Par. P1.2	Hz	0.00	158	
P5.11 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Torque Limit Supv Val	–1000.0	1000.0	%	100.0	160	
P5.13 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.14 ②	Ref Limit Supv Val	0.00	Par. P1.2	Hz	0.00	162	
P5.17 ②	Temp Limit Supv				0	165	See P5.13
P5.18 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.19 ②	Power Limit Supv				0	167	See P5.13
P5.20 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.21 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.22 ②	AI Limit Supv				0	171	See P5.13
P5.23 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.24 ②	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P5.25 ②	PID1 Superv Upper Limit	Par. P10.5	Par. P10.6	Varies	0.00	1347	
P5.26 ②	PID1 Superv Lower Limit	Par. P10.5	Par. P10.6	Varies	0.00	1349	
P5.27 ②	PID1 Superv Delay	0	3000	s	0	1351	
P5.28 ②	PID2 Superv Enable				0	1408	0 = Disabled 1 = Enabled
P5.29 ②	PID2 Superv Upper Limit	Par. P11.5	Par. P11.6	Varies	0.00	1409	
P5.30 ②	PID2 Superv Lower Limit	Par. P11.5	Par. P11.6	Varies	0.00	1411	
P5.31 ②	PID2 Superv Delay	0	3000	s	0	1413	
P5.32 ②	RO1 On Delay	0	320	s	0	2111	
P5.33 ②	RO1 Off Delay	0	320	s	0	2112	
P5.34 ②	RO2 On Delay	0	320	s	0	2113	
P5.35 ②	RO2 Off Delay	0	320	s	0	2114	
P5.36 ②	RO3 On Delay	0	320	s	0	2115	
P5.37 ②	RO3 Off Delay	0	320	s	0	2116	
P5.38 ②	RO3 Reverse				0	2117	0 = No 1 = Yes
P5.39 ②	Motor Current 1 Supv				0	2189	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.40 ②	Motor Current 1 Supv Value	0	Drive Nominal Current CT*2	A	Drive Nominal Current CT*2	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 94. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.41 ②	Motor Current 2 Supv				0	2191	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.42 ②	Motor Current 2 Supv Value	0	Drive Nominal Current CT*2	A	Drive Nominal Current CT*2	2192	
P5.43 ②	Second AI Supv Select				0	2193	0 = AI1 1 = AI2
P5.44 ②	Second AI Limit Supv				0	2194	See P5.13
P5.45 ②	Second AI Limit Supv Val	0	100	%	0	2195	
P5.46 ②	Motor Current 1 Supv Hyst	0.1	1	A	0.1	2196	
P5.47 ②	Motor Current 2 Supv Hyst	0.1	1	A	0.1	2197	
P5.48 ②	AI Supv Hyst	1	10	%	1	2198	
P5.49 ②	Second AI Supv Hyst	1	10	%	1	2199	
P5.50 ②	Freq Limit 1 Supv Hyst	0.1	1	Hz	0.1	2200	
P5.51 ②	Freq Limit 2 Supv Hyst	0.1	1	Hz	0.1	2201	
P5.52 ②	Torque Limit Supv Hyst	1	5	%	1	2202	
P5.53 ②	Ref Limit Supv Hyst	0.1	1	Hz	0.1	2203	
P5.54 ②	Temp Limit Supv Hyst	1	10	°C	1	2204	
P5.55 ②	Power Limit Supv Hyst	0.1	10	%	0.1	2205	

Table 95. 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 P1.14
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 95. 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 ②	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 ②	Energy Savings Reset				0	2124	0 = No Action 1 = Reset
P7.28 ②	2th Stage Ramp Frequency	P1.1	P1.2	Hz	30	2447	
P7.29 ②	Change Phase Sequence Motor	0	1		0	2515	0 = Change Disable 1 = Change Enable

Table 96. 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	0	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 97. 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
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	1.00	300.00	s	1.00	321	
P9.25 ②	Trail Time	0.00	600.00	s	30.00	322	
P9.26 ②	Start Function				0	323	0 = Flying Start 1 = Ramp
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

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. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 ②	Cold Weather Mode				0	2126	0 = Disable 1 = Enable
P9.40 ②	Cold Weather Voltage Level	0	20	%	2	2127	
P9.41 ②	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				31	2160	0 = DigIN: NormallyOpen 1 = DigIN: NormallyClosed 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = Slot A PT100 Temp Channel 1 33 = Slot A PT100 Temp Channel 2 34 = Slot A PT100 Temp Channel 3 35 = Slot A Max PT100 Temp 36 = Slot B PT100 Temp Channel 1 37 = Slot B PT100 Temp Channel 2 38 = Slot B PT100 Temp Channel 3 39 = Slot B Max PT100 Temp 40 = Slot A and Slot B Max PT100 Temp
P9.48 ②	Preheat Enter Temp	0.0	19.9	°C	10.0	2161	
P9.49 ②	Preheat Quit Temp	20.0	40.0	°C	20.0	2162	
P9.50 ②	Preheat Output Voltage	0.0	20.0	%	2.0	2163	
P9.51	PID Feedback AI loss Response				0	2401	0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Frequency 4 = Warning: Analog ->Net
P9.52 ②	PID Feedback AI Loss Pre Freq	0.00	400.00	Hz	0.00	2402	

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. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.53 ②	PID Feedback AI Loss Pipe Fill Level	0.0	1000.0	A	0.0	2403	
P9.54 ②	PID Feedback AI Loss PreFreq Timeout	0	6000	s	0	2404	
P9.55 ②	PID Feedback AI Loss Attemps	0	10		1	2405	
P9.56 ②	STO Fault Response				2	2429	0 = No Action 1 = Warning 2 = Fault
P9.57 ②	Fault Reset Start	0	1		0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset

Table 98. 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 = m^3/s 12 = m^3/min 13 = m^3/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 = ft^3/s 31 = ft^3/min 32 = ft^3/h 33 = ft/s 34 = in wg 35 = ft wg 36 = PSI 37 = lb/in^2 38 = HP 39 = °F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m
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

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 98. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 16 = Multi Drive Network 17=FB PID1 Set Point 1 18=FB PID1 Set Point 2
P10.15 ②	PID1 Set Point 1 Min	–200.00	200.00	%	0.00	1313	
P10.16 ②	PID1 Set Point 1 Max	–200.00	200.00	%	100.00	1314	
P10.17 ①②	PID1 Set Point 1 Sleep Enable				0	1315	0 = Disabled 1 = Enabled
P10.18 ②	PID1 Setpoint 1 Sleep Unit				0	2396	0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck
P10.19 ②	PID1 Setpoint 1 Sleep Level	Par P10.5	Par P10.6	varies	0.00	2453	
P10.20 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.21 ②	PID1 Set Point 1 Wake Up Level	–99999.99	99999.99	varies	0.00	1318	
P10.22 ②	PID1 Set Point 1 Boost	–2.0	2.0		1.0	1320	
P10.23 ①②	PID1 Set Point 2 Source				2	1321	See P10.14
P10.24 ②	PID1 Set Point 2 Min	–200.00	200.00	%	0.00	1322	
P10.25 ②	PID1 Set Point 2 Max	–200.00	200.00	%	100.00	1323	
P10.26 ①②	PID1 Set Point 2 Sleep Enable				0	1324	0 = Disabled 1 = Enabled
P10.27 ②	PID1 Setpoint 2 Sleep Unit				0	2397	0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck
P10.28 ②	PID1 Setpoint 2 Sleep Level	Par P10.5	Par P10.6	varies	0.00	2454	
P10.29 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.30 ②	PID1 Set Point 2 Wake Up Level	–99999.99	99999.99	varies	0.00	1327	
P10.31 ②	PID1 Set Point 2 Boost	–2.0	2.0		1.0	1329	
P10.32 ①②	PID1 Feedback Function				0	1330	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1–Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1–Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2)
P10.33 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 98. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.34 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 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21=FB PID1 Feedback 1 22=FB PID1 Feedback 2
P10.35 ②	PID1 Feedback 1 Min	–200.00	200.00	%	0.00	1333	
P10.36 ②	PID1 Feedback 1 Max	–200.00	200.00	%	100.00	1334	
P10.37 ①②	PID1 Feedback 2 Source				0	1335	See P10.34
P10.38 ②	PID1 Feedback 2 Min	–200.00	200.00	%	0.00	1336	
P10.39 ②	PID1 Feedback 2 Max	–200.00	200.00	%	100.00	1337	
P10.40 ①②	PID1 Feedforward Func				0	1338	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)
P10.41 ②	PID1 Feedforward Gain	–1000.0	1000.0	%	100.0	1339	
P10.42 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB 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 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21=FB PID1 Feedforward 1 22=FB PID1 Feedforward 2
P10.43 ②	PID1 Feedforward 1 Min	–200.00	200.00	%	0.00	1341	
P10.44 ②	PID1 Feedforward 1 Max	–200.00	200.00	%	100.00	1342	
P10.45 ①②	PID1 Feedforward 2 Source				0	1343	See P10.42
P10.46 ②	PID1 Feedforward 2 Min	–200.00	200.00	%	0.00	1344	

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 98. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.47 ②	PID1 Feedforward 2 Max	–200.00	200.00	%	100.00	1345	
P10.48 ②	PID1 Set Point 1 Comp Enable				0	1352	0 = Disabled 1 = Enabled
P10.49 ②	PID1 Set Point 1 Comp Max	–200.00	200.00	%	0.00	1353	
P10.50 ②	PID1 Set Point 2 Comp Enable				0	1354	0 = Disabled 1 = Enabled
P10.51 ②	PID1 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1355	
P10.52 ②	PID1 Wake Up Action	0	3		0	2466	0 = Below Wake Up Level 1 = Above Wake Up Level 2 = Below Wake Up Level(PID ref.) 3 = Above Wake Up Level(PID ref.)

Table 99. 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	0=Not Used 1=PID2 Keypad Set Point 1 2=PID2 Keypad Set Point 2 3=AI1 4=AI2 5=Slot A: AI1 6=Slot B: AI1 7=FB Process Data Input 1 8=FB Process Data Input 2 9=FB Process Data Input 3 10=FB Process Data Input 4 11=FB Process Data Input 5 12=FB Process Data Input 6 13=FB Process Data Input 7 14=FB Process Data Input 8 15=PID1 Output 16=Multi Drive Network 17=FB PID2 Set Point 1 18=FB PID2 Set Point 2
P11.15 ②	PID2 Set Point 1 Min	–200.00	200.00	%	0.00	1375	
P11.16 ②	PID2 Set Point 1 Max	–200.00	200.00	%	100.00	1376	
P11.17 ①②	PID2 Set Point 1 Sleep Enable				0	1377	0 = Disabled 1 = Enabled
P11.18 ②	PID2 Setpoint 1 Sleep Unit				0	2398	0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck
P11.19 ②	PID2 Setpoint 1 Sleep Level	Par P11.5	Par P11.6	varies	0.00	2456	
P11.20 ②	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379	

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. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.21 ②	PID2 Set Point 1 WakeUp Level	–99999.99	99999.99	varies	0.00	1380	
P11.22 ②	PID2 Set Point 1 Boost	–2.0	2.0		1.0	1382	
P11.23 ①②	PID2 Set Point 2 Source				2	1383	See P11.14
P11.24 ②	PID2 Set Point 2 Min	–200.00	200.00	%	0.00	1384	
P11.25 ②	PID2 Set Point 2 Max	–200.00	200.00	%	100.00	1385	
P11.26 ①②	PID2 Set Point 2 Sleep Enable				0	1386	0 = Disabled 1 = Enabled
P11.27 ②	PID2 Setpoint 2 Sleep Unit				0	2399	0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck
P10.28 ②	PID2 Setpoint 2 Sleep Level	Par P11.5	Par P11.6	varies	0.00	2458	
P11.29 ②	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388	
P11.30 ②	PID2 Set Point 2 WakeUp Level	–99999.99	99999.99	varies	0.00	1389	
P11.31 ②	PID2 Set Point 2 Boost	–2.0	2.0		1.0	1391	
P11.32 ①②	PID2 Feedback Func				0	1392	See P10.32
P11.33 ②	PID2 Feedback Gain	–1000.0	1000.0	%	100.0	1393	
P11.34 ①②	PID2 Feedback 1 Source				1	1394	0=Not Used 1=AI1 2=AI2 3=Slot A: AI1 4=Slot B: AI1 5=FB Process Data Input 1 6=FB Process Data Input 2 7=FB Process Data Input 3 8=FB Process Data Input 4 9=FB Process Data Input 5 10=FB Process Data Input 6 11=FB Process Data Input 7 12=FB Process Data Input 8 13=PT100 Temperture 14=PID1 Output 15=SlotA PT100 Temp Channel 1 16=SlotA PT100 Temp Channel 2 17=SlotA PT100 Temp Channel 3 18=SlotB PT100 Temp Channel 1 19=SlotB PT100 Temp Channel 2 20=SlotB PT100 Temp Channel 3 21=FB PID2 Feedback 1 22=FB PID2 Feedback 2
P11.35 ②	PID2 Feedback 1 Min	–200.00	200.00	%	0.00	1395	
P11.36 ②	PID2 Feedback 1 Max	–200.00	200.00	%	100.00	1396	
P11.37 ①②	PID2 Feedback 2 Source				0	1397	See P10.34
P11.38 ②	PID2 Feedback 2 Min	–200.00	200.00	%	0.00	1398	
P11.39 ②	PID2 Feedback 2 Max	–200.00	200.00	%	100.00	1399	
P11.40 ①②	PID2 Feedforward Func				0	1400	See P10.40
P11.41 ②	PID2 Feedforward Gain	–1000.0	1000.0	%	100.0	1401	

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. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.42 ①②	PID2 Feedforward 1 Source				0	1402	0=Not Used 1=AI1 2=AI2 3=Slot A: AI1 4=Slot B: AI1 5=FB Process Data Input 1 6=FB Process Data Input 2 7=FB Process Data Input 3 8=FB Process Data Input 4 9=FB Process Data Input 5 10=FB Process Data Input 6 11=FB Process Data Input 7 12=FB Process Data Input 8 13=PT100 Temperture 14=PID1 Output 15=SlotA PT100 Temp Channel 1 16=SlotA PT100 Temp Channel 2 17=SlotA PT100 Temp Channel 3 18=SlotB PT100 Temp Channel 1 19=SlotB PT100 Temp Channel 2 20=SlotB PT100 Temp Channel 3 21=FB PID2 Feedforward 1 22=FB PID2 Feedforward 2
P11.43 ②	PID2 Feedforward 1 Min	–200.00	200.00	%	0.00	1403	
P11.44 ②	PID2 Feedforward 1 Max	–200.00	200.00	%	100.00	1404	
P11.45 ①②	PID2 Feedforward 2 Source				0	1405	See P11.42
P11.46 ②	PID2 Feedforward 2 Min	–200.00	200.00	%	0.00	1406	
P11.47 ②	PID2 Feedforward 2 Max	–200.00	200.00	%	100.00	1407	
P11.48 ②	PID2 Set Point1 Comp Enable				0	1414	0 = Disabled 1 = Enabled
P11.49 ②	PID2 Set Point1 Comp Max	–200.00	200.00	%	0.00	1415	
P11.50 ②	PID2 Set Point 2 Comp Enable				0	1416	0 = Disabled 1 = Enabled
P11.51 ②	PID2 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1417	
P11.52 ②	PID2 Wake Up Action	0	3		0	2467	0 = Below Wake Up Level 1 = Above Wake Up Level 2 = Below Wake Up Level(PID ref.) 3 = Above Wake Up Level(PID ref.)

Table 100. 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 101. 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	

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 101. Brake—P14, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 102. 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 Output 7 = PID2 Control Output
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	
P15.7 ②	Fire Mode Test Enable				0	2445	0 = Disable 1 = Enable

Table 103. 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 104. Bypass—P17

Basic Settings

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1.1 ①②	Bypass Enable				0	1418	0 = Disabled 1 = Enabled
P17.1.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.1.3 ①②	Auto Bypass				0	542	0 = Disabled 1 = Enabled
P17.1.4 ①②	Auto Bypass Delay	0	32765	s	10	543	

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 104. Bypass—P17, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1.5 ①②	Overcurrent Bypass Enable				0	547	0 = Disabled 1 = Enabled
P17.1.6 ①②	IGBT Fault Bypass Enable				0	546	0 = Disabled 1 = Enabled
P17.1.7 ①②	4 mA Fault Bypass Enable				0	548	0 = Disabled 1 = Enabled
P17.1.8 ①②	Undervoltage Bypass Enable				0	545	0 = Disabled 1 = Enabled
P17.1.9 ①②	Overvoltage Bypass Enable				0	549	0 = Disabled 1 = Enabled
P17.2.1 ②	Redundant Drive Enable	0	1		0	2476	0 = Disbaled 1 = Enabled
P17.2.2 ②	Drive ID	0	5		0	2278	
P17.2.3 ②	Redundant Run Time Enable	0	1		0	2477	0 = Disbaled 1 = Enabled
P17.2.4 ②	Redundant Run Time Reset	0	1		0	2478	0 = Not Reset 1 = Reset
P17.2.5 ②	Redundant RunTime Limit	0.0	300000.0	h	0.0	2479	

Table 105. Basic Settings - P18.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1.1 ②	Multi-Pump Mode				0	2279	0 = Disable 1 = Single Drive Control 2 = Multi Drive Network
P18.1.2 ②	Drive ID	0	5		0.00	2278	
P18.1.3 ②	PID Bandwidth	0	100	Varies	10	343	
P18.1.4 ②	Staging Frequncy	Par P1.1	400		Par P1.2	2315	
P18.1.5 ②	De-Staging Frequency	0	Par P1.2		Par P1.1	2316	
P18.1.6 ②	Add/Remove Delay	0	3600	s	10	344	
P18.1.7 ②	Interlock Enable				0	350	0 = Disable 1 = Single Drive Control 2 = Multi Drive Network
P18.1.8 ②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.1.9 ②	Damper Time Out	1	32500	s	5	484	
P18.1.10 ②	Damper Delay	1	32500	s	5	485	
P18.1.11 ②	Derag Cycles	0	10		3	2468	0 = Off 1 = Start 2 = Stop 3 = Start and Stop 4 = Digital Input
P18.1.12 ②	Derag at Start/Stop	0	4		0	2469	
P18.1.13 ②	Deragging Run Time	0	3600	s	0	2470	
P18.1.14 ②	Derag Speed	Par. P1.1	Par. P1.2	Hz	5	2471	
P18.1.15 ②	Derag Off Delay	1	600	s	10	2472	

Multi-Pump Com Status P18.2

Table 106. Operation Mode P18.2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.1.1	Drive 1				0	2218	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.2.1.2	Drive 2				0	2230	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.2.1.3	Drive 3				0	2242	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 106. Operation Mode P18.2.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.1.4	Drive 4				0	2254	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.2.1.5	Drive 5				0	2266	0 = Offline 1 = Slave Drive 2 = Master Drive

Table 107. Multi Pump Status P18.2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.2.1	Drive 1				0	2219	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.2	Drive 2				0	2231	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.3	Drive 3				0	2243	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.4	Drive 4				0	2245	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.5	Drive 5				0	2267	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown

Table 108. Network Status P18.2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.2.3.1	Drive 1				0	2220	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.2	Drive 2				0	2232	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.3	Drive 3				0	2244	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.4	Drive 4				0	2246	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.5	Drive 5				0	2268	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error

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.

Multi-Pump Measurement P18.3

Table 109. Last Fault Code P18.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.1.1	Drive 1				0	2221	
P18.3.1.2	Drive 2				0	2233	
P18.3.1.3	Drive 3				0	2245	
P18.3.1.4	Drive 4				0	2257	
P18.3.1.5	Drive 5				0	2269	

Table 110. Output Frequency P18.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.2.1	Drive 1			Hz	0	2222	
P18.3.2.2	Drive 2			Hz	0	2234	
P18.3.2.3	Drive 3			Hz	0	2246	
P18.3.2.4	Drive 4			Hz	0	2258	
P18.3.2.5	Drive 5			Hz	0	2270	

Table 111. Motor Voltage P18.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.3.1	Drive 1			V	0	2223	
P18.3.3.2	Drive 2			V	0	2235	
P18.3.3.3	Drive 3			V	0	2247	
P18.3.3.4	Drive 4			V	0	2259	
P18.3.3.5	Drive 5			V	0	2271	

Table 112. Motor Current P18.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.4.1	Drive 1			A	0	2224	
P18.3.4.2	Drive 2			A	0	2236	
P18.3.4.3	Drive 3			A	0	2248	
P18.3.4.4	Drive 4			A	0	2260	
P18.3.4.5	Drive 5			A	0	2272	

Table 113. Motor Torque P18.3.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.5.1	Drive 1			%	0	2225	
P18.3.5.2	Drive 2			%	0	2237	
P18.3.5.3	Drive 3			%	0	2249	
P18.3.5.4	Drive 4			%	0	2261	
P18.3.5.5	Drive 5			%	0	2273	

Table 114. Motor Power P18.3.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.6.1	Drive 1			%	0	2226	
P18.3.6.2	Drive 2			%	0	2238	
P18.3.6.3	Drive 3			%	0	2250	
P18.3.6.4	Drive 4			%	0	2262	
P18.3.6.5	Drive 5			%	0	2274	

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. Motor Speed P18.3.7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.7.1	Drive 1			RPM	0	2227	
P18.3.7.2	Drive 2			RPM	0	2239	
P18.3.7.3	Drive 3			RPM	0	2251	
P18.3.7.4	Drive 4			RPM	0	2263	
P18.3.7.5	Drive 5			RPM	0	2275	

Table 116. Motor Run Time P18.3.8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.3.8.1	Drive 1			h	0	2228	
P18.3.8.2	Drive 2			h	0	2240	
P18.3.8.3	Drive 3			h	0	2252	
P18.3.8.4	Drive 4			h	0	2264	
P18.3.8.5	Drive 5			h	0	2276	

Table 117. Multi-Pump Single Drive - P18.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.4.1 ②	Number of Pumps	1	5		1	342	
P18.4.2 ②	Include Frequency Converter				1	346	0 = Disable 1 = Enable
P18.4.3 ②	Auto-Change Enable				0	345	0 = Disable 1 = Enable
P18.4.4 ②	Auto-Change Interval	0	3000	h	48	347	
P18.4.5 ②	Auto-Change Freq Limit	Par. P1.1	Par P1.2	Hz	25	349	
P18.4.6 ②	Auto-Change Pump Limit	0	5		1	348	
P18.4.7 ②	Pipe Fill Aux Pump Select				0	2441	0=Disabled 1=Aux Motor 1 2=Aux Motor 2 3=Aux Motor 3 4=Aux Motor 4
P18.4.8 ②	Pipe Fill Aux Pump Run Time	0.0	3600.0	min	0.0	2442	
P18.4.9 ②	Pipe Fill Aux Pump Operation				0	2443	0 = Automatic 1 = Stop
P18.4.10 ②	Pipe Fill Aux Pump Delay	0.0	600.0	min	2.0	2444	

Table 118. Multi-Pump Multi Drive - P18.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.5.1 ②	Number of Drives	1	5		1	2451	
P18.5.2 ②	Regulation Source				0	2284	0 = Network 1 = PID Controller 1
P18.5.3 ②	Recovery Method				0	2285	0 = Automatic 1 = Stop
P18.5.4 ②	Callback Source				0	2286	0 = No Action 1 = Safety Torque Off
P18.5.5 ②	Add/Remove Drive Selection				0	2311	0 = Drive ID 1 = Run Time
P18.5.6 ②	Run Time Enable				0	2280	0 = Disable 1 = Enable
P18.5.7 ②	Run Time Limit	0	300000	h	0	2281	
P18.5.8 ②	Run Time Reset				0.0	2283	0 = No Action 1 = Reset
P18.5.9 ②	Master Drive Mode	0	2		0	2473	0 = Follow PID 1 = Fixed Speed 2 = Turn Off
P18.5.10 ②	Master Fixed Speed	Par. P1.1	Par. P1.2	Hz	50.00	2474	
P18.5.11 ②	Master Fixed Speed Delay	0	1000	s	5	2475	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 119. Protections—P18.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.6.1 ②	Pipe Fill Loss Detection Method				0	2406	0 = Motor Current 1 = Motor Power 2 = Motor Torque
P18.6.2 ②	Pipe Fill Loss Level	0.0	1000.0	The unit is Varies, depend on P18.6.1 selection	0.0	2407	
P18.6.3 ②	Pipe Fill Loss Time	0	600	s	0	2408	
P18.6.4 ②	Pipe Fill Loss Frequency	0.00	Par P1.2	Hz	0.00	2409	
P18.6.5 ②	Pipe Fill Loss Response				0	2410	0 = No Action 1 = Warning 2 = Fault
P18.6.6 ②	Pipe Fill Loss Attempts	0	10		1	24011	
P18.6.7 ②	Prime Pump Enable				0	2430	See P3.2
P18.6.8 ②	Prime Pump Level	0.00	6000.00	%	0.00	2431	
P18.6.9 ②	Prime Pump Frequency	Par P1.1	Par P1.2	Hz	0.00	2433	
P18.6.10 ②	Prime Pump Delay Time	0.0	3600.0	min	0.0	2434	
P18.6.11 ②	Prime Pump Loss of Prime Level	0.0	1000.0	%	0.0	2435	
P18.6.12 ②	Prime Pump Level 2	0.00	6000.00	%	0.00	2436	
P18.6.13 ②	Prime Pump Frequency 2	Par P1.1	Par P1.2	Hz	0.00	2438	
P18.6.14 ②	Prime Pumpe Delay Time 2	0.0	3600.0	min	0.0	2439	
P18.6.15 ②	Prime Pumpe Loss of Prime Level 2	0.0	1000.0	%	0.0	2440	

Table 120. 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	

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 120. Real Time Clock—P19, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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
P19.32 ②	Interval 1 Setting	0	1		0	2487	0 = Weekly 1 = Daily
P19.33 ②	Interval 2 Setting	0	1		0	2488	0 = Weekly 1 = Daily
P19.34 ②	Interval 3 Setting	0	1		0	2489	0 = Weekly 1 = Daily
P19.35 ②	Interval 4 Setting	0	1		0	2490	0 = Weekly 1 = Daily
P19.36 ②	Interval 5 Setting	0	1		0	2491	0 = Weekly 1 = Daily

Communication P20

Table 121. FB Process Data Input Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1	FB Process Data Input 1 Sel				2541	2533	
P20.1.2	FB Process Data Input 2 Sel				2542	2534	
P20.1.3	FB Process Data Input 3 Sel				2550	2535	
P20.1.4	FB Process Data Input 4 Sel				103	2536	
P20.1.5	FB Process Data Input 5 Sel				104	2537	
P20.1.6	FB Process Data Input 6 Sel				107	2538	
P20.1.7	FB Process Data Input 7 Sel				0	2539	
P20.1.8	FB Process Data Input 8 Sel				0	2540	

Table 122. FB Process Data Output Sel—P20.2

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

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 122. FB Process Data Output Sel—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.8	FB Process Data Output 8 Sel				28	1563	
P20.2.9	Standard Status Word Bit0 Function Select				1	2415	See P3.2
P20.2.10	Standard Status Word Bit1 Function Select				1	2416	See P3.3
P20.2.11	Standard Status Word Bit2 Function Select				1	2417	See P3.4
P20.2.12	Standard Status Word Bit3 Function Select				1	2418	See P3.5
P20.2.13	Standard Status Word Bit4 Function Select				1	2419	See P3.6
P20.2.14	Standard Status Word Bit5 Function Select				1	2420	See P3.7
P20.2.15	Standard Status Word Bit6 Function Select				1	2421	See P3.8
P20.2.16	Standard Status Word Bit7 Function Select				1	2422	See P3.9

RS485 Bus P20.3

Table 123. Basic Setting— P20.3.1

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

Table 124. Modbus RTU— P20.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.2.1	Slave Address	1	247		1	587	
P20.3.2.2	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.2.3	Parity Type				0	585	0 = None 1 = Odd 2 = Even
P20.3.2.4	Modbus RTU Protocol Status				0	588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.3.2.5	Slave Busy				0	589	0 = Not Busy 1 = Busy
P20.3.2.6	Parity Error				0	590	
P20.3.2.7	Slave Fault				0	591	
P20.3.2.8	Last Fault Response				0	592	
P20.3.2.9	Comm Timeout Modbus RTU			ms	10000	593	
P20.3.2.10	Modbus RTU Fault Response	0	1		0	2516	0 = In Fieldbus Control 1 = In All Control

Table 125. BACnet MS/TP— P20.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.1	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.3.2	MSTP MS/TP Device Address	0	127		1	595	
P20.3.3.3	MSTP Instance Number	0	4194302		0	596	
P20.3.3.4	MSTP Comm Timeout MSTP			ms	10000	598	

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. BACnet MS/TP— P20.3.3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.5	MSTP Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.3.3.6	MSTP Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud Rate Fault
P20.3.3.7	MSTP Fault Response	0	1		0	2526	0 = In Fieldbus Control 1 = In All Control

Table 126. Table 118. Ethernet IP—P20.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.4.1	IP Address Mode				1	1500	"0 = Static IP 1 = DHCP with AutoIP"
P20.4.2	Active IP Address					1507	
P20.4.3	Active Subnet Mask					1509	
P20.4.4	Active Default Gateway					1511	
P20.4.5	MAC Address					1513	
P20.4.6	Static IP Address				192.168.1.254	1501	
P20.4.7	Static Subnet Mask				255.255.255.0	1503	
P20.4.8	Static Default Gateway				192.168.1.1	1505	

Table 127. Modbus TCP—P20.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.5.1	Connection Limit				5	609	
P20.5.2	Modbus TCP Unit ID				1	610	
P20.5.3	Comm Timeout Modbus TCP			ms	10000	611	
P20.5.4	Modbus TCP Protocol Status				0	612	0 = Stopped 1 = Operational 2 = Faulted
P20.5.5	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.5.6	Parity Error				0	614	
P20.5.7	Slave Failure				0	615	
P20.5.8	Last Fault Response				0	616	
P20.5.9	Modbus TCP Fault Response	0	1		0	2517	0 = In Fieldbus Control 1 = In All Control

Table 128. 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

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. Basic Setting—P21.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 4 = Keypad Reference
P21.1.11	Timeout Time	0	65535	s	30	629	
P21.1.12	Contrast Adjust	5	18		12	630	
P21.1.13	Backlight Time	1	65535	min	10	631	
P21.1.14	Fan Control				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	
P21.1.17	Startup Wizard	0	1		1	626	0 = No 1 = Yes
P21.1.18	Jog Soft Key Hidden	0	1		0	2412	0 = Disable 1 = Enable
P21.1.19	Reverse Softkey Hidden	0	1		0	2413	0 = Disable 1 = Enable

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. Basic Setting—P21.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.20	Output Display Unit				45	2426	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 = m^3/s 12 = m^3/min 13 = m^3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVs 20 = kW 21 = deg C 22 = GPM 23 = gal/s 24 = gal/min 25 = gal/h 26 = lb/s 27 = lb/min 28 = lb/h 29 = CFM 30 = ft^3/s 31 = ft^3/min 32 = ft^3/h 33 = ft/s 34 = in wg 35 = ft wg 36 = PSI 37 = lb/in^2 38 = HP 39 = deg F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m 45 = Hz
P21.1.21	Output Display Unit Min	-60000.00	Par P21.1.22	varies	0.00	2462	
P21.1.22	Output Display Unit Max	Par P21.1.21	60000.00	varies	60	2427	

Table 129. 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 130. Application Info—P21.3

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

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. 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

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.

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

Force Open/Force close selection

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

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

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

Example:

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

DIGIN selection

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

Example:

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

Option board DigIN selection

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

Example:

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

Timer channel selection

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

Example:

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

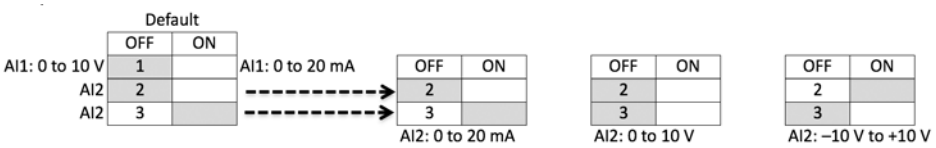
Force Open/Force close selection

The standard options are DigIn: Force Open - indication that the parameter function is always going to be open, that being said depending on the logic of the function this could mean the function is always not active or always active. When the selection of a function is DigIN: Force Closed - indication that the parameter function is always going to be closed, that being said again depending on the location of the function this could mean the function is always active or not active. Examples of these options would be P3.2 Start Signal 1, when set to "Force Open" and the drive is looking at I/O terminals for control, in this case the drive would never start since this Function is always Open. If this function is set to "F.

Control I/O configuration

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

Table 132. Multi-Purpose application default I/O configuration



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

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

Table 133. 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 134. 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, Virtual RO1, Virtual RO2				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 134. 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	Instant Motor Power			kW	0.000	1686	
M45	Energy Savings			Varies		2120	
M46	Control board DIDO Status				0	2209	Bit 0 = DIN1 Status Bit 1 = DIN2 Status Bit 2 = DIN3 Status Bit 3 = DIN4 Status Bit 4 = DIN5 Status Bit 5 = DIN6 Status Bit 6 = DIN7 Status Bit 7 = DIN8 Status Bit 8 = DO1 Status Bit 9 = RO1 Status Bit 10 = RO2 Status Bit 11 = RO3 Status Bit 12 = Slot A with Board Bit 13 = Slot B with Board Bit 14 -15 = Not used
M47	SlotA DIDO Status				0	2210	Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used
M48	SlotB DIDO Status				0	2211	Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used

Table 134. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M49	App Status Word				0	29	Bit 0 = MC Ready Bit 1 = MC_Run Bit 2 = MC_Fault Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning/AR-Fault Bit 7 = MC_ZeroSpeed Bit 8 = I/O Control Indicate Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Indicator Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 = Run Bypass Bit 14 = Ext Brake Control Bit 15 = Bypass Mode
M50	Standard Status Word				0	2414	Bit 0 = P20.1.9 (default = Ready) Bit 1 = P20.1.10 (default = Run) Bit 2 = P20.1.11 (default = Fault) Bit 3 = P20.1.12 (default = Fault Invert) Bit 4 = P20.1.13 (default = Warning) Bit 5 = P20.1.14 (default = Reversed) Bit 6 = P20.1.15 (default = At Speed) Bit 7 = P20.1.16 (default = Zero Frequency) Bit 8 - 15 = Not Used
M51	Output				0	2447	
M52	Reference				0	2449	
M53	Total MWh Count				Varies	601	
M54	Total Power Day Count				Varies	603	
M55	Total Power Hr Count				Varies	606	
M56	Trip MWh Count				Varies	604	
M57	Trip Power Day Count				Varies	636	
M58	Trip Power Hr Count				Varies	637	
M59	Multi-Monitoring				0, 1, 2	30	

Table 135. 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	

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 136. Basic parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ①②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2 ①②	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 Start 2 3 = Keypad
P1.12	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.13 ②	Bumpless Enable				0	2464	0 = Disabled 1 = Enabled
P1.14 ①②	Local Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 8 = Motor Pot 9 = Max Frequency 10 = AI1 + AI2 11 = AI1–AI2 12 = AI2–AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = Min (AI1, AI2) 16 = MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output
P1.15 ①②	Remote1 Reference				1	137	See P1.14
P1.16 ①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled
P1.17 ②	Run Delay Time	0	32500	s	0	2423	
P1.18 ②	HOA Source	0	2		0	2465	0 = Disable 1 = I/O Terminal 2 = Keypad

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 137. Analog input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1	AI Ref Scale Min Value	0.00	Par. P2.1.2	Hz	0	144	
P2.1.2	AI Ref Scale Max Value	Par. P2.1.1	400.00	Hz	0	145	
P2.2.1 ②	AI1 Mode	0	1		1	222	0 = 0–20 mA 1 = 0–10 V
P2.2.2 ②	AI1 Signal Range	0	2		0	175	0 = 0–100% / 0–20 mA / 0–10 V 1 = 20–100% / 4–20 mA / 2–10 V 2 = Customized
P2.2.3 ②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.2.4 ②	AI1 Custom Max	Par. P2.2.3	100.00	%	100.00	177	
P2.2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.2.6 ②	AI1 Signal Invert	0	1		0.00	181	0 = Not Inverted 1 = Inverted
P2.2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.2.10 ②	AI1 Joystick Offset	–50.00	50.00	%	0.00	133	
P2.3.1 ②	AI2 Mode	0	2		1	222	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V
P2.3.2 ②	AI2 Signal Range	0	2		0	175	0 = 0–100% / 0–20 mA / 0–10 V 1 = 20–100% / 4–20 mA / 2–10 V 2 = Customized
P2.3.3 ②	AI2 Custom Min	0.00	Par. P2.2.4	%	0.00	176	
P2.3.4 ②	AI2 Custom Max	Par. P2.2.3	100.00	%	100.00	177	
P2.3.5 ②	AI2 Filter Time	0.00	10.00	s	0.10	174	
P2.3.6 ②	AI2 Signal Invert	0	1		0.00	181	0 = Not Inverted 1 = Inverted
P2.3.7 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.3.8 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	179	
P2.3.9 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	180	
P2.3.10 ②	AI2 Joystick Offset	-50.00	50.00	%	0.00	133	
P2.4.1 ②	Fine Tuning Input	0	5		0	2484	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot A: AI1 5 = Fieldbus
P2.4.2 ②	Fine Tuning Min	0.00	100.00	%	0.00	2485	
P2.4.3 ②	Fine Tuning Max	0.00	100.00	%	0.00	2486	

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. Digital input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	IO Terminal 1 Start/Stop Logic				0	143	0 = Forward–Reverse 1 = Start–Reverse 2 = Start–Enable 3 = Start Pulse–Stop Pulse
P3.2 ②⑤	IO Terminal 1 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 31 = RO1 Function 32 = RO2 Function 33 = RO3 Function 34 = Virtual RO1 Function 35 = Virtual RO2 Function
P3.3 ②⑤	IO Terminal 1 Start Signal 2				3	191	See P3.2
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②③	Reverse				0	198	See P3.2
P3.6 ②③	Ext. Fault 1 NO				4	192	See P3.2
P3.7 ②③	Ext. Fault 1 NC				1	193	See P3.2
P3.8 ②④	Fault Reset				5	200	See P3.2
P3.9 ②③	Run Enable				1	194	See P3.2
P3.10 ②③	Preset Speed B0				6	205	See P3.2
P3.11 ②③	Preset Speed B1				7	206	See P3.2
P3.12 ②③	Preset Speed B2				0	207	See P3.2
P3.13 ②③	PID1 Control Enable				1	550	See P3.2
P3.14 ②③	PID2 Control Enable				1	553	See P3.2
P3.15 ②③	Accel/Decel Time Set				0	195	See P3.2
P3.16 ②③	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②④	No Access To Param				0	215	See P3.2
P3.18 ②③	Accel Pot Value				0	203	See P3.2

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed
④ Input function is edge sensed
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45

Table 138. Digital input—P3, continued

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

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45.

Table 138. Digital input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.52 ②	Ext. Fault 1 Text				0	2297	0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage
P3.53 ②	Ext. Fault 2 Text				1	2298	0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage
P3.54 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 11 = Rod Breakage
P3.55 ②④	Parameter Set1/2 Sel				0	2312	See P3.2
P3.56 ②④	Deragging Enable				0	2394	see P3.2
P3.57 ②	Off Control				0	2395	see P3.2

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic P3.1 and P3.45.

Table 139. Analog output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	0 = 0–20 mA 1 = 0–10 V
P4.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0–Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 9 = PID1 Setpoint 10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 14 = PID2 Setpoint 15 = PID2 Feedback 1 16 = PID2 Feedback 2 17 = PID2 Control Error Value 18 = PID2 Control Output 19 = AI1 20 = AI2 21 = Output Freq (–2 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 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2 35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current(-2 to +2N)
P4.3 ②	AO1 Minimum				1	149	0 = 0 V / 0 mA 1 = 2 V / 4 mA
P4.4 ②	AO1 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	AO1 Scale	10	1000	%	100	150	
P4.6 ②	AO1 Inversion				0	148	0 = Not inverted 1 = Inverted
P4.7 ②	AO1 Offset	–100.00	100.00	%	0.00	173	
P4.8 ②	AO2 Mode				0	228	See P4.1
P4.9 ②	AO2 Function				1	229	See P4.2
P4.10 ②	AO2 Minimum				1	232	See P4.3
P4.11 ②	AO2 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	AO2 Scale	10	1000	%	100	233	
P4.13 ②	AO2 Inversion				0	231	See P4.6
P4.14 ②	AO2 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 140. 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 57 = Pre-Charge Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault 60 = Run Bypass/Drive 61 = Bypass Overload
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	Virtual RO1 Function				0	2465	See P5.1
P5.6 ②	Virtual RO2 Function				0	2466	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 140. Digital output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.7 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-on Control
P5.8 ②	Freq Limit 1 Supv Val	0.00	Par. P1.2	Hz	0.00	155	
P5.9 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-off Control 4 = Brake-on/off Control
P5.10 ②	Freq Limit 2 Supv Val	0.00	Par. P1.2	Hz	0.00	158	
P5.11 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-off Control
P5.12 ②	Torque Limit Supv Val	–1000.0	1000.0	%	100.0	160	
P5.13 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.14 ②	Ref Limit Supv Val	0.00	Par. P1.2	Hz	0.00	162	
P5.15 ②	Ext Brake Off Delay	0.0	100.0	s	0.5	163	
P5.16 ②	Ext Brake On Delay	0.0	100.0	s	1.5	164	
P5.17 ②	Temp Limit Supv				0	165	See P5.13
P5.18 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.19 ②	Power Limit Supv				0	167	See P5.13
P5.20 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.21 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.22 ②	AI Limit Supv				0	171	See P5.13
P5.23 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.24 ②	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P5.25 ②	PID1 Superv Upper Limit	Par. P10.5	Par. P10.6	Varies	0.00	1347	
P5.26 ②	PID1 Superv Lower Limit	Par. P10.5	Par. P10.6	Varies	0.00	1349	
P5.27 ②	PID1 Superv Delay	0	3000	s	0	1351	
P5.28 ②	PID2 Superv Enable				0	1408	0 = Disabled 1 = Enabled
P5.29 ②	PID2 Superv Upper Limit	Par. P11.5	Par. P11.6	Varies	0.00	1409	
P5.30 ②	PID2 Superv Lower Limit	Par. P11.5	Par. P11.6	Varies	0.00	1411	
P5.31 ②	PID2 Superv Delay	0	3000	s	0	1413	
P5.32 ②	RO1 On Delay	0	320	s	0	2111	
P5.33 ②	RO1 Off Delay	0	320	s	0	2112	
P5.34 ②	RO2 On Delay	0	320	s	0	2113	
P5.35 ②	RO2 Off Delay	0	320	s	0	2114	
P5.36 ②	RO3 On Delay	0	320	s	0	2115	
P5.37 ②	RO3 Off Delay	0	320	s	0	2116	
P5.38 ②	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 140. Digital output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.39 ②	Motor Current 1 Supv				0	2189	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake Off Control
P5.40 ②	Motor Current 1 Supv Value	0	DCI_uwDrive NomCurrCT*2	A	DCI_uwDrive NomCurrCT	2190	
P5.41 ②	Motor Current 2 Supv				0	2191	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake Off Control
P5.42 ②	Motor Current 2 Supv Value	0	DCI_uwDrive NomCurrCT*2	A	DCI_uwDrive NomCurrCT	2192	
P5.43 ②	Second AI Supv Select				0	2193	0 = AI1 1 = AI2
P5.44 ②	Second AI Limit Supv				0	2194	See P5.13
P5.45 ②	Second AI Limit Supv Val	0	100	%	0	2195	
P5.46 ②	Motor Current 1 Supv Hyst	0.1	1	A	0.1	2196	
P5.47 ②	Motor Current 2 Supv Hyst	0.1	1	A	0.1	2197	
P5.48 ②	AI Supv Hyst	1	10	%	1	2198	
P5.49 ②	Second AI Supv Hyst	1	10	%	1	2199	
P5.50 ②	Freq Limit 1 Supv Hyst	0.1	1	Hz	0.1	2200	
P5.51 ②	Freq Limit 2 Supv Hyst	0.1	1	Hz	0.1	2201	
P5.52 ②	Torque Limit Supv Hyst	1	5	%	1	2202	
P5.53 ②	Ref Limit Supv Hyst	0.1	1	Hz	0.1	2203	
P5.54 ②	Temp Limit Supv Hyst	1	10	?	1	2204	
P5.55 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 141. 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 141 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 142. Drive control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	P1.11
P7.2 ①②	Remote 2 Reference				7	139	See P1.14
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	
P7.7 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

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 Drive control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 ②	Energy Savings Reset				0	2124	0 = No Action 1 = Reset
P7.28 ②	2th Stage Ramp Frequency	P1.1	P1.2	Hz	30	2447	
P7.29 ②	Change Phase Sequence Motor	0	1		0	2515	0 = Change Disable 1 = Change Enable

Table 143. 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
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	

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 143. Motor control—P8, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	%	varies	1593	
P8.21 ②	Speed Control Ti	0.0	3200.0	ms	varies	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	
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	0	32000	s	0	1622	
P8.40 ②	Flux Current Ramp Time	0	32000	ms	200	1623	
P8.41 ②	Zero Speed Start Time	0	32000	ms	100	1624	
P8.42 ②	Zero Speed Stop Time	0	32000	ms	100	1625	
P8.43 ②	Droop Control Filter Time Constant	0	3000	ms	0	1630	
P8.44 ②	Startup Torque Selection				0	1631	0 = Not Used 1 = TorqueMemory 2 = 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 ②	Startup Torque Actual			%		1635	

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 143. Motor control—P8, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 144. 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
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	1.00	300.00	s	1.00	321	
P9.25 ②	Trail Time	0.00	600.00	s	30.00	322	
P9.26 ②	Start Function				0	323	0 = Flying Start 1 = Ramp
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	

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 144. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 ②	Cold Weather Mode				0	2126	0 = Disable 1 = Enable
P9.40 ②	Cold Weather Voltage Level	0	20	%	2	2127	
P9.41 ②	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				31	2160	0 = DigIN: NormallyOpen 1 = DigIN: NormallyClosed 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = Slot A PT100 Temp Channel 1 33 = Slot A PT100 Temp Channel 2 34 = Slot A PT100 Temp Channel 3 35 = Slot A Max PT100 Temp 36 = Slot B PT100 Temp Channel 1 37 = Slot B PT100 Temp Channel 2 38 = Slot B PT100 Temp Channel 3 39 = Slot B Max PT100 Temp 40 = Slot A and Slot B Max PT100 Temp
P9.48 ②	Preheat Enter Temp	0.0	19.9	°C	10.0	2161	
P9.49 ②	Preheat Quit Temp	20.0	40.0	°C	20.0	2162	
P9.50 ②	Preheat Output 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 144. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.51 ②	PID Feedback AI loss Response				0	2401	0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Frequency 4 = Warning: Analog ->Net
P9.52 ②	PID Feedback AI Loss Pre Freq	0.00	400.00	Hz	0.00	2402	
P9.53 ②	PID Feedback AI Loss Pipe Fill Level	0.0	1000.0	A	0.0	2403	
P9.54 ②	PID Feedback AI Loss PreFreq Timeout	0	6000	s	0	2404	
P9.55 ②	PID Feedback AI Loss Attemps	0	10		1	2405	
P9.56 ②	STO Fault Response				2	2429	0 = No Action 1 = Warning 2 = Fault
P9.57 ②	Fault Reset Start	0	1		0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset

Table 145. 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 = m^3/s 12 = m^3/min 13 = m^3/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 = ft^3/s 31 = ft^3/min 32 = ft^3/h 33 = ft/s 34 = in wg 35 = ft wg 36 = PSI 37 = lb/in^2 38 = HP 39 = °F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m

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 145. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	
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 16 = Multi Drive Network 17=FB PID1 Set Point 1 18=FB PID1 Set Point 2
P10.15 ②	PID1 Set Point 1 Min	–200.00	200.00	%	0.00	1313	
P10.16 ②	PID1 Set Point 1 Max	–200.00	200.00	%	100.00	1314	
P10.17 ①②	PID1 Set Point 1 Sleep Enable				0	1315	0 = Disabled 1 = Enabled
P10.18 ②	PID1 Setpoint 1 Sleep Unit				0	2396	0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck
P10.19 ②	PID1 Setpoint 1 Sleep Level	Par P10.5	Par P10.6	varies	0.00	2453	
P10.20 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.21 ②	PID1 Set Point 1 Wake Up Level	–99999.99	99999.99	varies	0.00	1318	
P10.22 ②	PID1 Set Point 1 Boost	–2.0	2.0		1.0	1320	
P10.23 ①②	PID1 Set Point 2 Source				2	1321	See P10.14
P10.24 ②	PID1 Set Point 2 Min	–200.00	200.00	%	0.00	1322	
P10.25 ②	PID1 Set Point 2 Max	–200.00	200.00	%	100.00	1323	
P10.26 ①②	PID1 Set Point 2 Sleep Enable				0	1324	0 = Disabled 1 = Enabled
P10.27 ②	PID1 Setpoint 2 Sleep Unit				0	2397	0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck
P10.28 ②	PID1 Setpoint 2 Sleep Level	Par P10.5	Par P10.6	varies	0.00	2454	
P10.29 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.30 ②	PID1 Set Point 2 Wake Up Level	–99999.99	99999.99	varies	0.00	1327	
P10.31 ②	PID1 Set Point 2 Boost	–2.0	2.0		1.0	1329	

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 145. PID Controller 1—P10 continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.32 ①②	PID1 Feedback Function				0	1330	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1–Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1–Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2)
P10.33 ②	PID1 Feedback Gain	–1000.0	1000.0	%	100.0	1331	
P10.34 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 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21=FB PID1 Feedback 1 22=FB PID1 Feedback 2
P10.35 ②	PID1 Feedback 1 Min	–200.00	200.00	%	0.00	1333	
P10.36 ②	PID1 Feedback 1 Max	–200.00	200.00	%	100.00	1334	
P10.37 ①②	PID1 Feedback 2 Source				0	1335	See P10.34
P10.38 ②	PID1 Feedback 2 Min	–200.00	200.00	%	0.00	1336	
P10.39 ②	PID1 Feedback 2 Max	–200.00	200.00	%	100.00	1337	
P10.40 ①②	PID1 Feedforward Func				0	1338	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)
P10.41 ②	PID1 Feedforward Gain	–1000.0	1000.0	%	100.0	1339	

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 145. PID Controller 1—P10 continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.42 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB 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 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21=FB PID1 Feedforward 1 22=FB PID1 Feedforward 2
P10.43 ②	PID1 Feedforward 1 Min	–200.00	200.00	%	0.00	1341	
P10.44 ②	PID1 Feedforward 1 Max	–200.00	200.00	%	100.00	1342	
P10.45 ①②	PID1 Feedforward 2 Source				0	1343	See P10.42
P10.46 ②	PID1 Feedforward 2 Min	–200.00	200.00	%	0.00	1344	
P10.47 ②	PID1 Feedforward 2 Max	–200.00	200.00	%	100.00	1345	
P10.48 ②	PID1 Set Point 1 Comp Enable				0	1352	0 = Disabled 1 = Enabled
P10.49 ②	PID1 Set Point 1 Comp Max	–200.00	200.00	%	0.00	1353	
P10.50 ②	PID1 Set Point 2 Comp Enable				0	1354	0 = Disabled 1 = Enabled
P10.51 ②	PID1 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1355	
P10.52 ②	PID1 Wake Up Action	0	3		0	2466	0 = Below Wake Up Level 1 = Above Wake Up Level 2 = Below Wake Up Level(PID ref.) 3 = Above Wake Up Level(PID ref.)

Table 146. 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	

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. PID Controller 2—P11 continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.14 ①②	PID2 Set Point 1 Source				1	1374	0=Not Used 1=PID2 Keypad Set Point 1 2=PID2 Keypad Set Point 2 3=AI1 4=AI2 5=Slot A: AI1 6=Slot B: AI1 7=FB Process Data Input 1 8=FB Process Data Input 2 9=FB Process Data Input 3 10=FB Process Data Input 4 11=FB Process Data Input 5 12=FB Process Data Input 6 13=FB Process Data Input 7 14=FB Process Data Input 8 15=PID1 Output 16=Multi Drive Network 17=FB PID2 Set Point 1 18=FB PID2 Set Point 2
P11.15 ②	PID2 Set Point 1 Min	–200.00	200.00	%	0.00	1375	
P11.16 ②	PID2 Set Point 1 Max	–200.00	200.00	%	100.00	1376	
P11.17 ①②	PID2 Set Point 1 Sleep Enable				0	1377	0 = Disabled 1 = Enabled
P11.18 ②	PID2 Setpoint 1 Sleep Unit				0	2398	0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck
P11.19 ②	PID2 Setpoint 1 Sleep Level	Par P11.5	Par P11.6	varies	0.00	2456	
P11.20 ②	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379	
P11.21 ②	PID2 Set Point 1 WakeUp Level	–99999.99	-99999.99	varies	0.00	1380	
P11.22 ②	PID2 Set Point 1 Boost	–2.0	2.0		1.0	1382	
P11.23 ①②	PID2 Set Point 2 Source				2	1383	See P11.14
P11.24 ②	PID2 Set Point 2 Min	–200.00	200.00	%	0.00	1384	
P11.25 ②	PID2 Set Point 2 Max	–200.00	200.00	%	100.00	1385	
P11.26 ①②	PID2 Set Point 2 Sleep Enable				0	1386	0 = Disabled 1 = Enabled
P11.27 ②	PID2 Setpoint 2 Sleep Unit				0	2399	0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck
P10.28 ②	PID2 Setpoint 2 Sleep Level	Par P11.5	Par P11.6	varies	0.00	2458	
P11.29 ②	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388	
P11.30 ②	PID2 Set Point 2 WakeUp Level	–99999.99	-99999.99	varies	0.00	1389	
P11.31 ②	PID2 Set Point 2 Boost	–2.0	2.0		1.0	1391	
P11.32 ①②	PID2 Feedback Func				0	1392	See P10.32
P11.33 ②	PID2 Feedback Gain	–1000.0	1000.0	%	100.0	1393	

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. PID Controller 2—P11 continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.34 ①②	PID2 Feedback 1 Source				1	1394	0=Not Used 1=AI1 2=AI2 3=Slot A: AI1 4=Slot B: AI1 5=FB Process Data Input 1 6=FB Process Data Input 2 7=FB Process Data Input 3 8=FB Process Data Input 4 9=FB Process Data Input 5 10=FB Process Data Input 6 11=FB Process Data Input 7 12=FB Process Data Input 8 13=PT100 Temperture 14=PID1 Output 15=SlotA PT100 Temp Channel 1 16=SlotA PT100 Temp Channel 2 17=SlotA PT100 Temp Channel 3 18=SlotB PT100 Temp Channel 1 19=SlotB PT100 Temp Channel 2 20=SlotB PT100 Temp Channel 3 21=FB PID2 Feedback 1 22=FB PID2 Feedback 2
P11.35 ②	PID2 Feedback 1 Min	–200.00	200.00	%	0.00	1395	
P11.36 ②	PID2 Feedback 1 Max	–200.00	200.00	%	100.00	1396	
P11.37 ①②	PID2 Feedback 2 Source				0	1397	See P11.34
P11.38 ②	PID2 Feedback 2 Min	–200.00	200.00	%	0.00	1398	
P11.39 ②	PID2 Feedback 2 Max	–200.00	200.00	%	100.00	1399	
P11.40 ①②	PID2 Feedforward Func				0	1400	See P10.40
P11.41 ②	PID2 Feedforward Gain	–1000.0	1000.0	%	100.0	1401	
P11.42 ①②	PID2 Feedforward 1 Source				0	1402	0=Not Used 1=AI1 2=AI2 3=Slot A: AI1 4=Slot B: AI1 5=FB Process Data Input 1 6=FB Process Data Input 2 7=FB Process Data Input 3 8=FB Process Data Input 4 9=FB Process Data Input 5 10=FB Process Data Input 6 11=FB Process Data Input 7 12=FB Process Data Input 8 13=PT100 Temperture 14=PID1 Output 15=SlotA PT100 Temp Channel 1 16=SlotA PT100 Temp Channel 2 17=SlotA PT100 Temp Channel 3 18=SlotB PT100 Temp Channel 1 19=SlotB PT100 Temp Channel 2 20=SlotB PT100 Temp Channel 3 21=FB PID2 Feedforward 1 22=FB PID2 Feedforward 2
P11.43 ②	PID2 Feedforward 1 Min	–200.00	200.00	%	0.00	1403	
P11.44 ②	PID2 Feedforward 1 Max	–200.00	200.00	%	100.00	1404	
P11.45 ①②	PID2 Feedforward 2 Source				0	1405	See P11.42
P11.46 ②	PID2 Feedforward 2 Min	–200.00	200.00	%	0.00	1406	
P11.47 ②	PID2 Feedforward 2 Max	–200.00	200.00	%	100.00	1407	
P11.48 ②	PID2 Set Point1 Comp Enable				0	1414	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 146. PID Controller 2—P11 continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.49 ②	PID2 Set Point1 Comp Max	–200.00	200.00	%	0.00	1415	
P11.50 ②	PID2 Set Point 2 Comp Enable				0	1416	0 = Disabled 1 = Enabled
P11.51 ②	PID2 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1417	
P11.52 ②	PID2 Wake Up Action	0	3		0	2467	0 = Below Wake Up Level 1 = Above Wake Up Level 2 = Below Wake Up Level(PID ref.) 3 = Above Wake Up Level(PID ref.)

Table 147. 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 148. 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 9=PID1 Control Output 10=PID2 Control Output 11=FB Torque Ref
P13.3 ②	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 ②	Speed Limiter Mode				0	1666	0 = NegFreqMax…PosFreqMax 1 = -|FreqRampOut|… +|FreqRampOut| 2 = NegFreqMax… FreqRampOut(MIN) 3 = FreqRampOut… PosFreqMax (MAX) 4 = FreqRampOut + -WindowPos/NegWidth 5 = 0…FreqRampOut (pos or neg direction) 6 = FreqRamp + -WindowPos/ Neg/PosOff/NegOff
P13.7 ②	Window Pos Width	0.00	50.00	Hz	2.00	1636	
P13.8 ②	Window Neg Width	0.00	50.00	Hz	2.00	1637	
P13.9 ②	Window Pos Off Limit	0.00	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 ②	Pull Out Torque	0	1000.0	%	250.0	1606	
P13.13 ②	Stop State Magnetization Time	0	32000	s	0	1684	
P13.14	FB Torque Ref	-300	300			2541	

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 149. 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 150. 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 Output 7=PID2 Control Output
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	
P15.7 ②	Fire Mode Test Enable				0	2445	0 = Disable 1 = Enable

Table 151. 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 152. Bypass—P17

Basic Settings

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1.1 ①②	Bypass Enable				0	1418	0 = Disabled 1 = Enabled
P17.1.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.1.3 ①②	Auto Bypass				0	542	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 152 Bypass—P17, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.1.5 ①②	Overcurrent Bypass Enable				0	547	0 = Disabled 1 = Enabled
P17.1.6 ①②	IGBT Fault Bypass Enable				0	546	0 = Disabled 1 = Enabled
P17.1.7 ①②	4 mA Fault Bypass Enable				0	548	0 = Disabled 1 = Enabled
P17.1.8 ①②	Undervoltage Bypass Enable				0	545	0 = Disabled 1 = Enabled
P17.1.9 ①②	Overvoltage Bypass Enable				0	549	0 = Disabled 1 = Enabled
P17.2.1 ②	Redundant Drive Enable	0	1		0	2476	0 = Disbaled 1 = Enabled
P17.2.2 ②	Drive ID	0	5		0	2278	
P17.2.3 ②	Redundant Run Time Enable	0	1		0	2477	0 = Disbaled 1 = Enabled
P17.2.4 ②	Redundant Run Time Reset	0	1		0	2478	0 = Not Reset 1 = Reset
P17.2.5 ②	Redundant RunTime Limit	0.0	300000.0	h	0.0	2479	

Table 153. Basic settings—P18.1

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.1.1 ②	Multi-Pump Mode				0	2279	0 = Disable 1 = Single Drive Control 2 = Multi Drive Network
P18.1.2 ②	Drive ID	0	5		0.00	2278	
P18.1.3 ②	PID Bandwidth	0	100	Varies	10	343	
P18.1.4 ②	Staging Frequncy	Par P1.1	400		Par P1.2	2315	
P18.1.5 ②	De-Staging Frequency	0	Par P1.2		Par P1.1	2316	
P18.1.6 ②	Add/Remove Delay	0	3600	s	10	344	
P18.1.7 ②	Interlock Enable				0	350	0 = Disable 1 = Enable
P18.1.8 ②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.1.9 ②	Damper Time Out	1	32500	s	5	484	
P18.1.10	Damper Delay	1	32500	s	5	485	
P18.1.11 ②	Derag Cycles	0	10		3	2468	0 = Off 1 = Start 2 = Stop 3 = Start and Stop 4 = Digital Input;
P18.1.12 ②	Derag at Start/Stop	0	4		0	2469	
P18.1.13 ②	Deragging Run Time	0	3600	s	0	2470	
P18.1.14 ②	Derag Speed	Par. P1.1	Par. P1.2	Hz	5	2471	
P18.1.15 ②	Derag Off Delay	1	600	s	10	2472	

Multi-Pump Com Status P18.2

Table 154. Operation mode—P18.2.1

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.2.1.1	Drive 1				0	2218	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.2.1.2	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 154. Operation mode—P18.2.1, continued

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.2.1.3	Drive 3				0	2242	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.2.1.4	Drive 4				0	2254	0 = Offline 1 = Slave Drive 2 = Master Drive
P18.2.1.5	Drive 5				0	2266	0 = Offline 1 = Slave Drive 2 = Master Drive

Table 155. Multi pump status—P18.2.2

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.2.2.1	Drive 1				0	2219	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.2	Drive 2				0	2231	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.3	Drive 3				0	2243	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.4	Drive 4				0	2245	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown
P18.2.2.5	Drive 5				0	2267	0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown

Table 156. Network status—P18.2.3

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.2.3.1	Drive 1				0	2220	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.2	Drive 2				0	2232	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.3	Drive 3				0	2244	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error
P18.2.3.4	Drive 4				0	2246	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error

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 156. Network status—P18.2.3, continued

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.2.3.5	Drive 5				0	2268	0 = Disconnected 1 = Fault 2 = Pump Lost 3 = Need Alternation 4 = No Error

Multi-Pump Measurement P18.3

Table 157. Last fault code—P18.3.1

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.3.1.1	Drive 1				0	2221	
P18.3.1.2	Drive 2				0	2233	
P18.3.1.3	Drive 3				0	2245	
P18.3.1.4	Drive 4				0	2257	
P18.3.1.5	Drive 5				0	2269	

Table 158. Output frequency—P18.3.2

Code	Parmeter	Min	Max	Unit	Default	ID	Note
P18.3.2.1	Drive 1			Hz	0	2222	
P18.3.2.2	Drive 2			Hz	0	2234	
P18.3.2.3	Drive 3			Hz	0	2246	
P18.3.2.4	Drive 4			Hz	0	2258	
P18.3.2.5	Drive 5			Hz	0	2270	

Table 159. Motor voltage—P18.3.3

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.3.3.1	Drive 1			V	0	2223	
P18.3.3.2	Drive 2			V	0	2235	
P18.3.3.3	Drive 3			V	0	2247	
P18.3.3.4	Drive 4			V	0	2259	
P18.3.3.5	Drive 5			V	0	2271	

Table 160. Motor current—P18.3.4

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.3.4.1	Drive 1			A	0	2224	
P18.3.4.2	Drive 2			A	0	2236	
P18.3.4.3	Drive 3			A	0	2248	
P18.3.4.4	Drive 4			A	0	2260	
P18.3.4.5	Drive 5			A	0	2272	

Table 161. Motor torque—P18.3.5

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.3.5.1	Drive 1			%	0	2225	
P18.3.5.2	Drive 2			%	0	2237	
P18.3.5.3	Drive 3			%	0	2249	
P18.3.5.4	Drive 4			%	0	2261	
P18.3.5.5	Drive 5			%	0	2273	

Table 162. Motor power—P18.3.6

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.3.6.1	Drive 1			%	0	2226	
P18.3.6.2	Drive 2			%	0	2238	
P18.3.6.3	Drive 3			%	0	2250	

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 162. Motor power—P18.3.6, continued

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.3.6.4	Drive 4			%	0	2262	
P18.3.6.5	Drive 5			%	0	2274	

Table 163. Motor Speed—P18.3.7

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.3.7.1	Drive 1			RPM	0	2227	
P18.3.7.2	Drive 2			RPM	0	2239	
P18.3.7.3	Drive 3			RPM	0	2251	
P18.3.7.4	Drive 4			RPM	0	2263	
P18.3.7.5	Drive 5			RPM	0	2275	

Table 164. Motor run Time—P18.3.8

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.3.8.1	Drive 1			h	0	2228	
P18.3.8.2	Drive 2			h	0	2240	
P18.3.8.3	Drive 3			h	0	2252	
P18.3.8.4	Drive 4			h	0	2264	
P18.3.8.5	Drive 5			h	0	2276	

Table 165. Multi-pump single drive—P18.4

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.4.1 ②	Number of Pumps	1	5		1	342	
P18.4.2 ②	Include Frequency Converter				1	346	0 = Disable 1 = Enable
P18.4.3 ②	Auto-Change Enable				0	345	0 = Disable 1 = Enable
P18.4.4 ②	Auto-Change Interval	0	3000	h	48	347	
P18.4.5 ②	Auto-Change Freq Limit	Par. P1.1	Par P1.2	Hz	25	349	
P18.4.6 ②	Auto-Change Pump Limit	0	5		1	348	
P18.4.7 ②	Pipe Fill Aux Pump Select				0	2441	0=Disabled 1=Aux Motor 1 2=Aux Motor 2 3=Aux Motor 3 4=Aux Motor 4
P18.4.8 ②	Pipe Fill Aux Pump Run Time	0.0	3600.0	min	0.0	2442	
P18.4.9 ②	Pipe Fill Aux Pump Operation				0	2443	0 = Automatic 1 = Stop
P18.4.10 ②	Pipe Fill Aux Pump Delay	0.0	600.0	min	2.0	2444	

Table 166. Multi-Pump multi drive—P18.5

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.5.1 ②	Number of Drives	1	5		1	2451	
P18.5.2 ②	Regulation Source				0	2284	0 = Network 1 = PID Controller 1
P18.5.3 ②	Recovery Method				0	2285	0 = Automatic 1 = Stop
P18.5.4 ②	Callback Source				0	2286	0 = No Action 1 = Safety Torque Off
P18.5.5 ②	Add/Remove Drive Selection				0	2311	0 = Drive ID 1 = Run Time
P18.5.6 ②	Run Time Enable				0	2280	0 = Disable 1 = Enable
P18.5.7 ②	Run Time Limit	0	300000	h	0	2281	

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 166. Multi-Pump multi drive—P18.5, continued

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.5.8 ②	Run Time Reset				0.0	2283	0 = No Action 1 = Reset
P18.5.9 ②	Master Drive Mode	0	2		0	2473	0 = Follow PID 1 = Fixed Speed 2 = Turn Off
P18.5.10 ②	Master Fixed Speed	Par. P1.1	Par. P1.2	Hz	50.00	2474	
P18.5.11 ②	Master Fixed Speed Delay	0	1000	s	5	2475	

Table 167. Protections—P18.6

Code	Parameter	Min	Max	Unit	Default	ID	Note
P18.6.1 ②	Pipe Fill Loss Detection Method				0	2406	0 = Motor Current 1 = Motor Power 2 = Motor Torque
P18.6.2 ②	Pipe Fill Loss Level	0.0	1000.0	%	0.0	2407	
P18.6.3 ②	Pipe Fill Loss Time	0	600	s	0	2408	
P18.6.4 ②	Pipe Fill Loss Frequency	0.00	Par P1.2	Hz	0.00	2409	
P18.6.5 ②	Pipe Fill Loss Response				0	2410	0 = No Action 1 = Warning 2 = Fault
P18.6.6 ②	Pipe Fill Loss Attempts	0	10		1	24011	
P18.6.7 ②	Prime Pump Enable				0	2430	See P3.2
P18.6.8 ②	Prime Pump Level	0.00	6000.00	%	0.00	2431	
P18.6.9 ②	Prime Pump Frequency	Par P1.1	Par P1.2	Hz	0.00	2433	
P18.6.10 ②	Prime Pump Delay Time	0.0	3600.0	min	0.0	2434	
P18.6.11 ②	Prime Pump Loss of Prime Level	0.0	1000.0	%	0.0	2435	
P18.6.12 ②	Prime Pump Level 2	0.00	6000.00	%	0.00	2436	
P18.6.13 ②	Prime Pump Frequency 2	Par P1.1	Par P1.2	Hz	0.00	2438	
P18.6.14 ②	Prime Pumpe Delay Time 2	0.0	3600.0	min	0.0	2439	
P18.6.15 ②	Prime Pumpe Loss of Prime Level 2	0.0	1000.0	%	0.0	2440	

Table 168. 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

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 168. Real time clock—P19, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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
P19.32 ②	Interval 1 Setting	0	1		0	2487	0 = Weekly 1 = Daily
P19.33 ②	Interval 2 Setting	0	1		0	2488	0 = Weekly 1 = Daily
P19.34 ②	Interval 3 Setting	0	1		0	2489	0 = Weekly 1 = Daily
P19.35 ②	Interval 4 Setting	0	1		0	2490	0 = Weekly 1 = Daily
P19.36 ②	Interval 5 Setting	0	1		0	2491	0 = Weekly 1 = Daily

Communication P20

Table 169. FB Process Data Input Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1	FB Process Data Input 1 Sel				2541	2533	
P20.1.2	FB Process Data Input 2 Sel				2542	2534	
P20.1.3	FB Process Data Input 3 Sel				2550	2535	
P20.1.4	FB Process Data Input 4 Sel				103	2536	
P20.1.5	FB Process Data Input 5 Sel				104	2537	
P20.1.6	FB Process Data Input 6 Sel				107	2538	
P20.1.7	FB Process Data Input 7 Sel				0	2539	
P20.1.8	FB Process Data Input 8 Sel				0	2540	

Table 170. FB Process Data Output Sel—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1	FB Process Data Output 1 Sel				1	1556	
P20.2.2	FB Process Data Output 2 Sel				2	1557	
P20.2.3	FB Process Data Output 3 Sel				3	1558	
P20.2.4	FB Process Data Output 4 Sel				4	1559	
P20.2.5	FB Process Data Output 5 Sel				5	1560	
P20.2.6	FB Process Data Output 6 Sel				6	1561	
P20.2.7	FB Process Data Output 7 Sel				7	1562	
P20.2.8	FB Process 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 170. FB Process Data Output Sel—P20.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.9	Standard Status Word Bit0 Function Select				1	2415	See P3.2
P20.2.10	Standard Status Word Bit1 Function Select				1	2416	See P3.3
P20.2.11	Standard Status Word Bit2 Function Select				1	2417	See P3.4
P20.2.12	Standard Status Word Bit3 Function Select				1	2418	See P3.5
P20.2.13	Standard Status Word Bit4 Function Select				1	2419	See P3.6
P20.2.14	Standard Status Word Bit5 Function Select				1	2420	See P3.7
P20.2.15	Standard Status Word Bit6 Function Select				1	2421	See P3.8
P20.2.16	Standard Status Word Bit7 Function Select				1	2422	See P3.9

RS485 Bus P20.3

Table 171. Basic Setting— P20.3.1

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

Table 172. Modbus RTU— P20.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.2.1	Slave Address	1	247		1	587	
P20.3.2.2	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.2.3	Parity Type				0	585	0 = None 1 = Odd 2 = Even
P20.3.2.4	Modbus RTU Protocol Status				0	588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.3.2.5	Slave Busy				0	589	0 = Not Busy 1 = Busy
P20.3.2.6	Parity Error				0	590	
P20.3.2.7	Slave Fault				0	591	
P20.3.2.8	Last Fault Response				0	592	
P20.3.2.9	Comm Timeout Modbus RTU			ms	10000	593	
P20.3.2.10	Modbus RTU Fault Response	0	1		0	2516	0 = In Fieldbus Control 1 = In All Control

Table 173. BACnet MS/TP— P20.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.1	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.3.2	MSTP MS/TP Device Address	0	127		1	595	
P20.3.3.3	MSTP Instance Number	0	4194302		0	596	
P20.3.3.4	MSTP Comm Timeout MSTP			ms	10000	598	

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 173. BACnet MS/TP— P20.3.3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.5	MSTP Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.3.3.6	MSTP Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud Rate Fault
P20.3.3.7	MSTP Fault Response	0	1		0	2526	0 = In Fieldbus Control 1 = In All Control

Table 174. Ethernet IP—P20.4

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

Table 175. Modbus TCP—P20.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.5.1	Connection Limit				5	609	
P20.5.2	Modbus TCP Unit ID				1	610	
P20.5.3	Comm Timeout Modbus TCP			ms	10000	611	
P20.5.4	Modbus TCP Protocol Status				0	612	0 = Stopped 1 = Operational 2 = Faulted
P20.5.5	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.5.6	Parity Error				0	614	
P20.5.7	Slave Failure				0	615	
P20.5.8	Last Fault Response				0	616	
P20.5.9	Modbus TCP Fault Response	0	1		0	2517	0 = In Fieldbus Control 1 = In All Control

Table 176. 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

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 176. Basic setting—P21.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 4 = Keypad Reference
P21.1.11	Timeout Time	0	65535	s	30	629	
P21.1.12	Contrast Adjust	5	18		12	630	
P21.1.13	Backlight Time	1	65535	min	10	631	
P21.1.14	Fan Control				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	
P21.1.17	Startup Wizard	0	1		1	626	0 = No 1 = Yes
P21.1.18	Jog Soft Key Hidden	0	1		0	2412	0 = Disable 1 = Enable
P21.1.19	Reverse Softkey Hidden	0	1		0	2413	0 = Disable 1 = Enable

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 176. Basic setting—P21.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.20	Output Display Unit				45	2426	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 = m^3/s 12 = m^3/min 13 = m^3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVs 20 = kW 21 = deg C 22 = GPM 23 = gal/s 24 = gal/min 25 = gal/h 26 = lb/s 27 = lb/min 28 = lb/h 29 = CFM 30 = ft^3/s 31 = ft^3/min 32 = ft^3/h 33 = ft/s 34 = in wg 35 = ft wg 36 = PSI 37 = lb/in^2 38 = HP 39 = deg F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m 45 = Hz
P21.1.21	Output Display Unit Min	-60000.00	Par P21.1.22	varies	0.00	2462	
P21.1.22	Output Display Unit Max	Par P21.1.21	60000.00	varies	60	2427	

Table 177. 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 178. Application info—P21.3

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

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 179. 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.

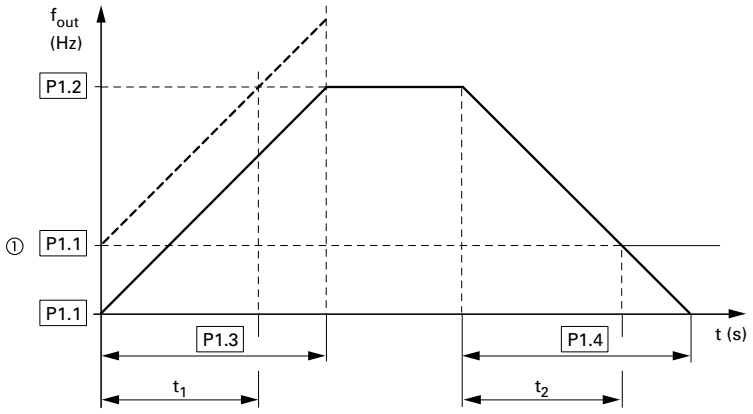
Some parameter names are followed by a number code indicating the applications in which the parameter is included. See the list of applications below. The parameter numbers under which the parameter appears in different applications are also given.

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. These frequencies effect the Preset Speeds, Jog Speed, 4mA Fault preset speed, Fire Mode speed, and brake speed 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:

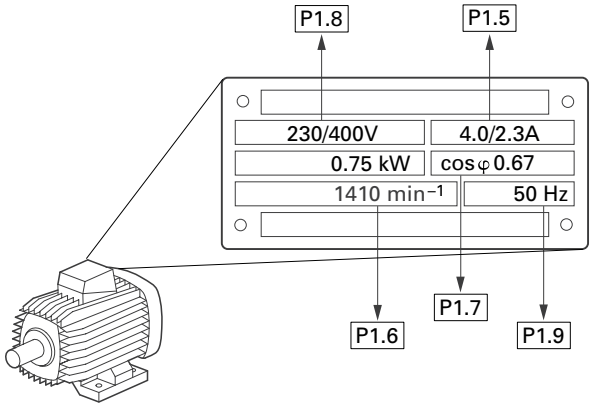
$$t_1 = \frac{(P1.2–P1.1) \times P1.3}{P1.2} \qquad t_2 = \frac{(P1.2–P1.1) \times P1.4}{P1.2}$$

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		**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
P1.13	**2464**	**Bumpless enable** When switching between Local or Remote control places when enabled the output of the drive will not change to the new refrence place untill that reference value is adjusted when in the new control place.	**1,2,3,4**	RW
P1.14	**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

Code	Modbus ID	Parameter	Application	RO/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	—	■	■	■
18 = PID2 control output just can select as reference in Multi-PID and Multi-Purpose application.	■	■	■	■

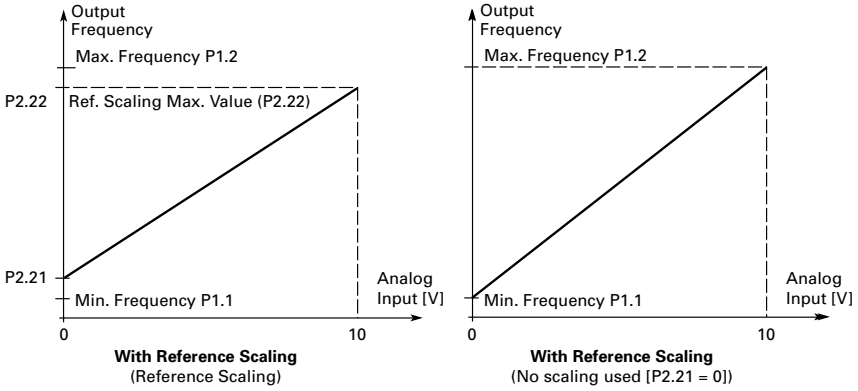
P1.15	**137**	**Remote1 Ref** This parameter determines the reference for Remote1 control mode. This value can be fed from an analog input, keypad, or fieldbus reference signal.	**1, 2, 3, 4**	RW

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	—	■	■	■
18 = PID2 control output just can select as reference in Multi-PID and Multi-Purpose application.	■	■	■	■

P1.16	**1679**	**Reverse enable** Enables or disables the reverse motor direction.	**1, 2, 3, 4**	RW
P1.17	**2423**	**Run delay time** Run Delay time parameter sets the time required for the drive to wait before another run command can be received. During this time the run singal is given it is ignored untill the time has expired upon which it will then start, this is true for keypad, I/O, or Fieldbus Control places."	**1,2,3,4**	RW

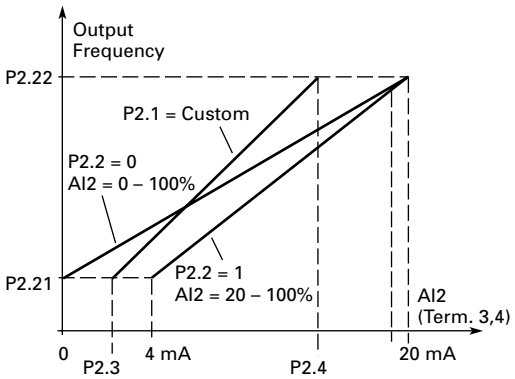
Code	Modbus ID	Parameter	Application	RO/RW
P1.18	**2465**	**HOA Source** "Enables the HOA control function. If enabled it selectes the desired location for switching between Hand, Off, and Auto control locations. 0 - Disabled - Off is disable and the standard Loc/Rem is used. 1 - HOA Source:I/O Terminal - Drive is looking for control source selection via I/O terminals. Have to use the HOA On/Off digital input along with Force Hand or Remote to function. 2 - HOA Source:Keypad - Keypad Loc/Rem button will function as the switch between Hand/Off/Auto."	**1,2,3,4**	RW
P2.1.1	**144**	**AI Ref Scale Min Value**	**1,2,3,4**	RW
P2.1.2	**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. Figure 47. With and without reference scaling	**1, 2, 3, 4**	RW

Figure 41. With and without reference scaling

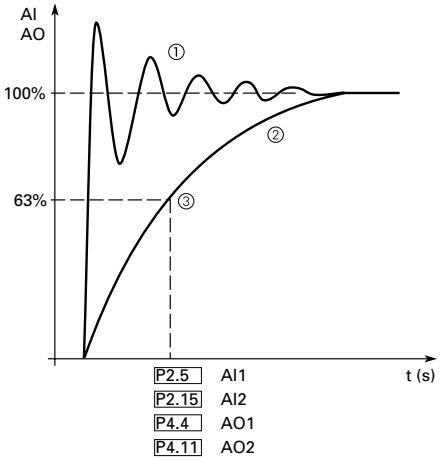
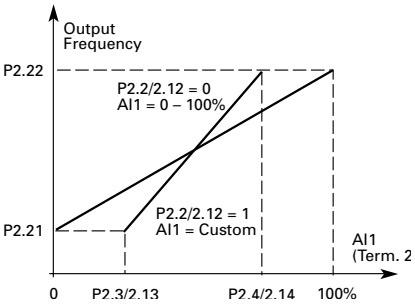
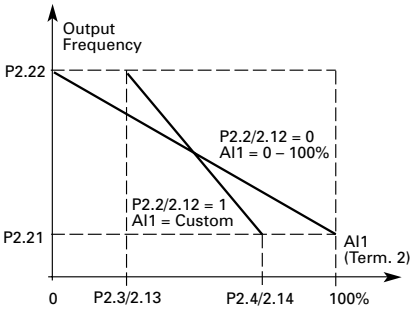


P2.2.1	**222**	**AI1 Mode** Sets the analog input mode for AI1 terminals 2 and 3 for current or voltage. The DIP switches on control board, left of the keypad, also need to be set. If using the 10 V supply on Terminal 1 of the DG1, it will require a ground jumper from Terminal 6 to the AI- input terminal 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
P2.2.2	**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 42. Analog input AI scaling



P2.2.3	**176**	**AI1 Custom Min**	**1,2,3,4**	RW

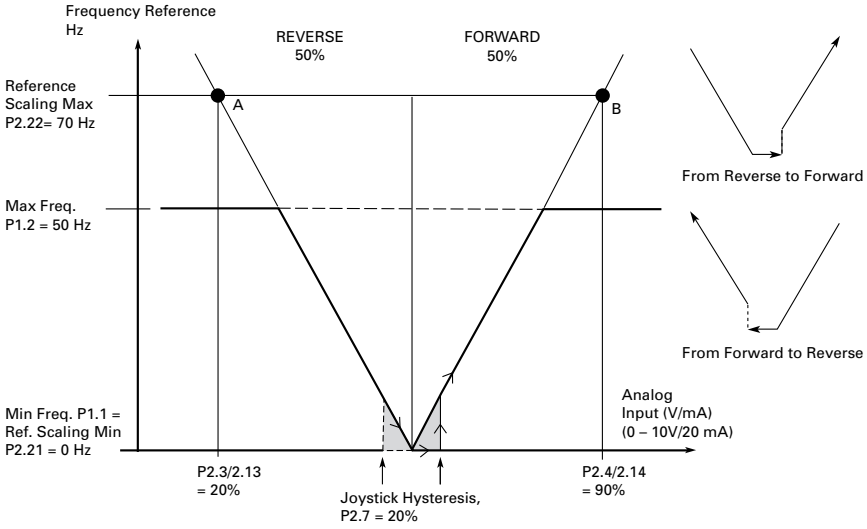
Code	Modbus ID	Parameter	Application	RO/RW
P2.2.4	**177**	**AI1 Custom Max** These parameters set the analog input signal for any input signal span within 0–100%. AI1 Custom Min <= AI1 Custom Max.	**1,2,3,4**	RW
P2.2.5	**174**	**AI1 filter time** When this parameter is given a value greater than 0, the function that filters out disturbances from the incoming analog signal is activated. A long filtering time makes the regulation response slower. **Figure 43. AI1 signal filtering**  **Notes:** ① Analog signal with faults (unfiltered). ② Filtered analog signal. ③ Filter time constant at 63% of the set value.	**1, 2, 3, 4**	RW
P2.2.6	**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. **Figure 44. AI1 No signal inversion**  **Figure 45. AI1 Signal Inversion**  Maximum AI1 signal = minimum set speed. Minimum AI1 signal = maximum set speed.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.2.7	**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 46. Example of joystick hysteresis

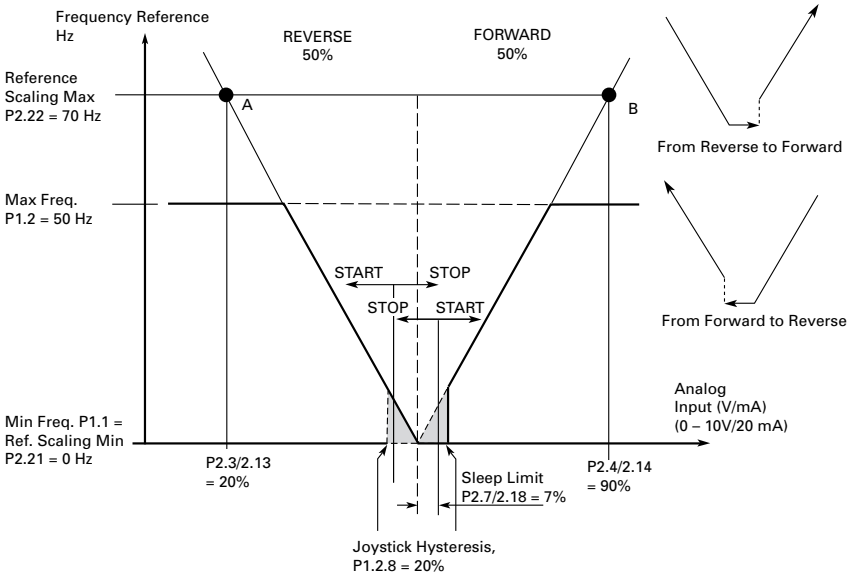


In this example, the value of P1.2.9 (Sleep limit) =0.

P2.2..8	**179**	**AI1 Sleep Limit**	**1, 2, 3, 4**	RW

The frequency converter keeps on output min frequency if the AI signal level falls below the Sleep limit defined 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.

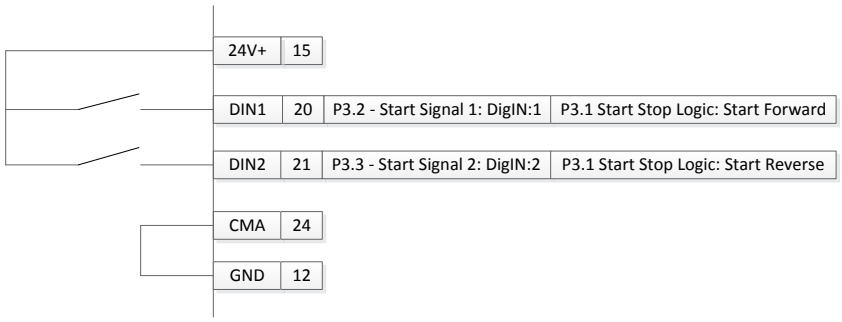
Figure 47. Example of sleep limit function



P2.2.9	**180**	**AI1 sleep delay**	**1, 2, 3, 4**	RW

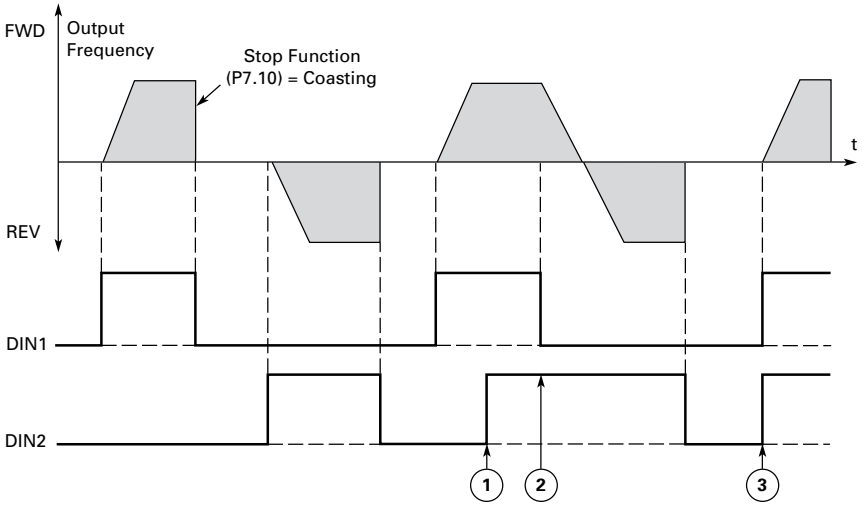
This parameter defines that the time the analog input signal has to stay under the Sleep limit determined with parameter P2.9 in order to make the frequency converter output min frequency.

Code	Modbus ID	Parameter	Application	RO/RW
P2.2.10	**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
P2.3.1	**222**	**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
P2.3.2	**175**	**AI2 signal range**	**1, 2, 3, 4**	RW
P2.3.3	**176**	**AI2 custom min**	**1, 2, 3, 4**	RW
P2.3.4	**177**	**AI2 custom max**	**1, 2, 3, 4**	RW
P2.3.5	**174**	**AI2 filter time**	**1, 2, 3, 4**	RW
P2.3.6	**181**	**AI2 signal invert**	**1, 2, 3, 4**	RW
P2.3.7	**178**	**AI2 joystick hyst**	**1, 2, 3, 4**	RW
P2.3.8	**179**	**AI2 sleep limit**	**1, 2, 3, 4**	RW
P2.3.9	**180**	**AI2 sleep delay**	**1, 2, 3, 4**	RW
P2.3.10	**133**	**AI2 joystick offset** See AI1 parameters.	**1, 2, 3, 4**	RW
P2.4.1	**2484**	**Fine Tuning Input** Selects the Analog input used for Fine adjustment tuning of a referenc signal. 0 - Not Used 1 - Analog Input 1 2 - Analog Input 2 3 = Slot A: AI1 4 = Slot A: AI1 5 = Fieldbus	**1, 2, 3, 4**	RW
P2.4.2	**2485**	**Fine Tuning Min** Percentage that is subtraced from the main reference when adjust input is at minimum.	**1, 2, 3, 4**	RW
P2.4.3	**2486**	**Fine Tuning Max** Percentage that is added from the main refrence when adjust input is at maximum.		
P3.1	**143**	**IO Terminal 1 start/stop logic** 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. This would be considered 2 wire control with either a contact used on the Start FWD or Start REV commands. Contacts Open the motor stops.		



Code	Modbus ID	Parameter	Application	RO/RW

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. This would be considered 2 wire control with a contact on start/stop, contact open it stops and direction on 2nd start signal.	**1, 2, 3, 4**		RW

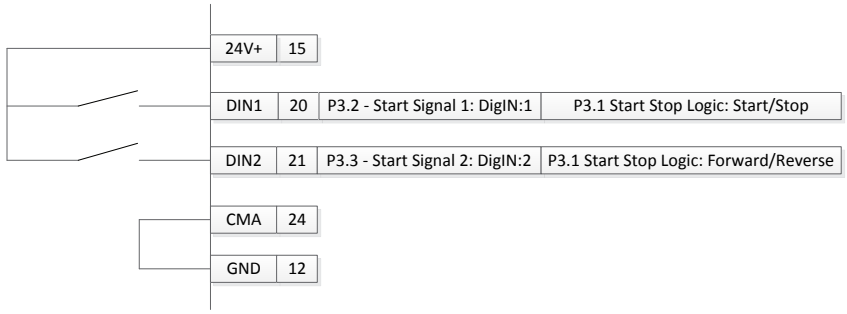
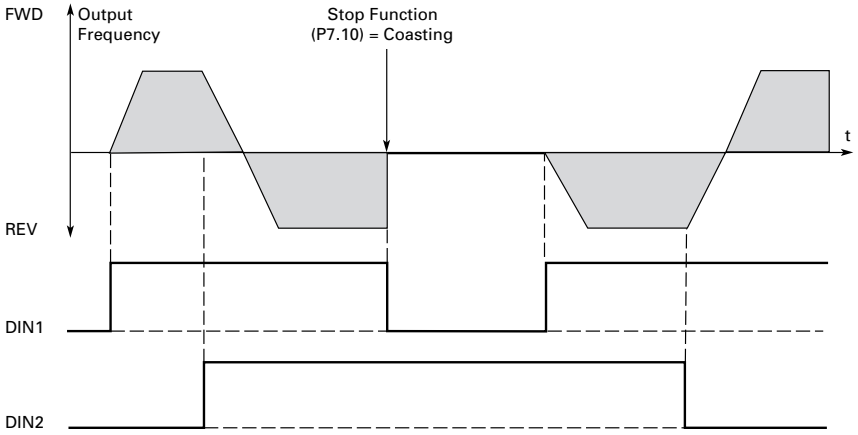
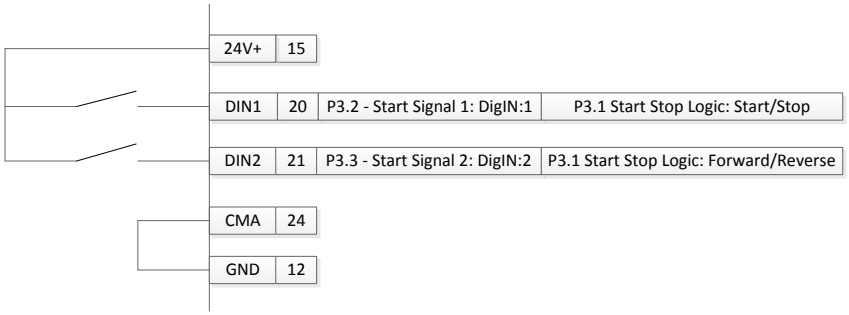


Figure 49. Start, stop and reverse



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. This would be considered 3 wire control with Start signal 2 required to be closed to enable Start on Start signal 1.	**1, 2, 3, 4**	RW



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

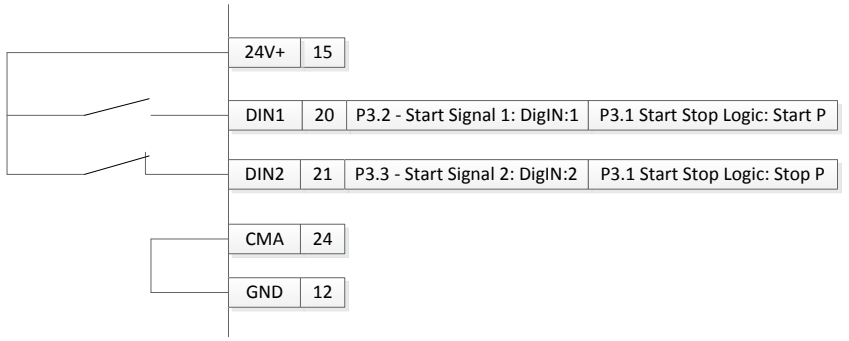
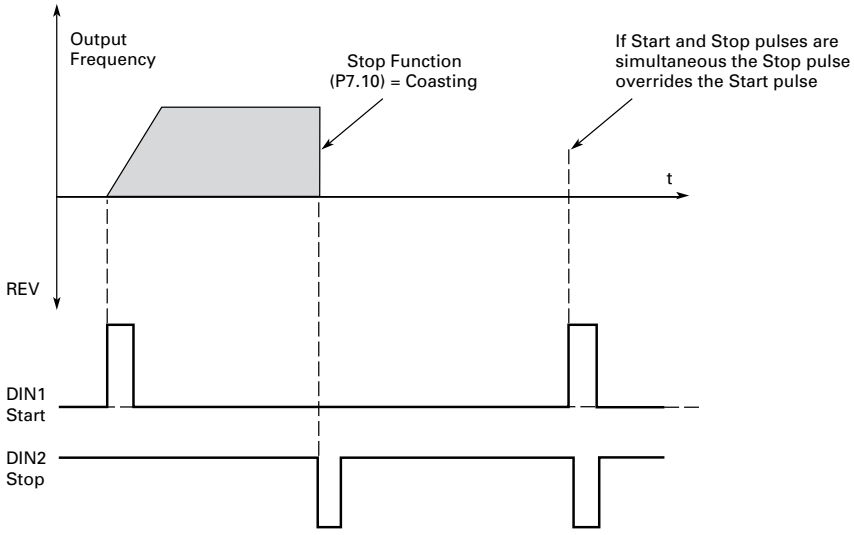


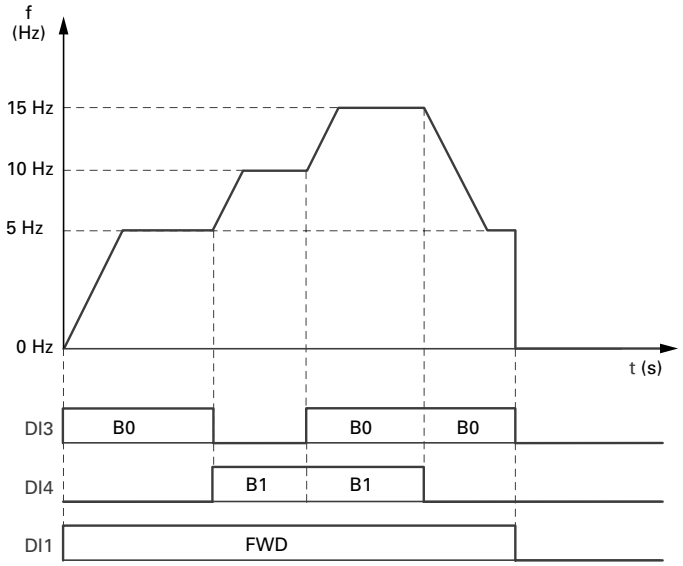
Figure 50. Start pulse/stop pulse



Code	Modbus ID	Parameter	Application	RO/RW
P3.2	**190**	**IO Terminal 1 Start Signal 1** Signal selection 1 for the start/stop logic listed in P3.1. This parameter would correspond to the function listed for DIN1. When the parameter is set to DigIN: 1 it references DIN1 on the control board, selecting different DIGIN values will assign it to a different input on the control board or option card. When set to Normally Open this function would be always tied low or 0 when using I/O terminal 1 as the control place. When value is set to Normally Closed this will cause the function to be always on and activate the output if I/O Terminal 1 is the current control place. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1, 2, 3, 4**	RW
P3.3	**191**	**IO Terminal 1 Start Signal 2** Signal selection 2 for the start/stop logic listed in P3.1.This parameter would correspond to the function listed for DIN2. When the parameter is set to DigIN: 2 it references DIN2 on the control board, selecting different DIGIN values will assign it to a different input on the control board or option card. When set to Normally Open this function would be always tied low or 0 when using I/O terminal 1 as the control place. When value is set to Normally Closed this will cause the function to be always on and activate the output if I/O Terminal 1 is the current control place. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1, 2, 3, 4**	RW
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. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open - the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. The description of the fault can be changed in P3.52. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = external fault. Open contact = no external fault.	**1, 2, 3, 4**	RW
P3.7	**193**	**Ext. Fault 1 NC** Allows for external input causing drive to fault. This function is defined as NC so the function activates on a open contact. If this function is assigned to Normally Closed - the function is always on so the drive will not fault, when set to Normally Open the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. The description of the fault can be changed in P3.52. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = no external fault. Open contact = external fault.	**1, 2, 3, 4**	RW
P3.8	**200**	**Fault Reset** Allows for external fault reset input. This function is looking for a rising edge to reset a fault. If this function is set for Normally Open, the drive will not do a reset via the control terminals. When set for Normally Closed, the fault condition will always be trying to reset on the rising edge. When it is tied to an input on the control board or option card the function would be set to DIGIN: and the input desired. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. DI change from open contact to closed contact: reset fault.	**1, 2, 3, 4**	RW

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

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

Note: When inputs are all 0 drive will follow control place reference command.

Code	Modbus ID	Parameter	Application	RO/RW
P3.13	**550**	PID1 Control Enable	**2, 3, 4**	RW
		Allows for activating PID1 control mode when it is set as a reference place in P1.1.13 or P1.1.14. If the input is not enabled, when starting the drive with PID1 Controller set as the reference, the drive output will not start. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Contact Close: Enables PID 1 control mode.		
P3.14	**553**	PID2 Control Enable	**3, 4**	RW
		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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Contact Close: Enables PID 2 control mode.		
P3.15	**195**	**Accel/decel time set**	**1, 2, 3, 4**	RW
		Selects between accel/decel time 1 and accel/decel time 2. When this function is set for Normally Open the Accel/Decel time set will follow time 1 always, when set for Normally Closed it will follow the 2nd Accel/Decel time always. Assigning it to an input will allow for the input to control this. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Closed contact = 2nd set of acc/dec time applied.		
		Open contact = 1st set of acc/dec time applied.		
P3.16	**201**	**Accel/decel prohibit**	**1, 2, 3, 4**	RW
		Disables the ability to change speed, even if the reference signal changes. If this input is enabled, the output stays at the value it was at before the input was enabled. When this functions is set for Normally Open the Accel/Decel will be allowed via the desired control source, when is set for Normally Closed the drive will prohibit changing of speed from any control source. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Closed contact: drive output frequency cannot rise or fall, it keeps on current output.		
P3.17	**215**	**No access to param**	**1, 2, 3, 4**	RW
		Locks out the ability to change parameters when this input is enabled. This can be used with the password protection. When this function is set for Normally Open it will allow for changing of parameters, if it is set for Normally Closed it prevents any changes to parameters. If a input is desired to control this DIGIN X can be used. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Closed contact: all writable parameters cannot be edited.		
P3.18	**203**	**Accel pot value**	**4**	RW
		Used when Motor Potentiometer is set for a reference. When this input is enabled, it increases the reference value until the contact opens. When this function is set for Normally Open it will not cause the Motor Pot reference to increase, when this is set for Normally Closed it will cause the Motor pot reference to increase till it reaches max frequency. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Closed contact: Potentiometer value keeps on rising.		
P3.19	**204**	**Decel pot value**	**4**	RW
		Used when Motor Potentiometer is set for a reference. When this input is enabled, it decreases the reference value until the contact opens. When this function is set for Normally Open it will not cause the Motor Pot reference to decrease, when this is set for Normally Closed it will cause the Motor pot reference to decrease till the min frequency is reached. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Closed contact: Potentiometer value keeps on falling.		
P3.20	**216**	**Reset pot zero**	**4**	RW
		When using the Motor Potentiometer as the reference signal, it sets the reference value to zero when the contact closes. When this is set for Normally Open it will not cause the Motor Pot reference to not reset to 0 speed, when this is set for Normally Closed it will cause the Motor pot reference to reset to 0 speed and stay there till the opens. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Closed contact: Potentiometer value reset to zero.		

Code	Modbus ID	Parameter	Application	RO/RW
P3.21	**196**	**Remote control** Selection allows for external control panel to control frequency converters control place. When this function is set for Normally Open the drive will not go into the remote control unless the keypad input is pressed. When set for Normally Closed the drive will always be in the remote location no matter the keypad loc/rem is pressed. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed Contact: force to remote control.	**1, 2, 3, 4**	RW
P3.22	**197**	**Local control** Selection allows for external control panel to control frequency converters control place. When this function is set for Normally Open the drive will not go into the local control place unless the keypad Loc/Rem button is used. When it is set for Normally Closed it will always be in the local control location no matter if the keypad loc/rem button is pressed. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: force to local control.	**1, 2, 3, 4**	RW
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. When this function is set for Normally Open the drive will not go into the Remote 2 control place and will stay in Remote 1. When it is set for Normally Closed the drive will always be in the Remote 2 Control Place. When a DIGIN is used it will allow cycling between the 2 based off high/low state. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: remote2 is selected as control source. Open contact: remote1 is selected as control 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). When this function is set for Normally pen the drive will follow the first set of motor parameters and when the input is set for Normally Closed it will used the Second Motor Parameter set. If an input is used the function will follow the logic of the input being high/low. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: the 2nd motor parameters are applied.	**2, 3, 4**	RW
P3.25	**218**	**Bypass start** Selection allows for switching between bypass and drive modes. When the input is enabled on the rising edge the bypass output contactor function is enabled in the output functions on the drive. When this fault is set for Normally Open/Normally Closed the drive will not activate the bypass relay ouptut function due to the drive looking for a rising edge trigger. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: switch to bypass. Open contact: switch to drive.	**2, 3, 4**	RW
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. When this function is set for Normally Open the drive will not activate the DC brake function. When Normally Closed is used the drive will always have the DC brake function activated. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: DC brake function is enabled.	**1, 2, 3, 4**	RW
P3.27	**219**	**Smoke mode** Selection enables the smoke purge preset speed to be enabled. When this function is set for Normally Open the drive will not activate the Smoke Mode frequency. When Normally Closed is used the drive will always run at the Smoke Purge Frequency. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive is in smoke purge mode. Note: when Fire mode is enabled, this causes the drive to ignore all faults except hardware overcurrent, STO, saturation fault. Warranty will be non valid in the case this is enabled and the drive causes issues to the system.	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/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. When this function is set for Normally Open or Normally Closed it will depend on the setting in the Fire Mode parameter group, if the function activates on an open contact and this is set for Normally Open it will always be in the Fire Mode, if Normally Closed is used then the function will always be off. Vise versa will occur if Fire Mode is active on an Closed contact. 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. **Note:** when Fire mode is enabled, this causes the drive to ignore all faults except hardware overcurrent, STO, saturation fault. Warranty will be non valid in the case this is enabled and the drive causes issues to the system.	**2, 3, 4**	RW
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. When this function is set for Normally Open and the drive is in Fire Mode it will follow Fire Mode Ref 1, if the function is set for Normally Closed it will fallow Fire Mode Ref 2. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive output reference frequency selection 2.	**2, 3, 4**	RW
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. When this function is set for Normally Open and the drive is in PID mode, it will use the first PID Set Point Reference. When the function is set for Normally Close the 2nd PID Set Point will be active. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: setpoint2 is selected for PID1. Open contact: setpoint1 is selected for PID1.	**3, 4**	RW
P3.32	**199**	**Jog enable** Selection enables the jog frequency reference and starts the drive to slowly advance the system. When this function is set for Normally Open the drive will not follow the jog enable speed. If the function is set for Normally Close then the output will be activated and run at the Jog Frequency. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive is under jog mode.	**1, 2, 3, 4**	RW
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. When this function is set for Normally Open the drive will not start the Timer sequence. If the function is set for Normally Close the Timer function will start. When assigned to an input the input active will start the timer. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Timer1,Timer2 or Timer3 will be started.	**2, 3, 4**	RW
P3.36	**208**	**AI ref source select** Selection switches between AI1 and AI2 reference signals that are located on the control board. When this function is set for Normally Open the drive will follow the AI1 input. If the function is set for Normally Close the AI2 input would then be active. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: AI2 is selected for reference source. Open contact: AI1 is selected for reference source.	**1, 2, 3, 4**	RW

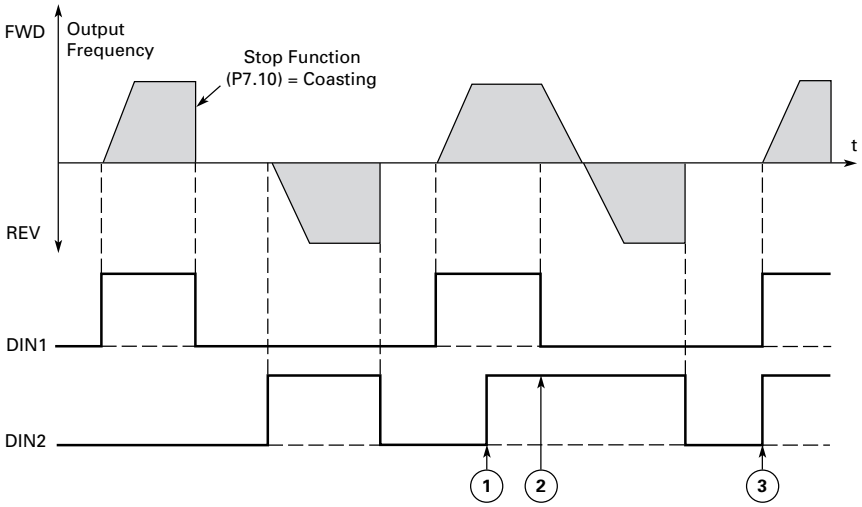
Code	Modbus ID	Parameter	Application	RO/RW
P3.37	**210**	**Motor interlock 1**	**2, 3, 4**	RW
P3.38	**211**	**Motor interlock 2**	**2, 3, 4**	RW
P3.39	**212**	**Motor interlock 3**	**2, 3, 4**	RW
P3.40	**213**	**Motor interlock 4**	**2, 3, 4**	RW
P3.41	**214**	**Motor interlock 5**	**2, 3, 4**	RW
		Selects 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. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Closed contact: motor interlock signal activated.		
		Open contact: motor interlock signal unactivated.		
P3.42	**747**	**Emergency stop**	**1, 2, 3, 4**	RW
		Function disables the frequency converter from running the motor. Once this function is open the drive will stop on E-stop fault, when input closes drive will return to run with no reset required. If the function is set for Normally Open it will cause the drive to always have this function active. When set to Normally Closed the function will not be active and allow operation of the drive. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Contact Open: Disables the ability for the motor to Run.		
		Contact Close: Enables the ability for the motor to Run.		
P3.43	**1246**	**BypassOverLoad**	**2, 3, 4**	RW
		Function faults frequency converter when using an overload block input. The relay would be fed into this input to fault the drive. When the function is set for Normally Open the drive will not go into the fault state, if it is set for Normally Closed the drive will go into this fault state and stay even if reset is applied. Input needs to be low to allow operation. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Closed contact: motor is over load in bypass.		
		Use TTF method to realize the above functions.		
P3.44	**2118**	**Fire Mode Direction Invert**	**2, 3, 4**	RW
		Function allows motor to run in reverse when fire mode input is enabled on a rising edge pulse. When the function is set for Normally Open and not in Fire mode the drive will run as normal. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		

Code	Modbus ID	Parameter	Application	RO/RW
P3.45	**2206**	**I0 Terminal 2 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.

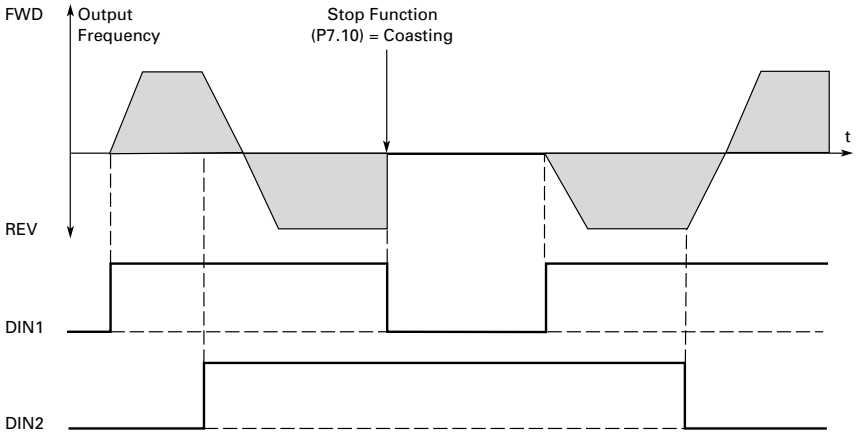
0 = P3.46: DI closed contact = start forward P3.4: DI closed contact = start reverse. This would be considered 2 wire control with either a contact used on the Start FWD or Start REV commands. Contacts Open the motor stops.

Figure 52. Start forward/start reverse



1 = P3.46: DI closed contact = start /open contact = stop P3.4: DI closed contact = reverse / open contact = forward. This would be considered 2 wire control with a contact on start/stop, contact open it stops and direction on 2nd start signal.

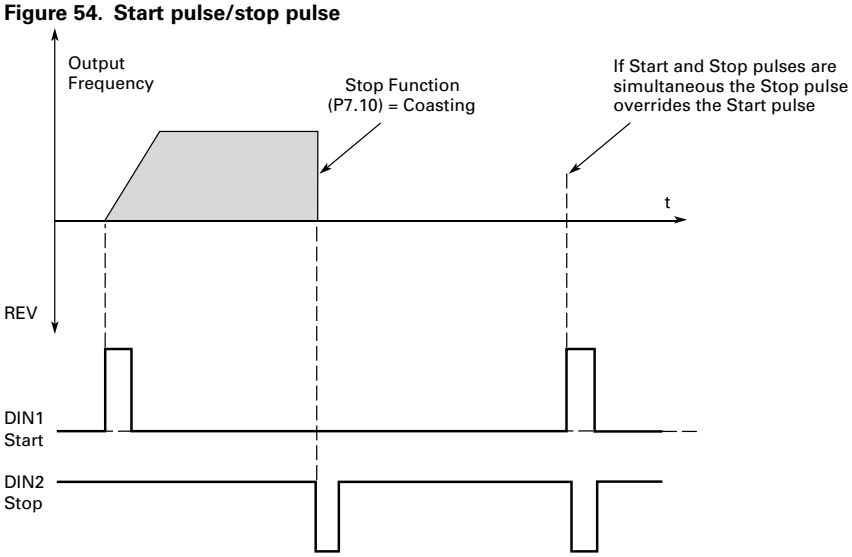
Figure 53. Start, stop and reverse



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.

2 = P3.46: DI closed contact = start / open contact = stop P3.4: DI closed contact = start enabled / open contact = start disabled and drive stopped if running Motor direction keeps forward. This would be considered 3 wire control with Start signal 2 required to be closed to enable Start on Start signal 1.

3 = Three-wire connection (pulse control): P3.46: DI changes from open to closed = start pulse P3.4: DI changes from closed to open = stop pulse P3.5: DI closed contact = reverse/ open contact = forward. This would be considered 3 wire control with Start Signal 1 being the Start Pulse and Start Signal 2 being the NC Stop.

Code	Modbus ID	Parameter	Application	RO/RW
		Figure 54. Start pulse/stop pulse		
				
P3.46	**2207**	**IO Terminal 2 Start Signal 1** The 2nd Signal selection 1 for the start/stop logic listed in P3.45. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1, 2, 3, 4**	RW
P3.47	**2208**	**IO Terminal 2 Start Signal 2** The 2nd Signal selection 2 for the start/stop logic listed in P3.45. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1, 2, 3, 4**	RW
P3.48	**2293**	**Ext. Fault 2 NO** Allows for external input causing drive to fault. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open - the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. The description on the fault can be changed in P3.53. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = external fault. Open contact = no external fault.	**1, 2, 3, 4**	RW
P3.49	**2294**	**Ext. Fault 2 NC** Allows for external input causing drive to fault. This function is defined as NC so the function activates on a open contact. If this function is assigned to Normally Closed - the function is always on so the drive will not fault, when set to Normally Open the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. The description on the fault can be changed in P3.53. Closed contact = no external fault. Open contact = external fault.	**1, 2, 3, 4**	RW
P3.50	**2295**	**Ext. Fault 3 NO**	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
		Allows for external input causing drive to fault. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open - the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. The description on the fault can be changed in P3.54. Closed contact = external fault. Open contact = no external fault.		
P3.51	**2296**	**Ext. Fault 3 NC** Allows for external input causing drive to fault. This function is defined as NC so the function activates on a open contact. If this function is assigned to Normally Closed - the function is always on so the drive will not fault, when set to Normally Open the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. The description on the fault can be changed in P3.54. Closed contact = no external fault. Open contact = external fault.	**1, 2, 3, 4**	RW
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 11 = Rod Breakage	**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 11 = Rod Breakage	**1, 2, 3, 4**	RW

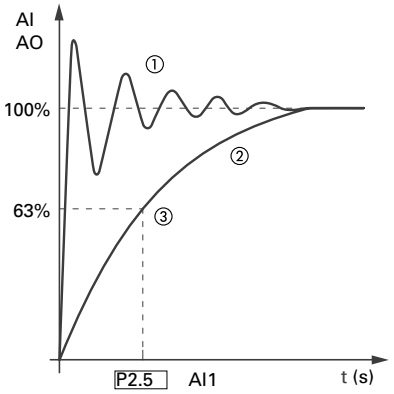
Code	Modbus ID	Parameter	Application	RO/RW
P3.54	**2299**	**Ext. Fault 3 Text** This parameter allows for the text to be changed when using external Fault 3 NO or NC. 0 = External Fault 1 = Vibration Cut Out 2 = High Motor Temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage	**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. When the function is set for Normally Open the drive will use the standard Parameter Set 1 in the keypad, if the function is set for Normally Closed the drive will follow Parameter Set 2 setting when stored to the keypad. DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1, 2, 3, 4**	RW
P3.56	**2394**	**Deragging enable** Enables the Derag function when the Derag at Start/Stop mode is set to Digital inputs. This will enable the derag function that cycles the output fwd and rev for the set time and cycles. If the function is set for Normally Open the deragging function will not be activate, if the function is set for Normally Closed then the Derag function will always be active. Can be set to DigiIN: X indicates on board terminal inputs, DigiIN:A:IOX:X indicates option boards in A slot, DigiIN:B:IOX:X indicates board in the B slot, or Timer Channel X signal will enable. ROX function allows for having input turn on based off the output of the relay functions.	**1,2,3,4**	RW
P3.57	**2395**	**Off control** Off control allows for disabling any control signal when the input is the off/open posisiton, when closed drive will follow the desired control signal. If the function is set for Normally Open this will cause the drive to operate, if the function i set for Normally closed the drive will operate and normally open the drive will be in the off location and not allow operation. Can be set to DigiIN: X indicates on board terminal inputs, DigiIN:A:IOX:X indicates option boards in A slot, DigiIN:B:IOX:X indicates optional board in B slto, or Timer Channel X. RO X function allows for having an input trun on without having to hard wire it to the physical relay output.	**1,2,3,4**	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

Code	Modbus ID	Parameter				Application	RO/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–Fmax)			■	■	■	■	
2 = Frequency Ref—reference frequency (Fmin–Fmax)			■	■	■	■	
3 = Motor Speed—motor speed (0–Motor Nominal Speed)			■	■	■	■	
4 = Motor Current—output motor current (0–Inmotor)			■	■	■	■	
5 = Motor Torque—motor torque (0–Tnmotor)			■	■	■	■	
6 = Motor Power—calculated motor power (0–Pnmotor)			■	■	■	■	
7 = Motor Voltage—output motor voltage (0–Unmotor)			■	■	■	■	
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 Tnmotor)			■	■	■	■	
23 = Motor Power—Motor calculated power (–2 to +2x Pnmotor)			■	■	■	■	
24 = PT100 Temp—Thermistor input temperature			■	■	■	■	
33 = SlotA PT100 Temp Channel 1			■	■	■	■	
34 = SlotA PT100 Temp Channel 2			■	■	■	■	
35 = SlotA PT100 Temp Channel 3			■	■	■	■	
36 = SlotB PT100 Temp Channel 1			■	■	■	■	
37 = SlotB PT100 Temp Channel 2			■	■	■	■	
38 = SlotB PT100 Temp Channel 3			■	■	■	■	
39 = User Defined Output			■	■	■	■	
40 = Motor Current(-2 to +2N)			■	■	■	■	
P4.3	**149**	**AO1 minimum**				**1, 2, 3, 4**	RW
		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					

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 55. Analog output filtering



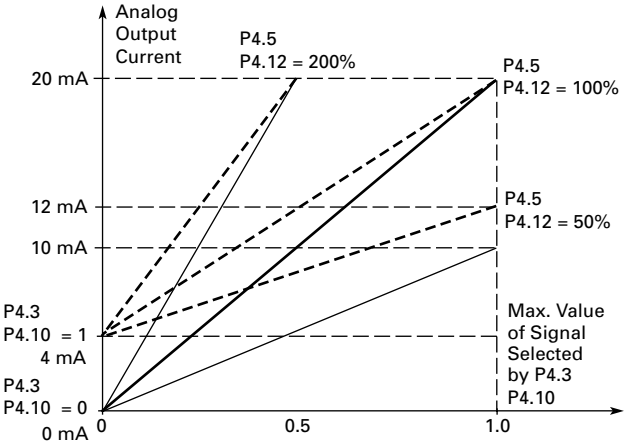
P2.5 AI1
P2.15 AI2
P4.4 AO1
P4.11 AO2

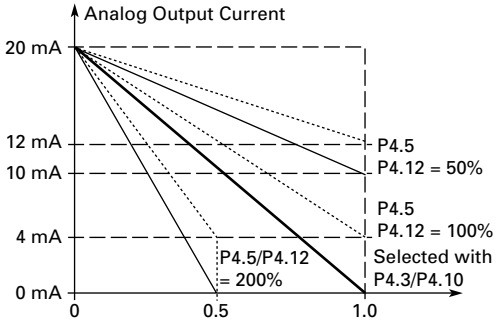
Notes
① Analog signal with faults (unfiltered).
② Filtered analog signal.
③ Filter time constant at 63% of the set value.

P4.5	**150**	**AO1 Scale**	**1, 2, 3, 4**	RW

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 56. 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. **Figure 57. Analog output invert**  	**1, 2, 3, 4**	RW
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
P5.4	**538**	RO3 Function	**1, 2, 3, 4**	RW

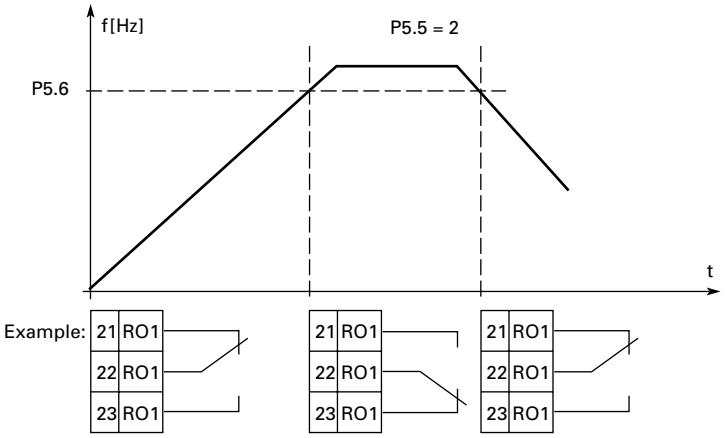
Code	Modbus ID	Parameter	Application	RO/RW

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	—	—	■	■

P5.4 **538** **RO3 function, continued** **1, 2, 3, 4** RW

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	■	■	■	■
57 = Pre-Charge Active	Pump Precharge has been completed	—	■	■	■
58 = 2th Stage Ramp Frequency Active	Indicates the Frequency is above the 2th Ramp	■	■	■	■
59=STO Fault Output	Frequency level to switch to 2nd accel/decel time.	■	■	■	■
60=Run Bypass/Drive					
61=Bypass Overload					

Code	Modbus ID	Parameter	Application	RO/RW
P5.5	**2465**	**Virtual RO1 function** This relay is a internal relay that can be used to tie to internal functions in the drive. The functions are the same with the standard hardware relays.	**1,2,3,4**	RW
P5.6	**2466**	**Virtual RO2 function** This relay is a internal relay that can be used to tie to internal functions in the drive. The functions are the same with the standard hardware relays.	**1,2,3,4**	RW
P5.7	**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

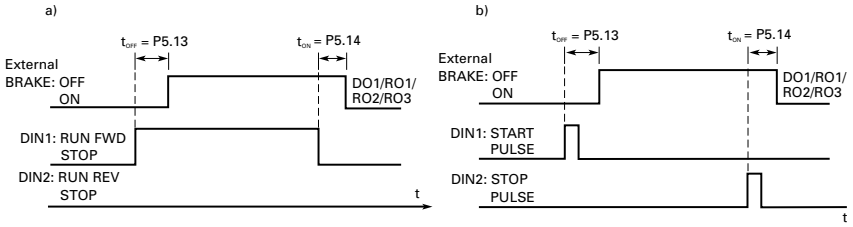
Code	Modbus ID	Parameter	Application	RO/RW
P5.8	**155**	**Freq limit 1 supv val.** Selects the frequency value supervised by P5.7. If the output frequency goes under/over the set limit (P5.6), this function generates a warning message via the digital output DO1 or via the relay outputs RO1 or RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4. **Figure 58. Supervision function** 	**1, 2, 3, 4**	RW
P5.9	**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
P5.10	**158**	**Freq Limit 2 supv val.** Selects the frequency value supervised by P5.9. See **Figure 55**. If the output frequency goes under/over the set limit (P5.9), 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	**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
P5.12	**160**	**Torque limit supv val.** Set here the torque value to be supervised by P5.11. If the output frequency goes under/over the set limit (P5.12), this function generates a warning message via the digital output DO1 or via the relay outputs RO1 or RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
P5.13	**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
P5.14	**162**	**Ref limit supv val** The frequency value to be supervised by P5.13. If the output frequency goes under/over the set limit (P5.14), this function generates a warning message via the digital output DO1 or via the relay outputs RO1 or RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P5.15	**163**	**Ext brake off delay**	**4**	RW
P5.16	**164**	**Ext brake on delay**	**4**	RW

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.

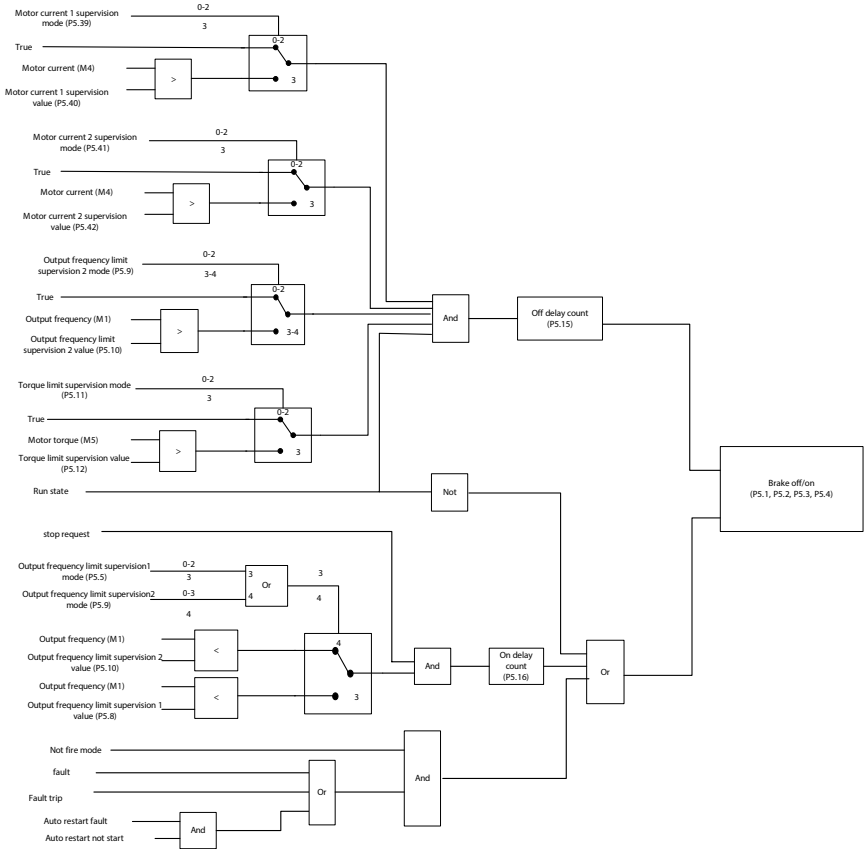
Figure 59. External brake control



a) Start/Stop Logic Selection, P3.1 = 0, 1 or 2

b) Start/Stop Logic Selection, P3.1 = 3

When using the brake control the following table is used to demonstrate the control functions. Brake on delay should be set longer than the ramp time in order to avoid damaging the brake.



P5.17	**165**	**Temp limit supv**	**1, 2, 3, 4**	RW

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

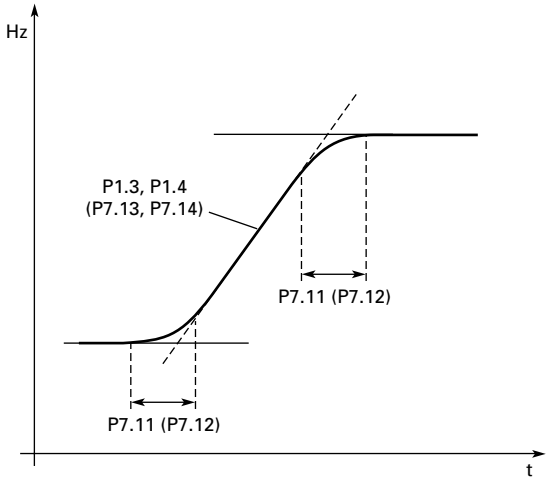
Code	Modbus ID	Parameter	Application	RO/RW
P5.18	**166**	**Temp limit supv val** This temperature value is supervised by P5.17. If the temperature of the frequency converter unit falls below or exceeds the set limit (P5.18), this function generates a warning message via the digital output DO1 or via a relay output RO1, RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
P5.19	**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
P5.20	**168**	**Power limit supv val** This power value is supervised by P5.19. If the calculated power value falls below or exceeds the set limit (P5.18), 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
P5.21	**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
P5.22	**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
P5.23	**172**	**AI limit supv val** The value of the selected analog input to be supervised by P5.22. If the value of the selected analog input goes under/over the set limit (P5.23), this function generates a warning message through the digital output or the relay outputs depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
P5.24	**1346**	**PID1 superv enable**	**2, 3, 4**	RW
P5.25	**1347**	**PID1 superv upper limit**	**2, 3, 4**	RW
P5.26	**1349**	**PID1 superv lower limit**	**2, 3, 4**	RW
P5.27	**1351**	**PID1 superv delay**	**2, 3, 4**	RW
P5.28	**1408**	**PID2 superv enable**	**3, 4**	RW
P5.29	**1409**	**PID2 superv upper limit**	**3, 4**	RW
P5.30	**1411**	**PID2 superv lower limit**	**3, 4**	RW
P5.31	**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
P5.32	**2111**	**RO1 on delay** Delay time for RO1 to turn on.	**1, 2, 3, 4**	RW
P5.33	**2112**	**RO1 off delay** Delay time for RO1 to turn off.	**1, 2, 3, 4**	RW
P5.34	**2113**	**RO2 on delay** Delay time for RO2 to turn on.	**1, 2, 3, 4**	RW
P5.35	**2114**	**RO2 off delay** Delay time for RO2 to turn off.	**1, 2, 3, 4**	RW

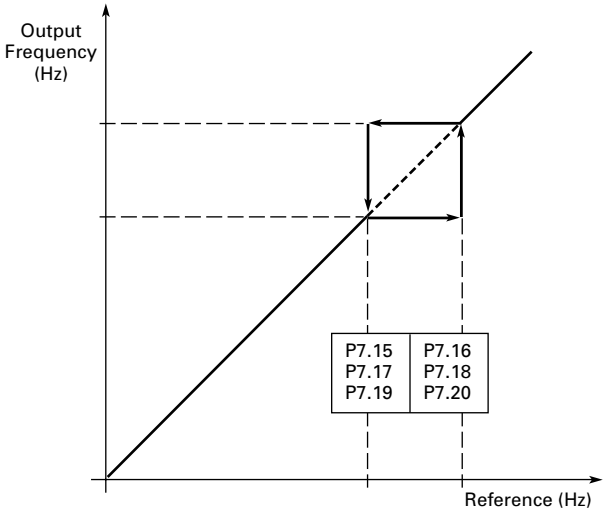
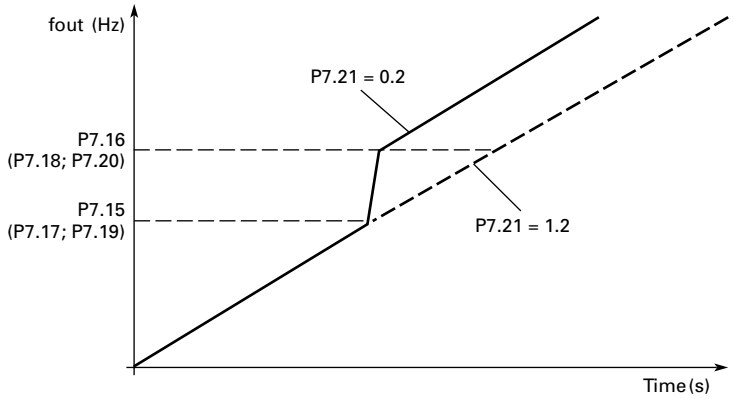
Code	Modbus ID	Parameter	Application	RO/RW
P5.36	**2115**	**RO3 on delay**	**1, 2, 3, 4**	RW
		Delay time for RO3 to turn on.		
P5.37	**2116**	**RO3 off delay**	**1, 2, 3, 4**	RW
		Delay time for RO3 to turn off.		
P5.38	**2117**	RO3 Invert	**1, 2, 3, 4**	RW
		Inverts the output function of RO3 to be normally closed instead of normally open on the Form A relay.		
		1 = Not Inverted		
		2 = Inverted		
P5.39	**2189**	**Motor current 1 supv**	**1, 2, 3, 4**	RW
		Selects how the frequency converter functions based off the motor current limit value setting. The drive monitors the active motor current and will enable itself based off the supervision value.		
		0 = No supervision		
		1 = Low limit supervision		
		2 = High limit supervision		
		3 = Brake Off Control (Application 4 only)		
P5.40	**2190**	**Motor current 1 supv value**	**1, 2, 3, 4**	RW
		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.		
P5.41	**2191**	**Motor current 2 supv**	**1, 2, 3, 4**	RW
		Selects how the frequency converter functions based off the motor current limit value setting. The drive monitors the active motor current and will enable itself based off the supervision value.		
		0 = No supervision		
		1 = Low limit supervision		
		2 = High limit supervision		
		3 = Brake Off Control (Application 4 only)		
P5.42	**2192**	**Motor current 2 supv value**	**1, 2, 3, 4**	RW
		The value of the selected motor current value to be monitored by P5.41.		
		If the value of the selected analog input goes under/over the set limit (P5.42), this function generates a warning message through the digital output or the relay outputs depending on the settings of P5.1 to P5.2, P5.3, and P5.4.		
P5.43	**2193**	**Second AI supv select**	**1, 2, 3, 4**	RW
		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)		
P5.44	**2194**	**Second AI limit supv**	**1, 2, 3, 4**	RW
		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		
P5.45	**2195**	**Second AI limit supv val**	**1, 2, 3, 4**	RW
		The value of the selected analog input to be supervised by P5.44.		
		If the value of the selected analog input goes under/over the set limit (P5.45), this function generates a warning message through the digital output or the relay outputs depending on the settings of P5.1 to P5.2, P5.3, and P5.4.		
P5.46	**2196**	**Motor current 1 supv hyst**	**1, 2, 3, 4**	RW
		This value selects the bandwidth between when the motor current 1 supervision enables and disables itself.		
P5.47	**2197**	**Motor current 2 supv hyst**	**1, 2, 3, 4**	RW
		This value selects the bandwidth between when the motor current 2 supervision enables and disables itself.		
P5.48	**2198**	**AI supv hysteresis**	**1, 2, 3, 4**	RW
		This value selects the bandwidth between when the AI supervision enables and disables itself.		

Code	Modbus ID	Parameter	Application	RO/RW
P5.49	**2199**	**Second AI supv hysteresis** This value selects the bandwidth between when the AI supervision enables and disables itself.	**1, 2, 3, 4**	RW
P5.50	**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
P5.51	**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
P5.52	**2202**	**Torque limit supv hysteresis** This value selects the bandwidth between when the Torque supervision enables and disables itself.	**1, 2, 3, 4**	RW
P5.53	**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
P5.54	**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
P5.55	**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
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	—	■	■	■
18 = PID2 Control Output—Selects the PID 2 calculation for output to maintain reference value.	—	—	■	■

Code	Modbus ID	Parameter	Application	RO/RW
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
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 interia 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

Code	Modbus ID	Parameter	Application	RO/RW
P7.12	**248**	**Ramp 2 shape**	**1, 2, 3, 4**	RW
		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.		
		Figure 60. 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
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

Code	Modbus ID	Parameter	Application	RO/RW
P7.20	**261**	**Skip F3 high lim** 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 61. Example of skip frequency area setting** 	**1, 2, 3, 4**	RW
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. **Figure 62. Ramp speed scaling between skip frequencies** 	**1, 2, 3, 4**	RW
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. This mode is engaged at the following levels - 230V - 156.8Vdc, 480V - 303Vdc, and 575 - 426.65Vdc. 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
P7.28	**2447**	**2th stage ramp frequency** When 2nd Stage Ramp Frequency is the frequency level at which the drive will enable the 2th Stage Ramp Frequency output function. This then can be used for other inputs or devices to signal a frequency level.	**1,2,3,4**	RW
P7.29	**2515**	**Change Phase Sequence Moto** This parameter allows for swapping the motor phase output from u, v, w to u, w, v.	**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 ±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. **Note:** Option 0/1 is V/Hz mode, Options 5/6 are Vector control modes.	**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**	**1, 2, 3, 4**	RW

Automatic torque boost

The voltage to the motor changes automatically, which makes the motor produce sufficient torque to start and run at low frequencies. The voltage increase depends on the motor type and power. Automatic torque boost can be used in applications where starting torque due to starting friction is high, e.g., in conveyors.

Example:

What changes are required to start the load from 0 Hz?

First set the motor nominal values (Parameter group P1).

Option 1: Activate the Automatic torque boost.

Option 2: Programmable V/Hz curve.

To obtain the required torque, the zero point voltage and midpoint voltage/frequency (in parameter group P8) need to be set, so that the motor can draw enough current at the low frequencies. First set parameter P8.4 to Programmable V/Hz curve (value 2).

Increase the zero point voltage P8.9 to get enough current at zero speed. Then set the midpoint voltage P8.8 to 100% and the midpoint frequency P8.7 to value P8.8/100%*P1.9.

Note: In high torque—low speed applications—it is likely that the motor will overheat. If the motor has to run a prolonged time under these conditions, special attention must be paid to cooling the motor. Use external cooling for the motor if the temperature tends to rise too high.

P8.4	**108**	**V/Hz Ratio**	**1, 2, 3, 4**	RW

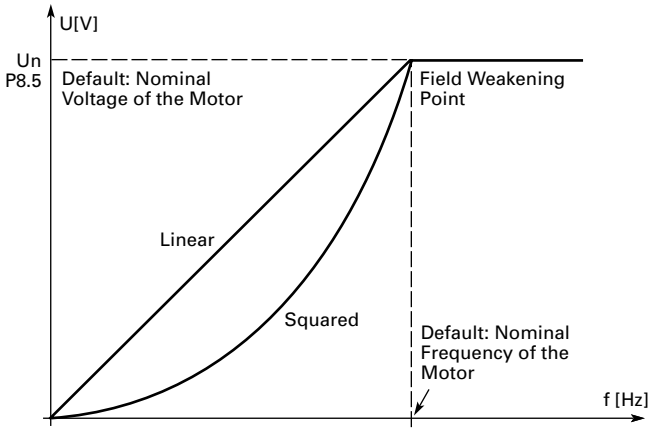
Linear

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

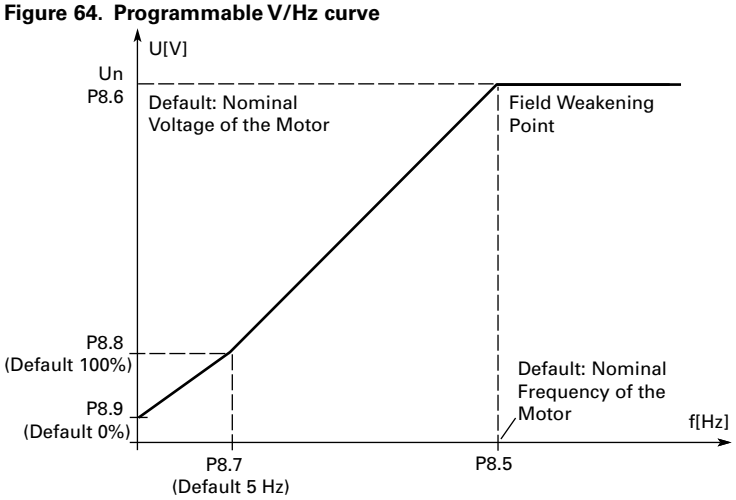
1 = The voltage of the motor changes following a squared curve form with the frequency in the area from 0 Hz to the field weakening point where the nominal voltage is supplied to the motor. The motor runs under magnetized below the field weakening point and produces less torque and electromechanical 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 63. Linear and squared change of motor voltage

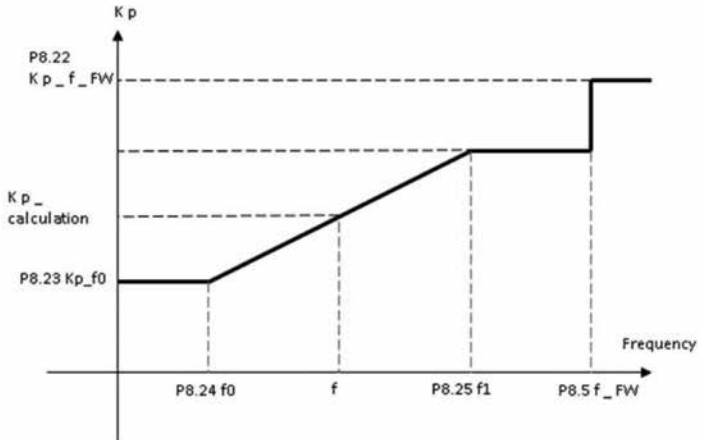


Programmable V/Hz curve

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.

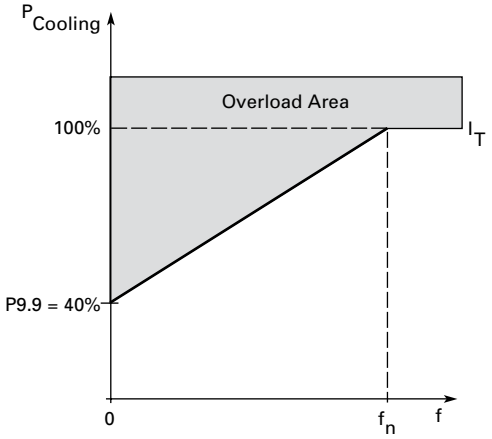
Code	Modbus ID	Parameter	Application	RO/RW
		Figure 64. Programmable V/Hz curve  **Manual motor tuning - in multi-purpose app** • Setting the Motor Magnetizing current: ◦ Run the Motor at 2/3 of the motor nominal frequency as the frequency reference. ◦ Read the Motor current in the Monitor Menu or via the InControl PC tool. ◦ Set the current as the Motor Excitation Current(P8.54) • Set the V/Hz optimization parameter (P8.4) to value 2 "Programmable V/Hz curve". • Run the Motor with zero frequency reference and increase the motor zero point voltage (P8.9) until the motor current is approximately same as the motor Excitation Current. If the Motor is in a low frequency area for only short periods, 65% of the motor nominal current is possible. • Set the Midpoint Voltage (P8.8) to 1.4142*(P8.9) and midpoint frequency(P8.7) to value P8.7/100%*P1.9. • If required, activate the speed control or V/Hz Optimization (Torque Boost). • If required, activate the speed control and V/Hz Optimization (Torque Boost). **Linear with flux optimization** 3 = The frequency converter starts to search for the minimum motor current in order to save energy and lower the disturbance level and the noise. This mode is called Eaton's Active Energy Control which will reduce the voltage and current but still maintain the desired speed.This function can be used in applications with constant motor load, such as fans, pumps, etc.		
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

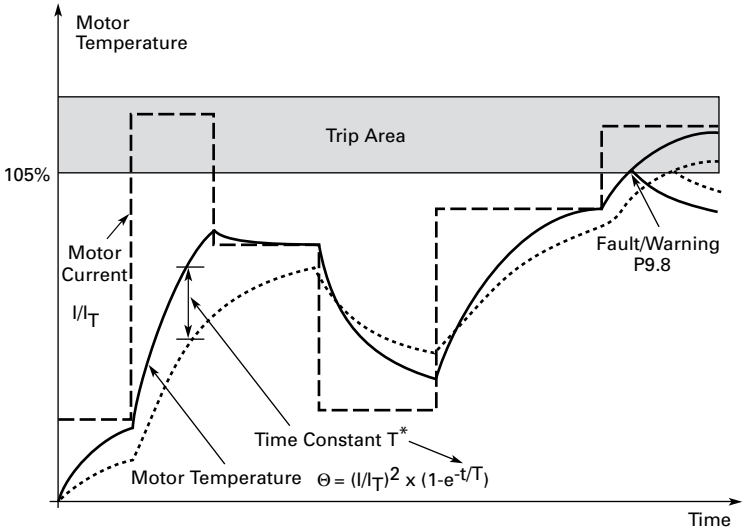
Code	Modbus ID	Parameter	Application	RO/RW
P8.9	**293**	**Zero frequency volt** If the programmable V/Hz curve has been selected with the P8.4, this parameter defines the zero frequency voltage of the curve. When putting this value above 0%, additional voltage is given. In some cases, by putting this 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. **Note:** See Installation Manual (MN040002EN) for the values listed for the individual frame size switching frequency ranges. It also provides de-rating tables required for sizing.	**1, 2, 3, 4**	RW
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
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 on an unloaded motor. Upon enabling this operation it will be active for 30 sec or until a run command is seen then set back to 0. When a run command is seen the message on the keypad will indicate "Motor Identification" is being performed and when completed will show "Motor ID Completed". If there is an issue with the Motor Identification a fault message will be displayed. Once completed, it will set the V/Hz curve 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 - Motor is supplied with current and voltage but at zero frequency. **Note:** Identification with Run must be performed on an unloaded motor shaft for accurate results.	**4**	RW
P8.15	**1574**	**Neg frequency limit** Frequency limit in the negative direction when in open loop control mode.	**4**	RW
P8.16	**1576**	**Pos frequency limit** Frequency limit in the positive direction when in open loop control mode.	**4**	RW
P8.17	**1585**	**Frequency ramp out filter time constant** Filter time constant for the Frequency Ramp controller.	**1, 2, 3, 4**	RW
P8.18	**1591**	**Speed error filter time constant** Filter time constant for speed reference and actual speed error.	**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** This parameter is the gain for the speed controller in open loop control mode given in % per Hz. Gain Value of 100% means that the nominal torque reference is produced at the speed controller output fro a frequency error of 1Hz. See image in P8.25.	**4**	RW
P8.21	**1594**	**Speed control Ti** Sets the integral time constant for the speed controller.	**4**	RW

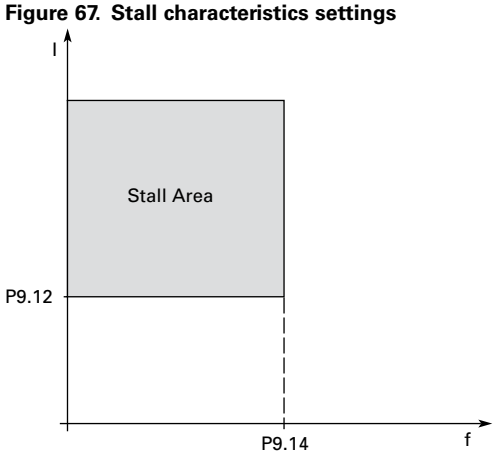
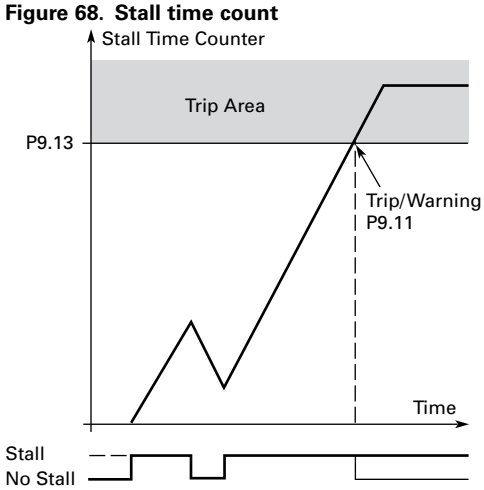
Code	Modbus ID	Parameter	Application	RO/RW
P8.22	**1595**	**Speed control Kp at field weakening** The relative gain of the speed controller in the Field weakening area as a percentage of the Speed Control Gain (P8.20). See image in P8.25.	**4**	RW
P8.23	**1596**	**Speed control Kp below F0** The relative gain of the speed controller as a percentage of the Speed Control Gain (P8.20) when the speed is below the defined level of Speed Control F0 frequency (P8.24). See Image in P8.25.	**4**	RW
P8.24	**1597**	**Speed control F0** Speed Level in Hz below the speed controller gain is equal to the Speed Control Gain Below F0 (P8.23). See image in P8.25.	**4**	RW
P8.25	**1598**	**Speed control F1** The Speed level in Hz above the speed controller Gain is equal to the Speed Control Gain (P8.20). From the speed defined by the F0 (P8.24) setting to the speed defined by the F1 setting (P8.25), the speed controller gain changes linearly from the F0 gain to the Speed Gain Kp. See image below. 	**4**	RW
P8.26	**1599**	**Speed control Kp below T0** The relative gain of the speed controller as a percentage of the Speed Control Gain (P8.20) when torque reference or speed control output is less than the value of Speed Control T0 (P8.27). This parameter is normally used to stabilise the speed controller for a drive system with gear backlash.	**4**	RW
P8.27	**1600**	**Speed control T0** The level of torque reference below which the speed controller gain is changed from the Speed Control Gain (P8.20) to Speed Control T0(P8.27). This is a percentage of nominal Torque.	**4**	RW
P8.28	**1601**	**Speed control Kp filter time constant** Filter time constant for the speed controller gain.	**4**	RW
P8.29	**1602**	**Motor torque limit** Torque limit setting in the motoring side.	**4**	RW
P8.30	**1603**	**Generator torque limit** Torque limit setting for the generating side.	**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 the generating side used in open loop control mode.	**4**	RW
P8.34	**1608**	**Generator power limit** Generator power limit setting the motoring side used in open loop control mode.	**4**	RW
P8.35	**1611**	**Acc compensation time constant** This value will compensate for the amount of inertia on the motor when start and stopping. It improves speed response and is defined as acceleration time to nominal speed with nominal torque.	**4**	RW
P8.36	**1612**	**Acc compensation filter time constant** The Filter time for the Acceleration Compensation time Constant (P8.35). Used to remove any disturbances in the ineria feedback.	**4**	RW

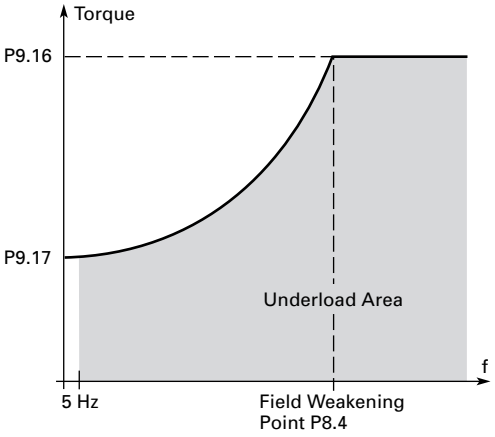
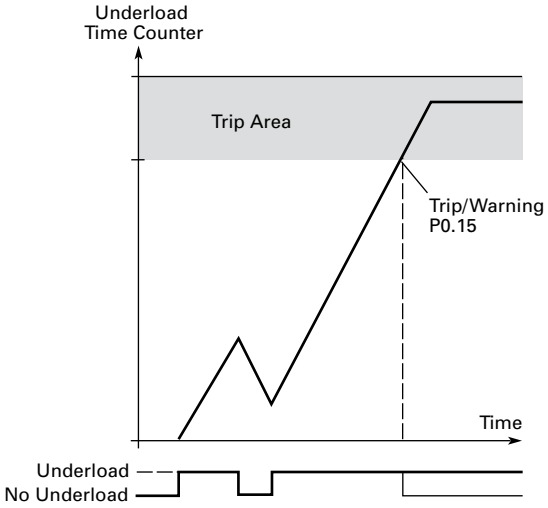
Code	Modbus ID	Parameter	Application	RO/RW
P8.37	**1620**	**Flux reference** This parameter defines the amount of flux that is output to the motor at any frequency or speed level.	**4**	RW
P8.38	**1621**	**Stop state magnetization** This parameter defines the % of magnetizing current based off the nominal current the drive will output in a stop state. This value is obtained during motor identification or auto tuning.	**4**	RW
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** Defines the amount of time required for the Flux Current to build up in the motor.	**4**	RW
P8.41	**1624**	**Zero speed start time** After giving the start command the drive will remain at 0 speed for the time defined by this parameter. The speed will then be released to follow the set frequency/speed reference after this time has elapsed from the instant where the command is given.	**4**	RW
P8.42	**1625**	**Zero speed stop time** The drive will remain at zero speed with controllers active for the time defined by this parameter after reaching the zero speed when a stop command is given. This parameter has no effect if the selected stop function is coasting. The zero speed time starts when the ramp time is expected to reach zero speed.	**4**	RW
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 there are 3 options depending on the desired reference response on startup; either Start Memory (P8.45), Torque Reference, and Start Torque FWD/REV (P8.46 or P8.47). This reference is only active when a start command is given form there it will follow the desired torque reference location.	**4**	RW
P8.45	**1632**	**Start memory start** This starting torque reference comes from the P8.48 Actual Torque. On start it will use the measure actual torque value stored to memory and then use that value the next time a start is required.	**4**	RW
P8.46	**1633**	**Start torque forward** Defines the amount of Starting torque reference applied on startup in the forward direction when selected in P8.44.	**4**	RW
P8.47	**1634**	**Start Torque Reverse** Defines the amount of Starting torque reference applied on startup in the reverse direction when selected in P8.44.	**4**	RW
P8.48	**1635**	**Start Torque Actual** Actual start torque.	**4**	RO
P8.49	**1667**	**Startup Torque Time** This time is used to define the amount of time the Start Torque value assigned in P8.44 will be applied for before the normal torque reference is used.	**4**	RW
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

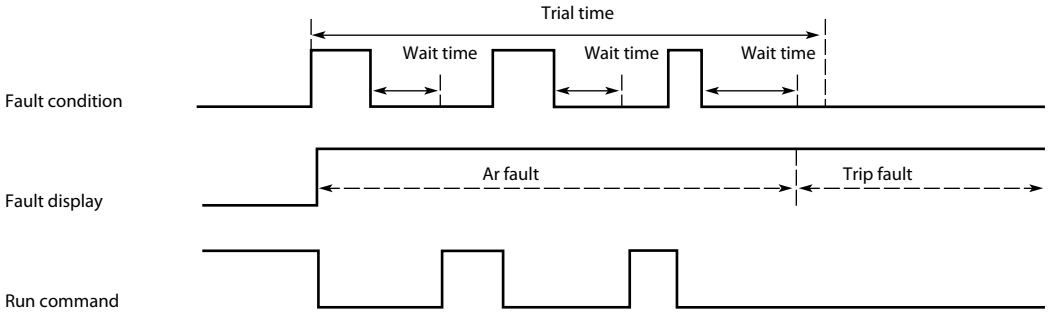
Code	Modbus ID	Parameter	Application	RO/RW
P9.1	**306**	**4 mA Input Fault** A warning or a fault action and message is generated if the 4–20 mA reference signal is used and the signal falls below 4 mA for 5 seconds or below 0.5 mA for 0.5 seconds. The information can also be programmed into digital 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
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

Code	Modbus ID	Parameter	Application	RO/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
P9.9	**311**	**Motor Therm F0 Current** The current can be set between 0–150.0% x InMotor. This parameter sets the value for thermal current at zero frequency. See **Figure 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. **Figure 65. Motor thermal current it curve** 	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P9.10	**312**	**Motor Thermal Time**	**1, 2, 3, 4**	RW
		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**.		
		Figure 66. Motor temperature calculation  * Changes by motor size and adjusted with P9.10.		
P9.11	**313**	**Stall protection**	**1, 2, 3, 4**	RW
		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		

Code	Modbus ID	Parameter	Application	RO/RW
P9.12	**314**	**Stall current limit** The current can be set to 0.1–InMotor*2. For a stall stage to occur, the current must have exceeded this limit. See **Figure 64**. The software does not allow entering a greater value than InMotor*2. If P1.5, nominal motor current is changed, this parameter is automatically restored to the default value (IL). **Figure 67. Stall characteristics settings** 	**1, 2, 3, 4**	RW
P9.13	**315**	**Stall time limit** This time can be set between 1.0 and 120.0s. This is the maximum time allowed for a stall stage. The stall time is counted by an internal up/down counter based off the current being above the limit setting. If the stall time counter value goes above this limit the protection will cause a trip (see P9.11). **Figure 68. Stall time count** 	**1, 2, 3, 4**	RW
P9.14	**316**	**Stall frequency limit** The frequency can be set between 1–fmax (P1.1.2). For a stall state to occur, the output frequency must have remained below this limit and above the current limit for the stall time.	**1, 2, 3, 4**	RW
P9.15	**317**	**Underload Protection** If the motor torque drops below the Fnom and F0 torque levels for the time limit, the underload protection is enabled. Deactivating the protection by setting the parameter to 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

Code	Modbus ID	Parameter	Application	RO/RW
P9.16	**318**	**Underload fnom torque**	**1, 2, 3, 4**	RW
		The torque limit can be set between 10.0–150.0% x TnMotor. This parameter gives the value for the minimum torque allowed when the output frequency is at or above the field weakening point. See **Figure 66**. If you change P1.5, nominal motor current, this parameter is automatically restored to the default value. **Figure 69. Setting of minimum load** 		
P9.17	**319**	**Underload F0 torque**	**1, 2, 3, 4**	RW
		The torque limit can be set between 5.0–150.0% x TnMotor. 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.		
P9.18	**320**	**Underload Time Limit**	**1, 2, 3, 4**	RW
		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**. **Figure 70. Underload time counter function** 		

Code	Modbus ID	Parameter	Application	RO/RW
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 going to a run state cycle with I/O run command is still active as the control place. 0 = Respond to I/O run command when power is applied. If in another control place and switched to I/O control do not respond. (Run Command has to be cycled). 1 = Do not responde to I/O run command when power is applied. If in another control place and switched to I/O control do not respond(Run Command has to be cycled). 2 = Respond to I/O commands when power is applied. If in another control place and switched to I/O control the drive will respond to a maintained Run Command. 3 = Do Not respond to I/O commands when power is applied. If in another control place and switched to I/O control the drive will respond to a maintained Run Command.	**1, 2, 3, 4**	RW
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
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**. **Figure 71. Auto restart fail (try number >2.)**  Fig5. Auto restart fail (try number >2.) 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.	**1, 2, 3, 4**	RW
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 = Flying Strting 1 = Start with Ramp	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/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 overvoltage fault trip. The fault is reset and the drive is started automatically after the DC-link voltage has returned to the normal level	**1, 2, 3, 4**	RW
P9.28	**325**	**Overvoltage attempts** This parameter determines how many automatic restarts can be made during the trial Time set by P9.25 after an overvoltage trip. 0 = No automatic restart after overvoltage fault trip >0 = Number of automatic restarts after overvoltage fault trip. The fault is reset and the drive is started automatically after the DC-link voltage has returned to the normal level	**1, 2, 3, 4**	RW
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

Code	Modbus ID	Parameter	Application	RO/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
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 = Disable 1 = Enable	**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
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

Code	Modbus ID	Parameter	Application	RO/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 = DigIN: NormallyOpen 1 = DigIN: NormallyClosed 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = SlotA PT100 Temp Channel 1 33 = SlotA PT100 Temp Channel 2 34 = SlotA PT100 Temp Channel 3 35 = SlotA Max PT100 Temp 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = SlotB Max PT100 Temp 40 = SlotA and SlotB Max PT100 Temp	**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
P9.51	**2401**	**PID feedback AI loss response** This parameter defines the function of the PID Feedback Analog Input loss response, if the AI feedback is lost based off the programed AI feedback. 0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Frequency (P9.52) 4 = Warning: Analog -> Net	**2,3,4**	RW
P9.52	**2402**	**PID feedback AI loss pre freq**	**2,3,4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
		This parameter defines the frequency the master would run to if a feedabck is lost and P9.51 was set to option 3.		
P9.53	**2403**	**PID feedback AI pipe fill loss** Detects pipe fill loss in the pump based off the measured level. If the value drops below this level for the time in P3.54 and below the frequency in P9.52 AI Loss pre freqeuncy occurs.	**2,3,4**	RW
P9.54	**2404**	**PID feedback AI loss PreFreq timeout** When P9.51 is set to 3 or 4, when the Feedback signal is lost, the drive will run at the frequency in P9.52 for the time set here, after this time the drive will fault out on "Feedback Loss". The Time is disabled when set to 0sec.	**2,3,4**	RW
P9.55	**2405**	**PID feedback AI loss attemps** This parameter sets the amount of tries it will try to Auto restart the Feedback AI loss fault.	**2,3,4**	RW
P9.56	**2429**	**STO fault response** STO Fault Response defines the function of how the STO input will be seen on the keypad and how the drive functions to it. No Action = Drive will stop no indication shown, n reset required, have to cycle start command. Fault = drive will indicate fault/Require Reset to start again, Warning = drive indicate warning/if STO clears drive will run without Reset.	**1,2,3,4**	RW
P9.57	**2483**	**Fault Reset Start** Defines how the drive functions after a Fault Reset is given if the run command has to be cycled or if still present it will start again. 0 - Start/Stop After Fault Reset - run command has to be cycled to restart after fault reset. 1 - Restart After Fault Reset - run command is still active after fault the drive will restart without resending command.	**1,2,3,4**	RW
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**	**PID1 Control DTime** Defines the derivation time of the PID Controller. This value will adjust the rate of change on the feedback signal. If this value is set to 1.00 sec, a change of %10 in error value during 1.00 sec causes the control output to change by %10.00. If value is set to 0.0, frequency converter operates as PI controller	**2, 3, 4**	RW
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 max** Defines the maximum 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

Code	Modbus ID	Parameter	Application	RO/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
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	**2397**	**PID1 setpoint 1 sleep unit** Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run. 0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck	**2,3,4**	RW
P10.19	**2454**	**PID1 setpoint 1 sleep level** defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.	**2,3,4**	RW
P10.20	**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
P10.21	**1318**	**PID1 set point 1 wake-up level** Defines the level that the PID feedback value must exceed to re-enable drive output. Need to change the description, depend on the wake-up action value. Which can be scaled based off the PID Unit Min/Max values P10.5 and P10.6.	**2, 3, 4**	RW
P10.22	**1320**	**PID1 set point 1 boost** The setpoint can be boosted via a multiplier value	**2, 3, 4**	RW
P10.23	**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
P10.24	**1322**	**PID1 set point 2 min** Defines Minimum Value.	**2, 3, 4**	RW
P10.25	**1323**	**PID1 set point 2 max** Defines Maximum Value.	**2, 3, 4**	RW
P10.26	**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

Code	Modbus ID	Parameter	Application	RO/RW
P10.27	**2397**	**PID1 setpoint 2 sleep unit** Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run. 0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck	**2,3,4**	RW
P10.28	**2454**	**PID1 setpoint 2 sleep level** Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.	**2,3,4**	RW
P10.29	**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
P10.30	**1327**	**PID1 set point 2 wake-up level** Defines the level that the PID feedback value must exceed to re-enable drive output. Need to change the description, depend on the wake-up action value. Can be scaled based off the PID Unit Min/Max values P10.5 and P10.6.	**2, 3, 4**	RW
P10.31	**1329**	**PID1 set point 2 boost** The setpoint can be boosted via a multiplier value.	**2, 3, 4**	RW
P10.32	**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
P10.33	**1331**	**PID1 feedback gain** Define Gain associated with feedback signal from the measuring device.	**2, 3, 4**	RW
P10.34	**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
P10.35	**1333**	**PID1 feedback 1 min** Minimum Unit Value for the feedback 1 signal.	**2, 3, 4**	RW
P10.36	**1334**	**PID1 feedback 1 max** Maximum Unit Value for the feedback 1 signal.	**2, 3, 4**	RW
P10.37	**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
P10.38	**1336**	**PID1 feedback 2 min** Minimum Unit Value for the Feedback 2 signal.	**2, 3, 4**	RW
P10.39	**1337**	**PID1 feedback 2 max** Maximum Unit Value for the Feedback 2 signal.	**2, 3, 4**	RW
P10.40	**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
P10.41	**1339**	**PID1 feedforward gain** Define feed forward gain control level.	**2, 3, 4**	RW
P10.42	**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
P10.43	**1341**	**PID1 feedforward 1 min** Define feed forward Minimum Value.	**2, 3, 4**	RW
P10.44	**1342**	**PID1 feedforward 1 max** Define feed forward Maximum Unit Value.	**2, 3, 4**	RW
P10.45	**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
P10.46	**1344**	**PID1 feedforward 2 min** Define feed forward2 Minimum Unit Value.	**2, 3, 4**	RW
P10.47	**1345**	**PID1 feedforward 2 max** Define feed forward2 Maximum Unit Value.	**2, 3, 4**	RW
P10.48	**1352**	**PID1 set point 1 comp enable** Enables pressure loss compensation for setpoint 1 value.	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P10.49	**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
P10.50	**1354**	**PID1 set point 2 comp enable** Enables pressure loss compensation for setpoint 2 signal value.	**2, 3, 4**	RW
P10.51	**1355**	**PID1 set point 2 comp max** Value added proportionally to the frequency, setpoint compensation = comp max * (output freq–min freq)/(max freq–min freq).	**2, 3, 4**	RW

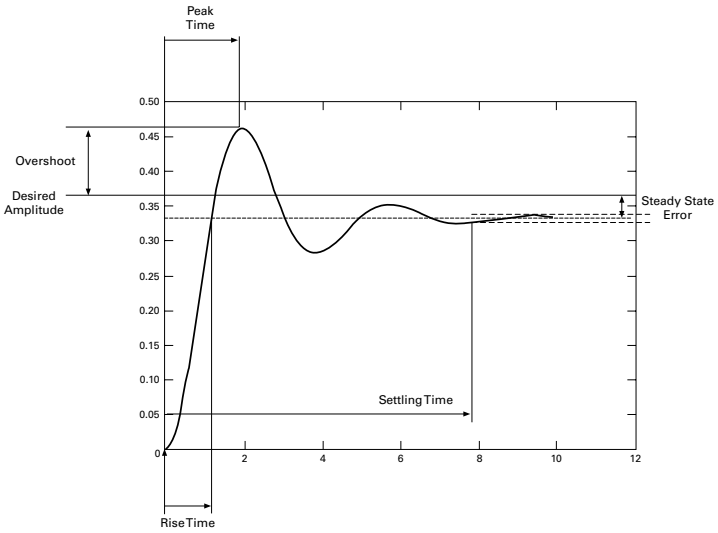
Procedure for setting up PID application:

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 72. Setting up PID application

Response	Rise time	Overshoot	Settling time	Steady state error
Increase PID Gain	Decrease Rise	Increases Overshoot	Not Affected	Decreases Error
Increase PID1 Time	Decrease Rise	Increases Overshoot	Increases Setting	Eliminates Error
Increase PID0 Time	Not Affected	Decreases Overshoot	Decreases Setting	Not Affected

Rise Time—the time required for the output to rise 90% of the desired level for the first time.
Overshoot—the difference between the peak level and the steady state level. Setting Time—time required for the system to converge to its steady state.
Steady State Error—the difference between the steady state level and the desired output level.



P10.52	**2466**	**PID1 Wake Up Action** This parameter defines the wakeup function action. 0 - Wakeup when below wakeup level P10.21/P10.30 1 - Wakeup when above wakup level P10.21/P10.30 2 - Wakeup when below wakeup level % set in P10.21/P10.30 from PID setpoint 3 - Wakeup when above wakeup level % set in P10.21/P10.30 from PID setpoint	**2,3,4**	RW
P10.53	**2542**	**FB PID1 Set Point 1** With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.	**2, 3, 4**	RO
P10.54	**2544**	**FB PID1 Set Point 2** With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.	**2, 3, 4**	RO
P10.55	**2550**	**FB PID1 Feedback 1** With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.	**2, 3, 4**	RO

Code	Modbus ID	Parameter	Application	RO/RW
P10.56	**2551**	**FB PID1 Feedback 2**	**2, 3, 4**	RO
		With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.		
P10.57	**2554**	**FB PID1 Feedforward 1**	**2, 3, 4**	RO
		With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.		
P10.58	**2555**	**FB PID1 Feedforward 2**	**2, 3, 4**	RO
		With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.		
P11.1	**1356**	**PID2 control gain**	**3, 4**	RW
		See P10.1.		
P11.2	**1357**	**PID2 control itime**	**3, 4**	RW
		See P10.2.		
P11.3	**1358**	**PID2 control dtime**	**3, 4**	RW
		See P10.3.		
P11.4	**1359**	**PID2 process unit**	**3, 4**	RW
		See P10.4.		
P11.5	**1360**	**PID2 process unit min**	**3, 4**	RW
		See P10.5.		
P11.6	**1362**	**PID2 process unit max**	**3, 4**	RW
		See P10.6.		
P11.7	**1364**	**PID2 process unit decimal**	**3, 4**	RW
		See P10.7.		
P11.8	**1365**	**PID2 error inversion**	**3, 4**	RW
		See P10.8.		
P11.9	**1366**	**PID2 dead band**	**3, 4**	RW
		See P10.9.		
P11.10	**1368**	**PID2 dead band delay**	**3, 4**	RW
		See P10.10.		
P11.11	**1369**	**PID2 keypad set point 1**	**3, 4**	RW
		See P10.11.		
P11.12	**1371**	**PID2 keypad set point 2**	**3, 4**	RW
		See P10.12.		
P11.13	**1373**	**PID2 ramp time**	**3, 4**	RW
		See P10.13.		
P11.14	**1374**	**PID2 set point 1 source**	**3, 4**	RW
		See P10.14.		
P11.15	**1375**	**PID2 set point 1 min**	**3, 4**	RW
		See P10.15.		
P11.16	**1376**	**PID2 set point 1 max**	**3, 4**	RW
		See P10.16.		
P11.17	**1377**	**PID2 set point 1 sleep enable**	**3, 4**	RW
		See P10.17.		
P11.18	**2398**	**PID2 setpoint 1 sleep unit**	**2,3,4**	RW
		Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run. 0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck		
P11.19	**2456**	**PID2 setpoint 1 sleep level**	**2,3,4**	RW
		defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.		
P11.20	**1379**	**PID2 set point 1 sleep delay**	**3, 4**	RW
		See P10.20.		

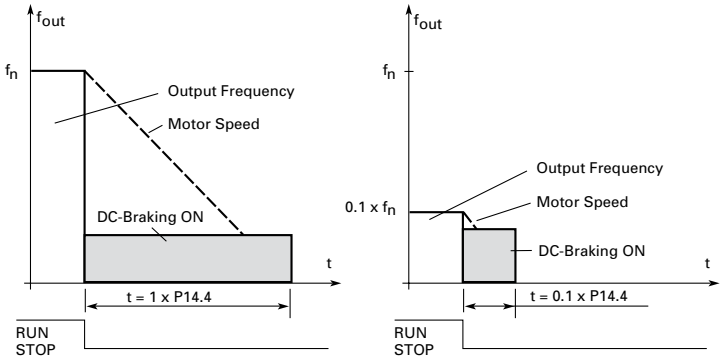
Code	Modbus ID	Parameter	Application	RO/RW
P11.21	**1380**	**PID2 set point 1 wake-up level** See P10.21.	**3, 4**	RW
P11.22	**1382**	**PID2 set point 1 boost** See P10.22.	**3, 4**	RW
P11.23	**1383**	**PID2 set point 2 source** See P10.23.	**3, 4**	RW
P11.24	**1384**	**PID2 set point 2 min** See P10.24.	**3, 4**	RW
P11.25	**1385**	**PID2 set point 2 max** See P10.25.	**3, 4**	RW
P11.26	**1386**	**PID2 set point 2 sleep enable** See P10.26.	**3, 4**	RW
P11.27	**2399**	**PID2 setpoint 2 sleep unit** Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run. 0 = Ouptut Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedabck	**2,3,4**	RW
P11.28	**2458**	**PID2 setpoint 2 sleep level** defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.	**2,3,4**	RW
P11.29	**1388**	**PID2 Set point 2 sleep delay** See P10.29.	**3, 4**	RW
P11.30	**1389**	**PID2 set point 2 wake-up level** See P10.30.	**3, 4**	RW
P11.31	**1391**	**PID2 set point 2 boost** See P10.31.	**3, 4**	RW
P11.32	**1392**	**PID2 feedback func** See P10.32.	**3, 4**	RW
P11.33	**1393**	**PID2 feedback gain** See P10.33.	**3, 4**	RW
P11.34	**1394**	**PID2 feedback 1 source** See P10.34.	**3, 4**	RW
P11.35	**1395**	**PID2 feedback 1 min** See P10.35.	**3, 4**	RW
P11.36	**1396**	**PID2 feedback 1 max** See P10.36.	**3, 4**	RW
P11.37	**1397**	**PID2 feedback 2 source** See P10.37.	**3, 4**	RW
P11.38	**1398**	**PID2 feedback 2 min** See P10.38.	**3, 4**	RW
P11.39	**1399**	**PID2 feedback 2 max** See P10.39.	**3, 4**	RW
P11.40	**1400**	**PID2 feedforward func** See P10.40.	**3, 4**	RW
P11.41	**1401**	**PID2 feedforward gain** See P10.41.	**3, 4**	RW
P11.42	**1402**	**PID2 feedforward 1 source** See P10.42.	**3, 4**	RW
P11.43	**1403**	**PID2 feedforward 1 min** See P10.43.	**3, 4**	RW
P11.44	**1404**	**PID2 feedforward 1 max** See P10.44.	**3, 4**	RW
P11.45	**1405**	**PID2 feedforward 2 source** See P10.45.	**3, 4**	RW
P11.46	**1406**	**PID2 feedforward 2 min** See P10.46.	**3, 4**	RW
P11.47	**1407**	**PID2 feedforward 2 max** See P10.47.	**3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P11.48	**1414**	**PID2 set point 1 comp enable**	**3, 4**	RW
		See P10.48.		
P11.49	**1415**	**PID2 set point 1 comp max**	**3, 4**	RW
		See P10.49.		
P11.50	**1416**	**PID2 set point 2 comp enable**	**3, 4**	RW
		See P10.50.		
P11.51	**1417**	**PID2 set point 2 comp max**	**3, 4**	RW
		See P10.51.		
P11.52	**2467**	**PID2 Wake Up Action**		
		This parameter defines the wakeup function action. 0 - Wakeup when below wakeup level P11.21/P11.30 1 - Wakeup when above wakup level P11.21/P11.30 2 - Wakeup when below wakeup level % set in P11.21/P11.30 from PID setpoint 3 - Wakeup when above wakeup level % set in P11.21/P11.30 from PID setpoint		
P11.53	**2546**	**FB PID2 Set Point 1**	**3, 4**	RO
		With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.		
P11.54	**2548**	**FB PID2 Set Point 2**	**3, 4**	RO
		With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.		
P11.55	**2552**	**FB PID2 Feedback 1**	**3, 4**	RO
		With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.		
P11.56	**2553**	**FB PID2 Feedback 2**	**3, 4**	RO
		With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.		
P11.57	**2556**	**FB PID2 Feedforward 1**	**3, 4**	RO
		With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.		
P11.58	**2557**	**FB PID2 Feedforward 2**	**3, 4**	RO
		With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.		
P12.1	**105**	**Preset speed 1**	**1, 2, 3, 4**	RW
P12.2	**106**	**Preset speed 2**	**1, 2, 3, 4**	RW
		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.		
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**	**1, 2, 3, 4**	RW
		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).		
P13.1	**295**	**Torque limit**	**4**	RW
		With this parameter you can set the torque limit control between 0.0–400.0% when in open loop torque control.		

Code	Modbus ID	Parameter	Application	RO/RW
P13.2	**303**	**Torque ref sel** Defines the source for torque reference. 0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = AI1 Joystick 6 = AI2 Joystick 7 = Keypad Torque Ref 8 = FB Process Data Input 1 9 = PID1 Control Output 10 = PID2 Control Output 11 = FB Torque Ref	**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
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	**1684**	**Stop state magnetization time** Motor stop magnetization time upon stopping in open loop torque control mode.	**4**	RW
P13.14	**2541**	**FB Torque Ref** With the Feildbus value, when the reference location is selected for this mode the FB value can be monitored in the keypad to see message setting is correct.	**4**	RO
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

Code	Modbus ID	Parameter	Application	RO/RW
P14.3	**262**	**Stop DC-Brake frequency**	**1, 2, 3, 4**	RW
		The output frequency at which the DC-braking is applied on stopping. See **Figure 70**.		
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-tion, the motor can be electrically stopped in the shortest possible time, without using an optional external braking resistor. The braking time is scaled according to the frequency when the DC-braking starts. If the frequency is ≥ the nominal frequency of the motor, the set value of parameter P14.4 determines the braking time. When the frequency is ≤10% of the nominal, the braking time is 10% of the set value of P14.4.		

Figure 73. Figure 70. DC-Braking time when stop mode = coasting

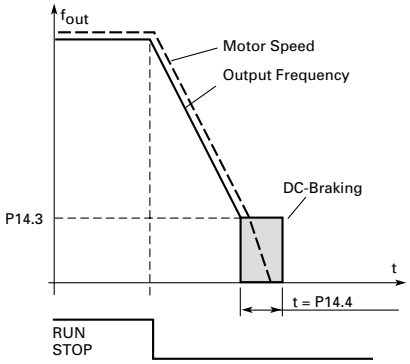


Par. P7.10 = 1; Stop function = Ramp:

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**.

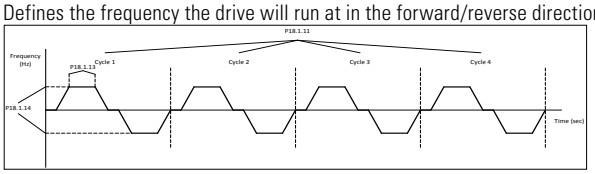
Figure 74. Figure 71. DC-Braking time when stop mode = ramp



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 **Note:** when Fire mode is enabled, this causes the drive to ignore any fault and run till its death. Warranty will be non valid in the case this is enabled and the drive causes issues to the system.	**2, 3, 4**	RW
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 7 = PID2 Control Output	**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
P15.7	**2445**	**Fire mode test enable** This parameter allows for testing the Fire Mode feature, with the parameter set to Enable and Fire Mode input enabled, the drive will run at the Fire Mode speed desired but all faults are enabled.	**2, 3, 4**	RW
P16.1	**557**	**Motor nom current 2** The second motor set nameplate current. Selected based off of a digital input.	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/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
P17.1.1	**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
P17.1.2	**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
P17.1. 3	**542**	**Auto bypass** This parameter specifies whether an automatic switch to bypass will occur specific fault condition of OverCurrent Bypass Enabled - (P17.5) through OverVoltage Bypass Enable (P17.9). P17.1 Bypass enabled needs to been enabled for Auto bypass to function. 0 = Auto Bypass disabled 1 = Auto Bypass enabled	**2, 3, 4**	RW
P17.1. 4	**543**	**Auto bypass delay** This parameter specifies the time delay before an automatic switch to bypass would occur after a fault condition is seen.	**2, 3, 4**	RW
P17.1. 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
P17.1.6	**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
P17.1.7	**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
P17.1.8	**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

Code	Modbus ID	Parameter	Application	RO/RW
P17.1.9	**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
P17.2.1	**2476**	**Redundant Drive Enabl** This parameter will allow for enabling the Redundant drive setup were mutliple drives can be connected via modbus communicaitons to start if the main drive fails or runtime settings below expires.	**2,3,4**	RW
P17.2.2	**2278**	**Drive ID** This parameter defines the drive address when using multi drive pump mode, based off this id the drive enables in the desired sequence and can be monitored at this drive ID value in the monitor screen.	**2,3,4**	RW
P17.2.3	**2477**	**Redundant Run Time Enable** This parameter enables the Run time limit on the Redundant drive so that drives will be cycled based off the Run time limit value.	**2,3,4**	RW
P17.2.4	**2478**	**Redundant Run Time Reset** This parameter will Reset th Redundant Drie Run timer value.	**2,3,4**	RW
P17.2.5	**2479**	**Redundant Run Time Limit** Sets the time limit for the Run time of one drive when enabled for the Redundant drive scheme.	**2,3,4**	RW
P18.1.1	**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
P18.1.2	**2278**	**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
P18.1.3	**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
P18.1.4	**2315**	**Staging frequncy** Master drive can only add pump when output frequency is over staging frequencyand feedback is out of bandwidth.	**2,3,4**	RW
P18.1.5	**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
P18.1.6	**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
P18.1.7	**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
P18.1.8	**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
P18.1.9	**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

Code	Modbus ID	Parameter	Application	RO/RW
P18.1.10	**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
P18.1.11	**2468**	**Derag Cycles** This parameter defines the number of cycles in the forward/Reverse dirction for removing any debris in system.	**2,3,4**	RW
P18.1.12	**2469**	**Derag at Start/Stop** Defines how the derage function will become activated; start, stop, both or based off the digital input.	**2,3,4**	RW
P18.1.13	**2470**	**Deragging Run Time** Defines the length of time the drive will run at the Derag speed in the forward and reverse direction.	**2,3,4**	RW
P18.1.14	**2471**	**Derag Speed** Defines the frequency the drive will run at in the forward/reverse direction when in the derag mode. 	**2,3,4**	RW
P18.1.15	**2472**	**Derag Off Delay** Defines the length of time the drive will run the derag function when enabled at stop.	**2,3,4**	RW
P18.2.1.1	**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
P18.2.1.2	**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
P18.2.1.3	**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
P18.2.1.4	**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
P18.2.1.5	**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
P18.2.2.1	**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
P18.2.2.2	**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
P18.2.2.3	**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
P18.2.2.4	**2245**	**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
P18.2.2.5	**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
P18.2.3.1	**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
P18.2.3.2	**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

Code	Modbus ID	Parameter	Application	RO/RW
P18.2.3.3	**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
P18.2.3.4	**2246**	**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
P18.2.3.5	**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
P18.3.1.1	**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
P18.3.1.2	**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
P18.3.1.3	**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
P18.3.1.4	**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
P18.3.1.5	**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
P18.3.2.1	**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
P18.3.2.2	**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
P18.3.2.3	**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
P18.3.2.4	**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
P18.3.2.5	**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

Code	Modbus ID	Parameter	Application	RO/RW
P18.3.3.1	**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
P18.3.3.2	**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
P18.3.3.3	**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
P18.3.3.4	**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
P18.3.3.5	**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
P18.3.4.1	**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
P18.3.4.2	**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
P18.3.4.3	**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
P18.3.4.4	**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
P18.3.4.5	**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
P18.3.5.1	**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
P18.3.5.2	**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
P18.3.5.3	**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
P18.3.5.4	**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
P18.3.5.5	**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

Code	Modbus ID	Parameter	Application	RO/RW
P18.3.6.1	**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
P18.3.6.2	**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
P18.3.6.3	**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
P18.3.6.4	**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
P18.3.6.5	**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
P18.3.7.1	**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
P18.3.7.2	**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
P18.3.7.3	**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
P18.3.7.4	**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
P18.3.7.5	**2275**	**Drive 5** This parameter gives the status of Drive 5 in terms of the Motor Speed when doingthe 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
P18.3.8.1	**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
P18.3.8.2	**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
P18.3.8.3	**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
P18.3.8.4	**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
P18.3.8.5	**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

Code	Modbus ID	Parameter	Application	RO/RW
P18.4.1	**342**	**Number of Pumps** Total number of auxiliary motors/pumps to be used with the Multi-Pump System. When in single drive mode, this functions as the amount of motors on a single drive. When in multi drive mode, this functions as the most drives active at one time.	**2,3,4**	RW
P18.4.2	**346**	**Include frequency 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
P18.4.3	**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
P18.4.4	**347**	**Auto-Change interval** Defines how often to rotate starting order of motors/pumps. Not available in multi-drive mode.	**2,3,4**	RW
P18.4.5	**349**	**Auto-Change freq limit** An autochange is done when the autochange interval has elapsed and the drive is running below autochange frequency limit. Not available in multi-drive mode.	**2,3,4**	RW
P18.4.6	**348**	**Auto-Change pump limit** An auto change is done when the auto change interval has elapsed and the number of running aux motors is less than auto change motor limit. Not available in multi-drive mode.	**2,3,4**	RW
P18.4.7	**2441**	**Pipe fill aux pump select** Defines the aux pump to perform the pipe fill process. 0 = Disabled 1 = Aux motor 1 2 = Aux Motor 2 3 = Aux Motor 3 4 = Aux Motor 4	**2,3,4**	RW
P18.4.8	**2442**	**Pipe fill aux pump run time** Defines the time the aux pump run time is set to.	**2,3,4**	RW
P18.4.9	**2443**	**Pipe fill aux pump operation** Defines the opearation mode of the aux pump operation when disabling. Either follow an automatic transition into scheme or stop. 0 = Automatic 1 = Stop	**2,3,4**	RW
P18.4.10	**2444**	**Pipe fill aux pump delay** Defines the delay time in enabling of the aux pump from enabling.	**2,3,4**	RW
P18.5.1	**2451**	**Number of drives** this paremter sets the maximum number of drives that will be active when running in the Multi drive sequence. If value is less then the amount of drives connected additional drives will beused as back up for the system.	**2,3,4**	RW
P18.5.2	**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
P18.5.3	**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
P18.5.4	**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
P18.5.5	**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

Code	Modbus ID	Parameter	Application	RO/RW
P18.5.6	**2280**	**Run time enable** The run time counter will start counting only if this parameter is enabled. 0 = Disable 1 = Enable	**2,3,5**	RW
P18.5.7	**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.	**2,3,6**	RW
P18.5.8	**2283**	**Run time reset** One-time parameter, set to be 1 will clear run time counter.	**2,3,7**	RW
P18.5.9	**2473**	**Master Drive Mode** Defines how the Master drive will maintain the freqeuncy control when slaves are brough in; follow PID, Fixed speed, or Turn itself off.	**2,3,4**	RW
P18.5.10	**2474**	**Master Fixed Speed** Defines the fixed speed frequency when the Master Drive mode is set for Fixed Speed control when slaves are brough in.	**2,3,4**	RW
P18.5.11	**2475**	**Master Fixed Speed Delay** Defines the delay time before the master drive begins running at the fixed speed or turns off if the Master Mode is set for Fixed Speed or Turrn Off.	**2,3,4**	RW
P18.6.1	**2406**	**Pipe fill loss detection method** Defines the value for looking at a pipe fill loss 0 = Motor Current 1 = Motor Power (%) 2 = Motor Torque (%)	**2,3,4**	RW
P18.6.2	**2407**	**Pipe fill loss level** Selects the level at which to look at a condition of pipe fill loss. When the measured value defined in the Detection Method drops below this level for the Prime Loss Time and is above the Prime Loss Freuency level, the drive will respond based off the P18.6.5 parameter.	**2,3,4**	RW
P18.6.3	**2408**	**Pipe fill loss time** Defines the delay time before a ""Pipe Fill Loss"" condition will occure based of the Dectection Method and Prime Loss Level.	**2,3,4**	RW
P18.6.4	**2409**	**Pipe fill loss frequency** Defines the freqeuency point at which the drive needs to be above to enabled the ""Pipe fill Loss"" feature. When set to 0 Hz protection is disabled.	**2,3,4**	RW
P18.6.5	**2410**	**Pipe fill loss response** Defines the response method when a ""Pipe Fill Loss"" condition occurs	**2,3,4**	RW
P18.6.6	**24011**	**Pipe fill loss attempts** Defines the amount of temps to auto restart the the drive on an ""Pipe Fill Loss"" condition.	**2, 3, 4**	RW
P18.6.7	**2430**	**Prime pump enable** This will enable or disabled the Pre-Charge function to allow for pre filling a system before going into PID conrol mode.	**2, 3, 4**	RW
P18.6.8	**2431**	**Prime pump level** This defines the level at which the Prime Pump function will drop out, If the feedback level reise above this value Precharge becomes deactivated, if the level is not reach it will switch after the delay time.	**2, 3, 4**	RW
P18.6.9	**2433**	**Prime pump frequency** Frequency at which the Prime Pump funciton will operate when enabled.	**2, 3, 4**	RW
P18.6.10	**2434**	**Prime pump delay time** This is the time that the drive will run the Precharge function on start up. When set to ""0 Hz"" this functin is not enabled. When set to ""0 Hz"" this functin is not enabled.	**2, 3, 4**	RW
P18.6.11	**2435**	**Prime pump loss of prime level** Selects the limit to indicate a loss of Prime in pump. If the measured current drops below the determined value for the value assined in the Prime Loss of Time setting the drive will display a Precharge Loss of Prime.	**2, 3, 4**	RW
P18.6.12	**2436**	**Prime pump level 2** This defines the level at which the Prime Pump function will drop out, If the feedback level reise above this value Precharge becomes deactivated, if the level is not reach it will switch after the delay time.	**2, 3, 4**	RW
P18.6.13	**2438**	**Prime pump frequency 2** Frequency at which the Prime Pump level 2 will operate at when enabled.	**2, 3, 4**	RW
P18.6.14	**2439**	**Prime pumpe delay time 2** This is the time that the drive will run at the 2nd Level Prime Pump functon level. When set to ""0 Hz"" this functin is not enabled.	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P18.6.15	2440	**Prime pumpe loss of prime level 2** Selects the limit to indicate a loss of Prime in pump. If the measured current drops below the determined value for the value assined in the Prime Loss of Time setting the drive will display a Precharge Loss of Prime.	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
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

Code	Modbus ID	Parameter	Application	RO/RW
P19.16	**503**	**Interval 4 on time**	**2, 3, 4**	RW
		See P19.1.		
P19.17	**505**	**Interval 4 off time**	**2, 3, 4**	RW
		See P19.2.		
P19.18	**526**	**Interval 4 from day**	**2, 3, 4**	RW
		See P19.3.		
P19.19	**527**	**Interval 4 to day**	**2, 3, 4**	RW
		See P19.4.		
P19.20	**528**	**Interval 4 channel**	**2, 3, 4**	RW
		See P19.5.		
P19.21	**507**	**Interval 5 on time**	**2, 3, 4**	RW
		See P19.1.		
P19.22	**509**	**Interval 5 off time**	**2, 3, 4**	RW
		See P19.2.		
P19.23	**529**	**Interval 5 from day**	**2, 3, 4**	RW
		See P19.3.		
P19.24	**530**	**Interval 5 to day**	**2, 3, 4**	RW
		See P19.4.		
P19.25	**531**	**Interval 5 channel**	**2, 3, 4**	RW
		See P19.5.		
P19.26	**511**	**Timer 1 duration**	**2, 3, 4**	RW
		The timer will run when activated by DI.		
P19.27	**532**	**Timer 1 channel**	**2, 3, 4**	RW
		Select affected time channel. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3		
P19.28	**513**	**Timer 2 duration**	**2, 3, 4**	RW
		See P19.26.		
P19.29	**533**	**Timer 2 channel**	**2, 3, 4**	RW
		SeeP19.27.		
P19.30	**515**	**Timer 3 duration**	**2, 3, 4**	RW
		See P19.26.		
P19.31	**534**	**Timer 3 channel**	**2, 3, 4**	RW
		See P19.27.		
P19.32	**2487**	**Interval 1 Setting**		
P19.33	**2488**	**Interval 2 Setting**		
P19.34	**2489**	**Interval 3 Setting**		
P19.35	**2490**	**Interval 4 Setting**		
P19.36	**2491**	**Interval 5 Setting**		
		Defines the Interval time setting for interval 1; to be Weekly or Daily. 0 - Weekly - would setup the timer for the week long. 1 - Daily - would setup the timer for the defined day.		
P20.1.1	**2533**	**FB process data input 1 sel**	**1, 2, 3, 4**	RW
		With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read\writen over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read/writen over these values. Default Values for Proc.		
P20.1.2	**2534**	**FB process data input 2 sel**	**1, 2, 3, 4**	RW
		See P20.1.1		
P20.1.3	**2535**	**FB Process Data Input 3 Sel**	**1, 2, 3, 4**	RW
		See P20.1.1		

Code	Modbus ID	Parameter	Application	RO/RW
P20.1.4	**2536**	**FB Process Data Input 4 Sel** See P20.1.1	**1, 2, 3, 4**	RW
P20.1.5	**2537**	**FB Process Data Input 5 Sel** See P20.1.1	**1, 2, 3, 4**	RW
P20.1.6	**2538**	**FB Process Data Input 6 Sel** See P20.1.1	**1, 2, 3, 4**	RW
P20.1.7	**2539**	**FB Process Data Input 7 Sel** See P20.1.1	**1, 2, 3, 4**	RW
P20.1.8	**2540**	**FB Process Data Input 8 Sel** See P20.1.1	**1, 2, 3, 4**	RW
P20.2.1	**1556**	**FB Process Data Output 1 Sel** See P20.1.1	**1,2,3,4**	RW
P20.2.2	**1557**	**FB Process Data Output 2 Sel** See P20.1.1	**1,2,3,4**	RW
P20.2.3	**1558**	**FB Process Data Output 3 Sel** See P20.1.1	**1,2,3,4**	RW
P20.2.4	**1559**	**FB Process Data Output 4 Sel** See P20.1.1	**1,2,3,4**	RW
P20.2.5	**1560**	**FB Process Data Output 5 Sel** See P20.1.1	**1,2,3,4**	RW
P20.2.6	**1561**	**FB Process Data Output 6 Sel** See P20.1.1	**1,2,3,4**	RW
P20.2.7	**1562**	**FB Process Data Output 7 Sel** See P20.1.1	**1,2,3,4**	RW
P20.2.8	**1563**	**FB Process Data Output 8 Sel** See P20.1.1	**1,2,3,4**	RW
P20.2.9	**2415**	**Standard Status Word Bit0 Function Select** See P20.2.9	**1, 2, 3, 4**	RW
P20.2.10	**2416**	**Standard Status Word Bit1 Function Select** See P20.2.9	**1, 2, 3, 4**	RW
P20.2.11	**2417**	**Standard Status Word Bit2 Function Select** See P20.2.9	**1, 2, 3, 4**	RW
P20.2.12	**2418**	**Standard Status Word Bit3 Function Select** See P20.2.9	**1, 2, 3, 4**	RW
P20.2.13	**2419**	**Standard Status Word Bit4 Function Select** See P20.2.9	**1, 2, 3, 4**	RO
P20.2.14	**2420**	**Standard Status Word Bit5 Function Select** See P20.2.9	**1, 2, 3, 4**	RO
P20.2.15	**2421**	**Standard Status Word Bit6 Function Select** See P20.2.9	**1, 2, 3, 4**	RO
P20.2.16	**2422**	**Standard Status Word Bit7 Function Select** See P20.2.9	**1, 2, 3, 4**	RO
P20.3.1.1	**586**	**RS485 Comm Set** This parameter defines the communication protocol for RS-485. 0 = Modbus RTU 1 = BACnet MS/TP	**1, 2, 3, 4**	RO
P20.3.2.1	**587**	**Slave Address** This parameter defines the slave address for RS-485 communication	**1, 2, 3, 4**	RW
P20.3.2.2	**584**	**Baud Rate** This parameter defines communication speed for RS-485 communication.	**1, 2, 3, 4**	RW
P20.3.2.3	**585**	**Parity Type** This parameter defines parity type for RS-485 communication.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P20.3.2.4	588	**Modbus RTU Protocol Status** This parameter shows the protocol status for RS-485 communication. 0 = Initial 1 = Stopped 2 = Operational 3 = Faulted	1, 2, 3, 4	RW
P20.3.2.5	589	**Slave Busy** Shows the status of the Slave device on the network.	1, 2, 3, 4	RW
P20.3.2.6	590	**Parity Error** Counts the amount of Parity Errors seen on the RS-485 network.	1, 2, 3, 4	RO
P20.3.2.7	591	**Slave Fault** Error response given when slave receives message without communication error, but can't handle it.	1, 2, 3, 4	RW
P20.3.2.8	592	**Last Fault Response** Stores the last active fault for viewing over communications.	1,2,3,4	RW
P20.3.2.9	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
P20.3.2.10	2516	**Modbus RTU Fault Response** Defines the Fieldbus Fault condition for Modbus RTU Communicaiton. 0 - Only in Fieldbus Control Mode - when fieldbus is the control place and Fieldbus fault is active drive will fault on loss of coms, if not in Fieldbus Control place will not fault. 1	1, 2, 3, 4	RO
P20.3.3.1	594	**MSTP Baud Rate** Communication speed of BACnet.	1, 2, 3, 4	RO
P20.3.3.2	595	**MSTP MS/TP Device Address** Selects the BACnet Address that the drive will be located at on Instance node.	1, 2, 3, 4	RO
P20.3.3.3	596	**MSTP Instance Number** Selects the BACnet Instance value.	1, 2, 3, 4	RO
P20.3.3.4	598	**MSTP Comm Timeout MSTP** Selects the time it waits before a communication fault occurs over BACnet.	1, 2, 3, 4	RW
P20.3.3.5	599	**MSTP Protocol Status** Shows the status of the BACnet Protocol.	1, 2, 3, 4	RW
P20.3.3.6	600	**MSTP Fault Code** BACnet Protocol faults 0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 3 = Baud rate fault	1, 2, 3, 4	RW
P20.3.3.7	2526	**MSTP Fault Response** Defines the Fieldbus Fault condition for Modbus RTU and BacNet Communicaiton. 0 - Only in Fieldbus Control Mode - when fieldbus is the control place and Fieldbus fault is active drive will fault on loss of coms, if not in Fieldbus Control place will not	1, 2, 3, 4	RO
P20.4.1	1500	**IP Address Mode** This parameter defined the IP address configuration mode for EIP/Modbus TCP. 0 = DHCP with AutoIP 1 = Static IP	1, 2, 3, 4	RW
P20.4.2	1507	**Active IP Address** The current used IP address.	1, 2, 3, 4	RW
P20.4.3	1509	**Active Subnet Mask** The current used subnet mask.	1, 2, 3, 4	RW
P20.4.4	1511	**Active Default Gateway** The current used default gateway.	1, 2, 3, 4	RO
P20.4.5	1513	**MAC Address** 48 bit hardware address.	1, 2, 3, 4	RO
P20.4.6	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	RO

Code	Modbus ID	Parameter	Application	RO/RW
P20.4.7	**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**	RO
P20.4.8	**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**	RO
P20.4.9	**608**	**Ethernet IP Protocol Status** Indicates if Ethernet Protocol is active or not. 0 = Stopped 1 = Operational 2 = Faulted	**1,2,3,4**	RW
P20.4.10	**2518**	**EIP Fault Response** Defines the Fieldbus Fault condition for Ethernet IP Communicaiton. 0 - Only in Fieldbus Control Mode - when fieldbus is the control place and Fieldbus fault is active drive will fault on loss of coms, if not in Fieldbus Control place will not fault. 1	**1,2,3,4**	RW
P20.5.1	**609**	**Connection Limit** Maximum number of connections allowed to the frequency converter.		
P20.5.2	**610**	**Modbus TCP Unit ID** Unit identifer unit value for Modbus TCP		
P20.5.3	**611**	**Comm Timeout Modbus TCP** Selects the time it waits before a communication fault occurs over Ethernet.		
P20.5.4	**612**	**Modbus TCP Protocol Status** Indicates if ModbusProtocol is active or not. 0 = Stopped 1 = Operational 2 = Faulted		
P20.5.5	**613**	**Slave Busy** Shows the status of the Slave device on the network.		
P20.5.6	**614**	**Parity Error** Counts the amount of Parity Errors seen on the RS-485 network.		
P20.5.7	**615**	**Slave Failure** Indicates the frequency converter is unable to process message.		
P20.5.8	**616**	**Last Fault Response** Stores the last active fault for viewing over communications.		
P20.5.9	**2517**	**Modbus TCP Fault Response** Defines the Fieldbus Fault condition for Modbus TCP Communicaiton. 0 - Only in Fieldbus Control Mode - when fieldbus is the control place and Fieldbus fault is active drive will fault on loss of coms, if not in Fieldbus Control place will not fault. 1 -		
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

Code	Modbus ID	Parameter	Application	RO/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
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

Code	Modbus ID	Parameter	Application	RO/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 keypad acknowledgement time. This would typically be adjusted when using long communication cables between the drive and a keypad to delay the message time outs. **Example:** l Transfer delay between the frequency converter and the PC = 600 ms l The value of HMI Acknowledge Timeout is set to 1200 ms (2 x 600, sending l delay + receiving delay) l The corresponding setting shall be entered in the [Misc]-part of the file l NCDrive.ini: l Retries = 5 l AckTimeOut = 1200 l 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
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
P21.1.17	**626**	**Startup wizard** The Startup Wizard facilitates commissioning the PowerXL DG1. If selected Enable, the Startup Wizard prompts the operator for the language and application desired, RTC time clock and then advances through the start-up parameter list/Application Mini wizard. After completion it allows the user to go to the Main menu or default page and this parameter is set to Disabled. The Startup Wizard in always enabled for the initial power up of the PowerXL DG1. By setting this parameter to Disable without going through the Startup Wizard it will not cause it to be active on Start up. If user goes into Start Up Wizard after completion or defaults drive the Startup wizard will be Enabled. Default: 0 Minimum: 0 = Enable Maximum: 1 = Disable	**1,2,3,4**	RW
P21.1.18	**2412**	**Jog soft key hidden** This parameter will enable or disable the softkey function for Jog as a softkey function on the display. 0 = Disable 1 = Enable	**1,2,3,4**	RW
P21.1.19	**2413**	**Reverse softkey hidden** This parameter will enable or disable the softkey function for Reverse as a softkey function on the display. 0 = Disable 1 = Enable	**1,2,3,4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P21.1.20	**2426**	**Output display unit** Allows for changing the M1.1 and M1.2 value to a desired unit that will refelect the application. From there with P21.1.21 it will allow setting a max limit for the value to display desired output. 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 = deg 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 = deg F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m 45 = Hz 46 = strokes/min	**1,2,3,4**	RW
P21.1.21	**2462**	**Output display unit min** Sets the minimum scaled value when changing the Unit display to a value.	**1, 2, 3, 4**	RW
P21.1.22	**2427**	**Output display unit max** Sets the maximum scaled valued when changing the Unit display to a value	**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

Code	Modbus ID	Parameter	Application	RO/RW
P21.4.3	**601**	**Total MWh count** Megawatt hours total operation time counter of the drive output active.	**1, 2, 3, 4**	RO
P21.4.4	**603**	**Total power day count** Number of days the drive has been supplied with power.	**1, 2, 3, 4**	RO
P21.4.5	**606**	**Total power Hr count** Number of hours the drive has been supplied with power.	**1, 2, 3, 4**	RO
P21.4.6	**604**	**Trip MWh count** Megawatts hours of the drive output active 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 drive 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
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

Code	Modbus ID	Parameter	Application	RO/RW
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, virtual RO1, virtual RO2** Digital output status. The Virtual RO1 and Virtual RO2 status are of internal relays in the control board not for external use.	**1, 2, 3, 4**	RO
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
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

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

Code	Modbus ID	Parameter	Application	RO/RW
M48	**2211**	**SlotB DIDO status** SlotB DIDO Status will give the input and output status of a board insterted in the B expander board slot. Depending on the board instered different bits will become active if the I/O is enabled. Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used	**1,2,3,4**	RO
M49	**29**	**App status word** Application Status word will provide additional status indication of the health of the drive. Bit 0 = MC Ready Bit 1 = MC_Run Bit 2 = MC_Fault Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning/AR-Fault Bit 7 = MC_ZeroSpeed Bit 8 = I/O Control Indicate Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Indicator Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 = Run Bypass Bit 14 = Ext Brake Control Bit 15 = Bypass Mode	**1,2,3,4**	RO
M50	**2414**	**Standard status word** Standard Status Word is defined based of the parameter setting in the Fieldbus Process Data Ouput(P20.1) group, P20.1.9 through P20.1.16 define the first 8 bits of this status word. The options for these bits are based off the standard Relay functions. Bit 0 = P20.1.9 (default = Ready) Bit 1 = P20.1.10 (default = Run) Bit 2 = P20.1.11 (default = Fault) Bit 3 = P20.1.12 (default = Fault Invert) Bit 4 = P20.1.13 (default = Warning) Bit 5 = P20.1.14 (default = Reversed) Bit 6 = P20.1.15 (default = At Speed) Bit 7 = P20.1.16 (default = Zero Frequency) Bit 8 - 15 = Not Used	**1,2,3,4**	RO
M51	**2447**	**Output** This is a user defined output value that is scalled based off a Min and max setting that can have different units, when the drive is running the value will be shown based off the scale factor. To set up the scale and units refer to parameters P21.1.20 Output Display Unit, P21.1.21 Output Display Min, and P21.1.22 Output Display Max.	**1,2,3,4**	RO
M52	**2449**	**Reference** This is a user defined reference value that is scalled based off a Min and max setting that can have different units. This reference will be used to display the output, as the reference increase the output value (M51) will follow when the drive is running. To set up the scale and units refer to parameters P21.1.20 Output Display Unit, P21.1.21 Output Display Min, and P21.1.22 Output Display Max.	**1,2,3,4**	RO
M53	**601**	**Total MWh Count** Megawatt hours total operation time counter of the drive output active.	**1,2,3,4**	RO
M54	**603**	**Total Power Day Count** Number of days the drive has been supplied with power.	**1,2,3,4**	RO
M55	**606**	**Total Power Hr Count** Number of hours the drive has been supplied with power.	**1,2,3,4**	RO

Code	Modbus ID	Parameter	Application	RO/RW
M56	**604**	**Trip MWh Count** Megawatts hours of the drive output active since last reset.	**1,2,3,4**	RO
M57	**636**	**Trip Power Day Count** Number of days since the last reset.	**1,2,3,4**	RO
M58	**637**	**Trip Power Hr Count** Number of hours the DG1 has been running a motor since the last reset.	**1,2,3,4**	RO
M59	**30**	**Multi-monitoring** Displays any 3 monitoring values in a single screen. The values are selectable via the keypad menu by going to the Multi-Monitor page and seeing 3 lines of Monitoring values, Up and Down keys can be used to select the row and then hitting the left arrow key will allow for editing the value then by going up and down. See Figure 16 for walking through keypad to set screen up.	**1, 2, 3, 4**	RO

Appendix B—"Fault Log" table, record 50 latest faults

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

Table 180. 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 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 Active Faults submenu shows the list of faults. Select the fault and push DETAIL to see the fault data.	The memory of active faults can store the maximum of 10 faults in the order of appearance.

Table 181. History faults

Menu	Function	Note
History Faults	10 latest faults are stored in the Fault history, Select the fault and push DETAIL to see the fault data.	The history fault will be stored until it is cleared with the OK button (push for 5s).
		The memory of active faults can store the maximum of 10 faults in the order of appearance.

Fault codes and descriptions

Configurable 1 = The fault type of this fault is configurable, fault type can be configured as 0 = No Action; 1 = Warning; 2 = Fault; 3= Fault, Coast

Fault code	Fault name	Fault type	Default fault type	Possible cause	Remedy
1	Over Current	Fault		AC drive has detected too high a current (>4*IH) in the motor cable: • Sudden heavy load increase • Short circuit in motor cables • Unsuitable motor	• Check loading • Check motor • Check cables and connections • Make identification run • Check ramp times
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
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

Appendix B—"Fault Log" table, record 50 latest faults

Fault code	Fault name	Fault type	Default fault type	Possible cause	Remedy
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
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.

Fault code	Fault name	Fault type	Default fault type	Possible cause	Remedy
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	Configurable (1)	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
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.

Fault code	Fault name	Fault type	Default fault type	Possible cause	Remedy
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.
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.

Fault code	Fault name	Fault type	Default fault type	Possible cause	Remedy
94	Pump Lost	Warning		In the Multi-Drive if a drive is running and is lost the Master will see a Warning as Pump is lost.	Check connections to the drives via the Modbus RS485 Communication bus or validate that a interlock was not removed to take a pump down.
95	Need Alternation	Warning		Run Time has expired and power should be cycled to Alternation of Pumps	Need to validate the amount of Run Time on all pumps/drives, stop is required to cycled the priority.
96	Parameter error	Warning		A parameter value is out of the range of the parameter, needs to be checked.	Check Parameter changes to validate they are in the valid range of the drive settings.
97	Prime Loss	Configurable	No Action	When using the Multi-Pump application when priming the pump function is used if the pump does not become Primed it will cause a fault depending on the variables entered.	Check Pump and sensor to validate operation. Check system to be sure there is nothing in the system causingerrors.
98	PID1 Feedback AI Loss	Configurable	No Action	PID1 analog feedback singal was lost.	Check the Analog input setting in the drive for the PID feedback and in the monitor menu to see value. Check external senor for errors.
99	PID2 Feedback AI Loss	Configurable	No Action	PID2 analog feedback singal was lost.	Check the Analog input setting in the drive for the PID feedback and in the monitor menu to see value. Check external senor for errors.
100	FieldBus Fault	Configurable	Fault	Smart Wire Bus fieldbus fault	Check SmartWire DT card
101	Option Card Fault	Configurable		SMDT Board hardware fault	Check SmartWire DT card
102	External Fault	Configurable	Fault	External fault from SWD	Check SmartWire DT card
103	Drive OverTemp Warning	Warning		drive degree greater than (DCI_ wDriveOverTempThreshold value - 10 degree) and less than DCI_wDriveOverTempThreshold value,report drive over temperature warning.	Check the drive degree
104	Compatibility Fault	Warning		DSP firmware is not compatible with MCB firmware	Check the DSP firmware revision
105	Compatibility Fault	Warning		Keypad firmware is not compatible with MCB firmware	Check the keypad firmware revision
106	Compatibility Fault	Warning		IO1 card firmware is not compatible with MCB firmware	Check the IO1 card firmware revision
107	Compatibility Fault	Warning		IO2 card firmware is not compatible with MCB firmware	Check the IO2 card firmware revision
108	Compatibility Fault	Warning		IO3 card firmware is not compatible with MCB firmware	Check the IO3 card firmware revision
109	Compatibility Fault	Warning		IO4 card firmware is not compatible with MCB firmware	Check the IO4 card firmware revision
110	Compatibility Fault	Warning		IO5 card firmware is not compatible with MCB firmware	Check the IO5 card firmware revision
111	Compatibility Fault	Warning		Profibus card firmware is not compatible with MCB firmware	Check the Profibus card firmware revision
112	Compatibility Fault	Warning		DeviceNet card firmware is not compatible with MCB firmware	Check the DeviceNet card firmware revision
113	Compatibility Fault	Warning		CANOpen card firmware is not compatible with MCB firmware	Check the CANOpen firmware revision
114	Compatibility Fault	Warning		SWD card firmware is not compatible with MCB firmware	Check the SWD card firmware revision

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