PowerXL DH1 Series VFD

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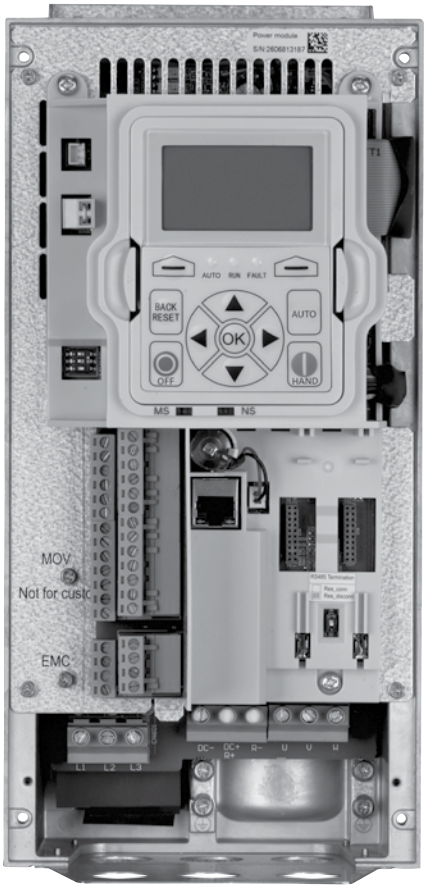
Application manual



Powering Business Worldwide

Supports Firmware Version Bundle:
DH1-V7.03-ETN

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Cover Photo: Eaton PowerXL™ DH1 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 SERIES 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 SERIES ARE LIVE WHEN THE AC DRIVE IS CONNECTED TO MAINS POTENTIAL. COMING INTO CONTACT WITH THIS VOLTAGE IS EXTREMELY DANGEROUS AND MAY CAUSE DEATH OR SEVERE INJURY.

⚠ WARNING

THE MOTOR TERMINALS U, V, W AND THE BRAKE RESISTOR TERMINALS ARE LIVE WHEN POWERXL SERIES IS CONNECTED TO MAINS, EVEN IF THE MOTOR IS NOT RUNNING.

⚠ WARNING

AFTER DISCONNECTING THE AC DRIVE FROM THE MAINS, WAIT UNTIL THE INDICATORS ON THE KEYPAD GO OUT (IF NO KEYPAD IS ATTACHED SEE THE INDICATORS ON THE COVER). WAIT 5 MORE MINUTES BEFORE DOING ANY WORK ON THE CONNECTIONS OF POWERXL SERIES DRIVE. 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 SERIES IS DISCONNECTED FROM MAINS.

⚠ WARNING

BEFORE CONNECTING THE AC DRIVE TO MAINS, CONFIRM THAT THE FRONT AND CABLE COVERS OF POWERXL SERIES DRIVE ARE CLOSED.

⚠ WARNING

DURING A RAMP STOP (SEE THE APPLICATION MANUAL), THE MOTOR IS STILL GENERATING VOLTAGE TO THE DRIVE. THEREFORE, DO NOT TOUCH THE COMPONENTS OF THE AC DRIVE BEFORE THE MOTOR HAS COMPLETELY STOPPED. WAIT UNTIL THE INDICATORS ON THE KEYPAD GO OUT (IF NO KEYPAD IS ATTACHED SEE THE INDICATORS ON THE COVER). WAIT ADDITIONAL 5 MINUTES BEFORE STARTING ANY WORK ON THE DRIVE.

Important warnings

⚠ WARNING

POWERXL SERIES AC DRIVE IS MEANT FOR FIXED INSTALLATIONS ONLY.

⚠ WARNING

DO NOT PERFORM ANY MEASUREMENTS WHEN THE AC DRIVE IS CONNECTED TO THE MAINS.

⚠ WARNING

THE GROUND LEAKAGE CURRENT OF POWERXL SERIES AC DRIVES EXCEEDS 3.5 MA AC. ACCORDING TO STANDARD EN61800-5-1, A REINFORCED PROTECTIVE GROUND CONNECTION MUST BE ENSURED.

⚠ WARNING

IF THE AC DRIVE IS USED AS A PART OF A MACHINE, THE MACHINE MANUFACTURER IS RESPONSIBLE FOR PROVIDING THE MACHINE WITH A SUPPLY DISCONNECTING DEVICE (EN 60204-1).

⚠ WARNING

ONLY SPARE PARTS DELIVERED BY EATON CAN BE USED.

⚠ WARNING

AT POWER-UP, POWER BRAKE OR FAULT RESET THE MOTOR WILL START IMMEDIATELY IF THE START SIGNAL IS ACTIVE, UNLESS THE PULSE CONTROL FOR START/STOP LOGIC HAS BEEN SELECTED. FURTHERMORE, THE I/O FUNCTIONALISTIC (INCLUDING START INPUTS) MAY CHANGE IF PARAMETERS, APPLICATIONS OR SOFTWARE ARE CHANGED. DISCONNECT, THEREFORE, THE MOTOR IF AN UNEXPECTED START CAN CAUSE DANGER.

⚠ WARNING

THE MOTOR STARTS AUTOMATICALLY AFTER AUTOMATIC FAULT RESET IF THE AUTO RESTART FUNCTION IS ACTIVATED. SEE THE APPLICATION MANUAL FOR MORE DETAILED INFORMATION.

⚠ WARNING

PRIOR TO MEASUREMENTS ON THE MOTOR OR THE MOTOR CABLE, DISCONNECT THE MOTOR CABLE FROM THE AC DRIVE.

⚠ WARNING

DO NOT TOUCH THE COMPONENTS ON THE CIRCUIT BOARDS. STATIC VOLTAGE DISCHARGE MAY DAMAGE THE COMPONENTS.

⚠ WARNING

CHECK THAT THE EMC LEVEL OF THE AC DRIVE CORRESPONDS TO THE REQUIREMENTS OF YOUR SUPPLY NETWORK.

Additional cautions

⚠ CAUTION

THE POWERXL SERIES AC DRIVE MUST ALWAYS BE GROUNDED WITH A GROUNDING CONDUCTOR CONNECTED TO THE GROUNDING TERMINAL MARKED WITH. THE GROUND LEAKAGE CURRENT OF POWERXL SERIES 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:

- **2.5 MM^2 IF MECHANICAL PROTECTION IS PROVIDED OR**
- **4 MM^2 IF MECHANICAL PROTECTION IS NOT PROVIDED.**

THE GROUND FAULT PROTECTION INSIDE THE AC DRIVE PROTECTS ONLY THE DRIVE ITSELF AGAINST GROUND FAULTS IN THE MOTOR OR THE MOTOR CABLE. IT IS NOT INTENDED FOR PERSONAL SAFETY. THE GROUND FAULT PROTECTION INSIDE THE AC DRIVE PROTECTS ONLY THE DRIVE ITSELF AGAINST GROUND FAULTS IN THE MOTOR OR THE MOTOR CABLE. IT IS NOT INTENDED FOR PERSONAL SAFETY. DUE TO THE HIGH CAPACITIVE CURRENTS PRESENT IN THE AC DRIVE, FAULT CURRENT PROTECTIVE SWITCHES MAY NOT FUNCTION PROPERLY.

DO NOT PERFORM ANY VOLTAGE WITHSTAND TESTS ON ANY PART OF POWERXL SERIES DRIVE. 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 manejar.

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

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

LORSQUE LE FILTRE CEM INTERNE EST DÉBRANCHÉ, L'ENTRAÎNEMENT PEUT NE PAS ÊTRE CONFORME AUX NORMES DE COMPATIBILITÉ ÉLECTROMAGNÉTIQUE.

- NE PAS TENTER D'INSTALLER OU DE RETIRER LES VIS DES VOM ET CEM LORSQUE L'ALIMENTATION EST APPLIQUÉE AUX BORNES D'ENTRÉE DE L'ENTRAÎNEMENT

Sécurité du moteur et de l'équipement

⚠ MISE EN GARDE

N'EFFECTUER AUCUN TEST DE RÉSISTANCE DE TENSION OU AU MÉGOHMMÈTRE SUR TOUTE PARTIE DE L'ENTRAÎNEMENT OU DE SES COMPOSANTS. UN TEST INADÉQUAT PEUT ENTRAÎNER DES DOMMAGES.

⚠ MISE EN GARDE

AVANT TOUT TEST OU MESURE DU MOTEUR OU DU CÂBLE DU MOTEUR, DÉBRANCHER LE CÂBLE DU MOTEUR AU NIVEAU DES BORNES DE SORTIE DE L'ENTRAÎNEMENT (U, V, W) POUR ÉVITER D'ENDOMMAGER CE DERNIER LORS DES TESTS.

⚠ MISE EN GARDE

NE TOUCHER AUCUN COMPOSANT SUR LES CARTES DE CIRCUIT. LES DÉCHARGES D'ÉLECTRICITÉ STATIQUE PEUVENT ENDOMMAGER LES COMPOSANTS.

⚠ MISE EN GARDE

AVANT DE METTRE LE MOTEUR EN MARCHE, VÉRIFIER QU'IL EST CORRECTEMENT MONTÉ ET ALIGNÉ AVEC L'ÉQUIPEMENT ENTRAÎNÉ. S'ASSURER QUE LE DÉMARRAGE DU MOTEUR NE RISQUE PAS DE PROVOQUER DES BLESSURES OU D'ENDOMMAGER L'ÉQUIPEMENT CONNECTÉ AU MOTEUR.

⚠ MISE EN GARDE

RÉGLER LA VITESSE MAXIMALE DU MOTEUR (FRÉQUENCE) DANS L'ENTRAÎNEMENT CONFORMÉMENT AUX EXIGENCES DU MOTEUR ET DE L'ÉQUIPEMENT QUI LUI EST CONNECTÉ. DES RÉGLAGES DE FRÉQUENCE MAXIMUM INCORRECTS PEUVENT ENDOMMAGER LE MOTEUR OU L'ÉQUIPEMENT ET CAUSER DES BLESSURES.

⚠ MISE EN GARDE

AVANT D'INVERSER LE SENS DE ROTATION DU MOTEUR, VEILLER À CE QUE CELA NE RISQUE PAS DE PROVOQUER DES BLESSURES OU DES DOMMAGES MATÉRIELS.

⚠ MISE EN GARDE

S'ASSURER QU'AUCUN CONDENSATEUR DE CORRECTION DE PUISSANCE N'EST CONNECTÉ À LA SORTIE DE L'ENTRAÎNEMENT OU AUX BORNES DU MOTEUR POUR ÉVITER UN MAUVAIS FONCTIONNEMENT DE L'ENTRAÎNEMENT ET DES DOMMAGES POTENTIELS.

⚠ MISE EN GARDE

S'ASSURER QUE LES BORNES DE SORTIE DE L'ENTRAÎNEMENT (U, V, W) NE SONT PAS CONNECTÉES À L'ALIMENTATION SECTEUR, CE QUI POURRAIT CAUSER DE GRAVES DOMMAGES À L'ENTRAÎNEMENT.

⚠ MISE EN GARDE

LORSQUE LES BORNES DE COMMANDE DE DEUX OU PLUSIEURS UNITÉS D'ENTRAÎNEMENT SONT RACCORDÉES EN PARALLÈLE, LA TENSION AUXILIAIRE DE CES CONNEXIONS DE COMMANDE DOIT ÊTRE FOURNIE PAR UNE SOURCE UNIQUE, QUI PEUT ÊTRE SOIT L'UNE DES UNITÉS, SOIT UNE ALIMENTATION EXTERNE.

⚠ MISE EN GARDE

L'ENTRAÎNEMENT DÉMARRE AUTOMATIQUEMENT APRÈS UNE INTERRUPTION DE LA TENSION D'ENTRÉE SI LA COMMANDE DE DÉMARRAGE EXTERNE EST ACTIVE.

⚠ MISE EN GARDE

NE PAS COMMANDER LE MOTEUR AVEC LE DISPOSITIF DE DÉCONNEXION ; À LA PLACE, UTILISER LES TOUCHES DE MARCHE ET D'ARRÊT DU TABLEAU DE CONTRÔLE OU LES COMMANDES DU TABLEAU DES E/S DE L'ENTRAÎNEMENT. LE NOMBRE DE CYCLES DE CHARGE MAXIMUM PERMIS DES CONDENSATEURS CC (C'EST-À-DIRE LES MISES SOUS TENSION PAR APPLICATION DE PUISSANCE) EST DE CINQ EN DIX MINUTES.

⚠ MISE EN GARDE

FONCTIONNEMENT INCORRECT DE L'ENTRAÎNEMENT :

- **SI L'ENTRAÎNEMENT N'EST PAS MIS EN MARCHE PENDANT UNE LONGUE PÉRIODE, LA PERFORMANCE DE SES CONDENSATEURS ÉLECTROLYTIQUES SERA RÉDUITE**
- **S'IL EST ARRÊTÉ POUR UNE PÉRIODE PROLONGÉE, LE METTRE EN MARCHE AU MOINS TOUS LES SIX MOIS PENDANT AU MOINS 5 HEURES POUR RESTAURER LA PERFORMANCE DES CONDENSATEURS, PUIS VÉRIFIER SON FONCTIONNEMENT. IL EST RECOMMANDÉ DE NE PAS BRANCHER L'ENTRAÎNEMENT DIRECTEMENT SUR LA TENSION SECTEUR. LA TENSION DOIT ÊTRE AUGMENTÉE PROGRESSIVEMENT EN UTILISANT UNE SOURCE CA RÉGLABLE**

LE NON-RESPECT DE CES INSTRUCTIONS PEUT ENTRAÎNER DES BLESSURES OU DES DÉGÂTS MATÉRIELS.

POUR PLUS D'INFORMATIONS TECHNIQUES, CONTACTER L'USINE OU LE REPRÉSENTANT COMMERCIAL EATON LOCAL.

Chapter 1—PowerXL series overview

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

How to use this manual

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

Receiving and inspection

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

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

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

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

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

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

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

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

Real time clock battery activation

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

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

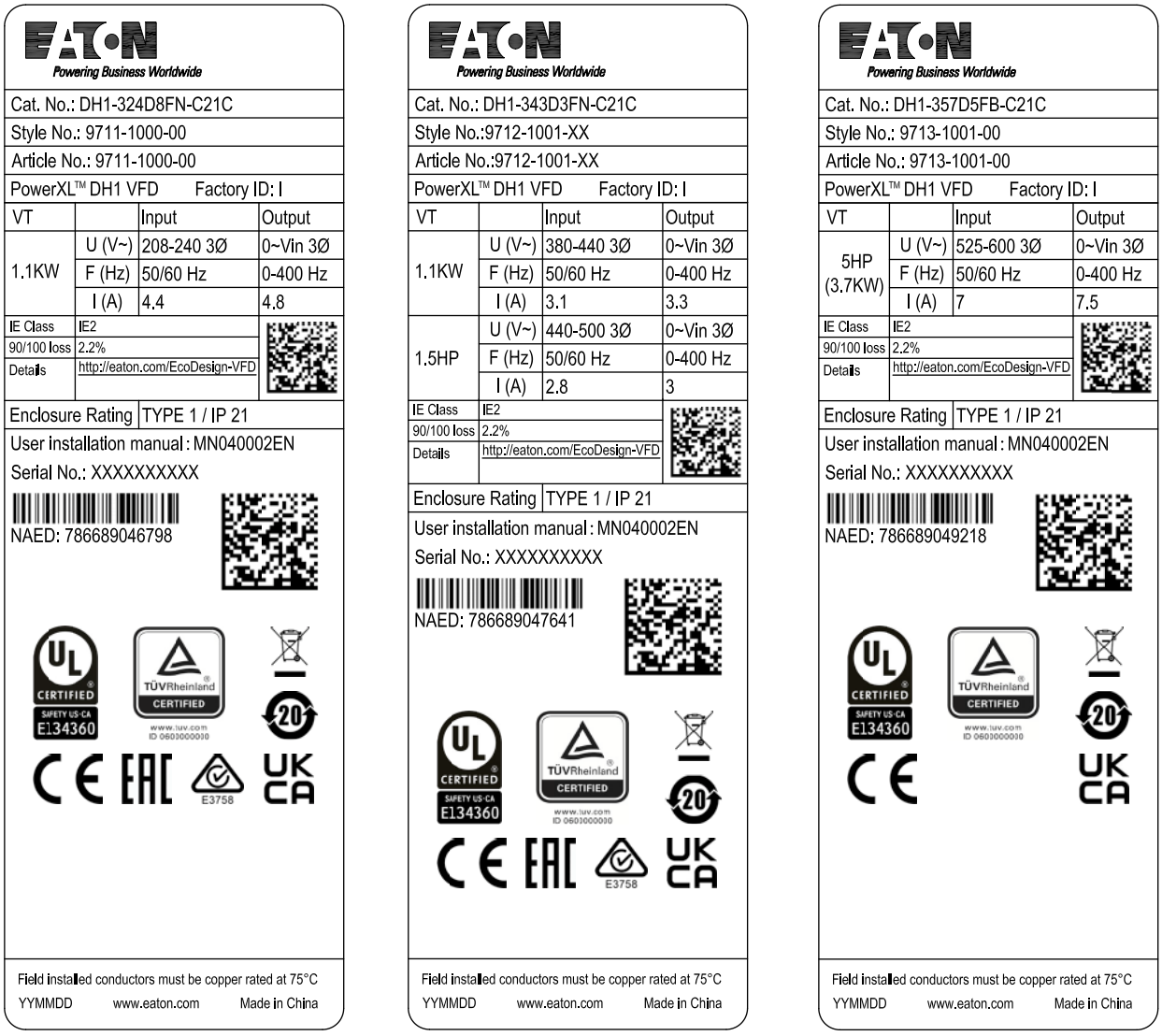
Figure 1. RTC battery connection

Table 1. Common abbreviations

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

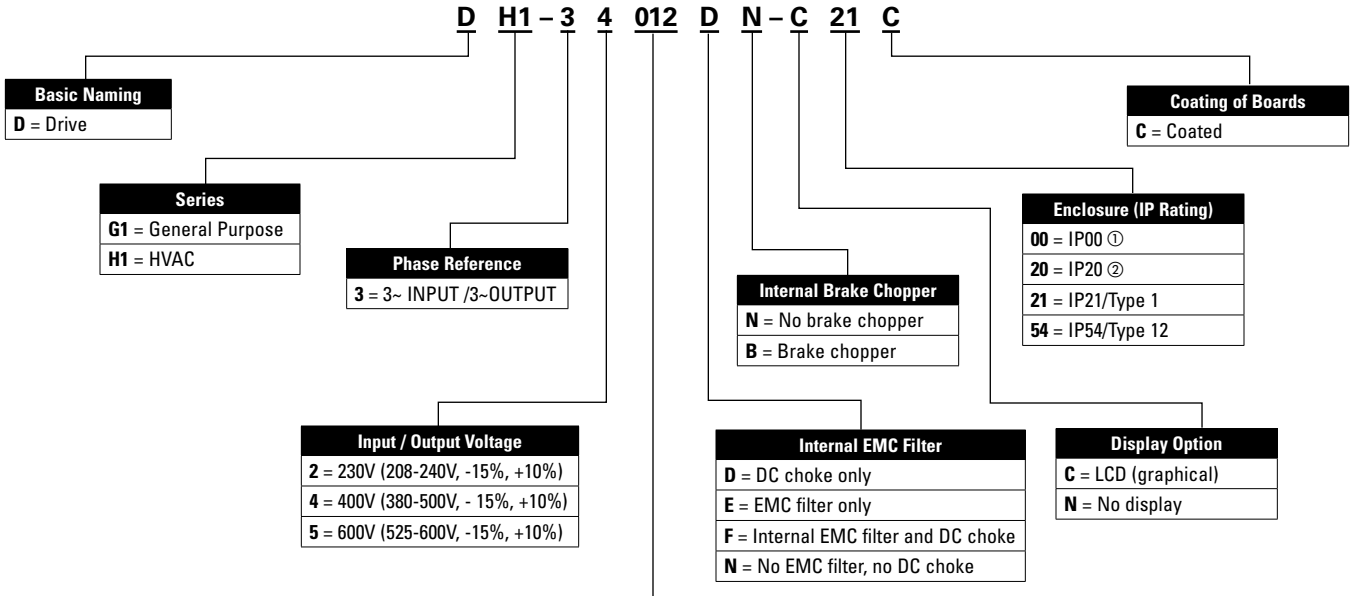
Product label

Figure 2. Rating label



Catalog number system

Figure 3. Catalog numbering system



DH1 - Output Current Rating (VT)		
208-240V	**380-500V**	**525-600V**
4D8 = 4.8A, 1.0HP, 0.75KW	3D3 = 3.3A, 1.5HP, 1.1KW	4D5 = 4.5A, 3HP, 2.2KW
6D6 = 6.6A, 1.5HP, 1.1KW	4D3 = 4.3A, 2.0HP, 1.5KW	7D5 = 7.5A, 5.0HP, 3.7KW
7D8 = 7.8A, 2.0HP, 1.5KW	5D6 = 5.6, 3.0HP, 2.2KW	010 = 10A, 7.5HP, 5.5KW
011 = 11A, 3.0HP, 2.2KW	7D6 = 7.6A, 5.0HP, 3KW	013 = 13.5A, 10HP, 7.5KW
012 = 12.5A, - HP, 3.0KW	9D0 = 9A, - HP, 4KW	018 = 18A, 15HP, 11KW
017 = 17.5A, 5.0HP, 3.7KW	012 = 12A, 7.5HP, 5.5KW	022 = 22A, 20HP, 15KW
025 = 25A, 7.5HP, 5.5KW	016 = 16A, 10HP, 7.5KW	027 = 27A, 25HP, 18.5KW
031 = 31A, 10HP, 7.5KW	023 = 23A, 15HP, 11KW	034 = 34A, 30HP, 22KW
048 = 48A, 15HP, 11KW	031 = 31A, 20HP, 15KW	041 = 41A, 40HP, 30KW
061 = 61A, 20HP, 15KW	038 = 38A, 25HP, 18.5KW	052 = 52A, 50HP, 37KW
075 = 75A, 25HP, 18.5KW	046 = 46A, 30HP, 22KW	062 = 62A, 60HP, 45KW
088 = 88A, 30HP, 22KW	061 = 61A, 40HP, 30KW	080 = 80A, 75HP, 55KW
114 = 114A, 40HP, 30KW	072 = 72A, 50HP, 37KW	100 = 100A, 100HP, 75KW
143 = 143A, 50HP, 37KW	087 = 87A, 60HP, 45KW	125 = 125A, 125HP, 90KW
170 = 170A, 60HP, 45KW	105 = 105A, 75HP, 55KW	144 = 144A, 150HP, 110KW
211 = 211A, 75HP, 55KW	140 = 140A, 100HP, 75KW	208 = 208A, 200HP, 132KW
261 = 261A, 100HP, 75KW	170 = 170A, 125HP, 90KW	250 = 250A, 250HP, 160KW
312 = 312A, 125HP, 90KW	205 = 205A, 150HP, 110KW	
	261 = 261A, 200HP, 132KW	
	310 = 310A, 250HP, 160KW	

① IP00 FR7 and FR8 is not avaliable for 230V input product or with the PowerXL DH1 Product

② IP20 FR0 will be avalible in June 2018

Power ratings and product selection

DH1 series drives—FR0, 230 Volt

Table 2. Open Type /IP20

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)			
Frame size	**230 V, 50 Hz kW rating**	**230 V, 60 Hz hp**	**Current A**	**230 V, 50 Hz kW rating**	**230 V, 60 Hz hp**	**Current A**	**DH1 Catalog number**
FR0	0.55	0.75	3.7	0.75	1	4.8	**DH1-324D8EB-C20C** ①
	0.75	1	4.8	1.1	1.5	6.6	**DH1-326D6EB-C20C** ①
	1.1	1.5	6.6	1.5	2	7.8	**DH1-327D8EB-C20C** ①

Note: ① IP20 FR0 will be available in June 2018.

DH1 series drives—FR1 - FR6, 230 Volt

Table 3. Type 1/IP21

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)			
Frame size	**230 V, 50 Hz kW rating**	**230 V, 60 Hz hp**	**Current A**	**230 V, 50 Hz kW rating**	**230 V, 60 Hz hp**	**Current A**	**DH1 Catalog number**
FR1	0.55	0.75	3.7	0.75	1	4.8	**DH1-324D8DN-C21C**
	0.75	1	4.8	1.1	1.5	6.6	**DH1-326D6DN-C21C**
	1.1	1.5	6.6	1.5	2	7.8	**DH1-327D8DN-C21C**
	1.5	2	7.8	2.2	3	11	**DH1-32011DN-C21C**
	2.2	3	11	3	–	12.5	**DH1-32012DN-C21C**
FR2	3	–	12.5	3.7	5	17.5	**DH1-32017DN-C21C**
	3.7	5	17.5	5.5	7.5	25	**DH1-32025DN-C21C**
	5.5	7.5	25	7.5	10	31	**DH1-32031DN-C21C**
FR3	7.5	10	31	11	15	48	**DH1-32048DN-C21C**
	11	15	48	15	20	61	**DH1-32061DN-C21C**
FR4	15	20	61	18.5	25	75	**DH1-32075DN-C21C**
	18.5	25	75	22	30	88	**DH1-32088DN-C21C**
	22	30	88	30	40	114	**DH1-32114DN-C21C**
FR5	30	40	114	37	50	143	**DH1-32143DN-C21C**
	37	50	143	45	60	170	**DH1-32170DN-C21C**
	45	60	170	55	75	211	**DH1-32211DN-C21C**
FR6	55	75	211	75	100	261	**DH1-32261DN-C21C**
	75	100	248	90	125	312	**DH1-32312DN-C21C**

Table 4. Type 12/IP54

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)			
Frame size	**230 V, 50 Hz kW rating**	**230 V, 60 Hz hp**	**Current A**	**230 V, 50 Hz kW rating**	**230 V, 60 Hz hp**	**Current A**	**DH1 Catalog number**
FR1	0.55	0.75	3.7	0.75	1	4.8	**DH1-324D8DN-C54C**
	0.75	1	4.8	1.1	1.5	6.6	**DH1-326D6DN-C54C**
	1.1	1.5	6.6	1.5	2	7.8	**DH1-327D8DN-C54C**
	1.5	2	7.8	2.2	3	11	**DH1-32011DN-C54C**
	2.2	3	11	3	–	12.5	**DH1-32012DN-C54C**
FR2	3	–	12.5	3.7	5	17.5	**DH1-32017DN-C54C**
	3.7	5	17.5	5.5	7.5	25	**DH1-32025DN-C54C**
	5.5	7.5	25	7.5	10	31	**DH1-32031DN-C54C**
FR3	7.5	10	31	11	15	48	**DH1-32048DN-C54C**
	11	15	48	15	20	61	**DH1-32061DN-C54C**
FR4	15	20	61	18.5	25	75	**DH1-32075DN-C54C**
	18.5	25	75	22	30	88	**DH1-32088DN-C54C**
	22	30	88	30	40	114	**DH1-32114DN-C54C**

Table 4. Type 12/IP54, continued

	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	DH1 Catalog number
FR5	30	40	114	37	50	143	**DH1-32143DN-C54C**
	37	50	143	45	60	170	**DH1-32170DN-C54C**
	45	60	170	55	75	211	**DH1-32211DN-C54C**
FR6	55	75	211	75	100	261	**DH1-32261DN-C54C**
	75	100	248	90	125	312	**DH1-32312DN-C54C**

DH1 series drives—FR0, 380–500 Volt

Table 5. Open Type IP20

	380–440 V, 50 Hz kW rating				440–500 V, 60 Hz hp rating				
Frame size	CT kW	VT kW	CT output current	VT output current	CT hp	VT hp	CT output current	VT output current	Catalog number
FR0	0.75	1.1	2.2	3.3	1	1.5	2.1	3	**DH1-343D3EB-C20C**
	1.1	1.5	3.3	4.3	1.5	2	3	3.4	**DH1-344D3EB-C20C**
	1.5	2.2	4.3	5.6	2	3	3.4	4.8	**DH1-345D6EB-C20C**
	2.2	3	5.6	7.6	3	5	4.8	7.6	**DH1-347D6EB-C20C**

DH1 series drives—380–500 volt

Table 6. Type 1/IP21

	380–440 V, 50 Hz kW rating				440–500 V, 60 Hz hp rating				
Frame size	CT kW	VT kW	CT output current	VT output current	CT hp	VT hp	CT output current	VT output current	Catalog number
FR1	0.75	1.1	2.2	3.3	1	1.5	2.1	3	**DH1-343D3DN-C21C**
	1.1	1.5	3.3	4.3	1.5	2	3	3.4	**DH1-344D3DN-C21C**
	1.5	2.2	4.3	5.6	2	3	3.4	4.8	**DH1-345D6DN-C21C**
	2.2	3	5.6	7.6	3	5	4.8	7.6	**DH1-347D6DN-C21C**
	3	4	7.6	9	5	—	7.6	—	**DH1-349D0DN-C21C**
	4	5.5	9	12	—	7.5	—	11	**DH1-34012DN-C21C**
FR2	5.5	7.5	12	16	7.5	10	11	14	**DH1-34016DN-C21C**
	7.5	11	16	23	10	15	14	21	**DH1-34023DN-C21C**
	11	15	23	31	15	20	21	27	**DH1-34031DN-C21C**
FR3	15	18.5	31	38	20	25	27	34	**DH1-34038DN-C21C**
	18.5	22	38	46	25	30	34	40	**DH1-34046DN-C21C**
	22	30	46	61	30	40	40	52	**DH1-34061DN-C21C**
FR4	30	37	61	72	40	50	52	65	**DH1-34072DN-C21C**
	37	45	72	87	50	60	65	77	**DH1-34087DN-C21C**
	45	55	87	105	60	75	77	96	**DH1-34105DN-C21C**
FR5	55	75	105	140	75	100	96	124	**DH1-34140DN-C21C**
	75	90	140	170	100	125	124	156	**DH1-34170DN-C21C**
	90	110	170	205	125	150	156	180	**DH1-34205DN-C21C**
FR6	110	132	205	261	150	200	180	240	**DH1-34261DN-C21C**
	132	160	245	310	200	250	240	302	**DH1-34310DN-C21C**

Table 7. Type 12/IP54

	380–440 V, 50 Hz kW rating				440–500 V, 60 Hz hp rating				
Frame size	**CT kW**	**VT kW**	**CT output current**	**VT output current**	**CT hp**	**VT hp**	**CT output current**	**VT output current**	**Catalog number**
FR1	0.75	1.1	2.2	3.3	1	1.5	2.1	3	**DH1-343D3DN-C54C**
	1.1	1.5	3.3	4.3	1.5	2	3	3.4	**DH1-344D3DN-C54C**
	1.5	2.2	4.3	5.6	2	3	3.4	4.8	**DH1-345D6DN-C54C**
	2.2	3	5.6	7.6	3	5	4.8	7.6	**DH1-347D6DN-C54C**
	3	4	7.6	9	5	—	7.6	—	**DH1-349D0DN-C54C**
	4	5.5	9	12	—	7.5	—	11	**DH1-34012DN-C54C**
FR2	5.5	7.5	12	16	7.5	10	11	14	**DH1-34016DN-C54C**
	7.5	11	16	23	10	15	14	21	**DH1-34023DN-C54C**
	11	15	23	31	15	20	21	27	**DH1-34031DN-C54C**
FR3	15	18.5	31	38	20	25	27	34	**DH1-34038DN-C54C**
	18.5	22	38	46	25	30	34	40	**DH1-34046DN-C54C**
	22	30	46	61	30	40	40	52	**DH1-34061DN-C54C**
FR4	30	37	61	72	40	50	52	65	**DH1-34072DN-C54C**
	37	45	72	87	50	60	65	77	**DH1-34087DN-C54C**
	45	55	87	105	60	75	77	96	**DH1-34105DN-C54C**
FR5	55	75	105	140	75	100	96	124	**DH1-34140DN-C54C**
	75	90	140	170	100	125	124	156	**DH1-34170DN-C54C**
	90	110	170	205	125	150	156	180	**DH1-34205DN-C54C**
FR6	110	132	205	261	150	200	180	240	**DH1-34261DN-C54C**
	132	160	245	310	200	250	240	302	**DH1-34310DN-C54C**

DH1 series drives—600 volt

Table 8. 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	**DH1-354D5DN-C21C**
	2.2	3	4.5	3.7	5	7.5	**DH1-357D5DN-C21C**
	3.7	5	7.5	5.5	7.5	10	**DH1-35010DN-C21C**
FR2	5.5	7.5	10	7.5	10	13.5	**DH1-35013DN-C21C**
	7.5	10	13.5	11	15	18	**DH1-35018DN-C21C**
	11	15	18	15	20	22	**DH1-35022DN-C21C**
FR3	15	20	22	18.5	25	27	**DH1-35027DN-C21C**
	18.5	25	27	22	30	34	**DH1-35034DN-C21C**
	22	30	34	30	40	41	**DH1-35041DN-C21C**
FR4	30	40	41	37	50	52	**DH1-35052DN-C21C**
	37	50	52	45	60	62	**DH1-35062DN-C21C**
	45	60	62	55	75	80	**DH1-35080DN-C21C**
FR5	55	75	80	75	100	100	**DH1-35100DN-C21C**
	75	100	100	90	125	125	**DH1-35125DN-C21C**
	90	125	125	110	150	144	**DH1-35144DN-C21C**
FR6	110	150	144	150	200	208	**DH1-35208DN-C21C**
	150	200	208	187	250	250	**DH1-35250DN-C21C**

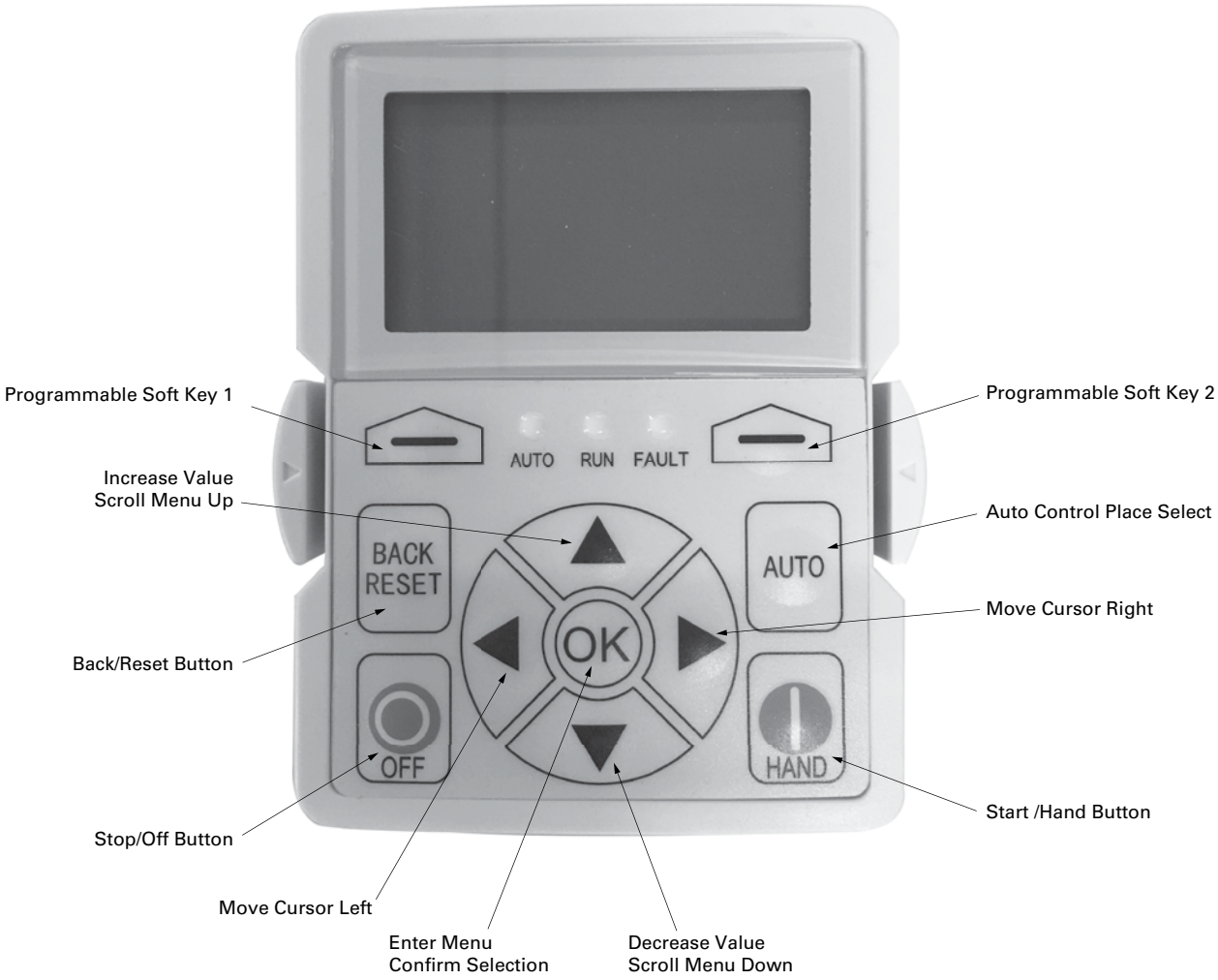
Table 9. Type 12/IP54

	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	**DH1-354D5DN-C54C**
	2.2	3	4.5	3.7	5	7.5	**DH1-357D5DN-C54C**
	3.7	5	7.5	5.5	7.5	10	**DH1-35010DN-C54C**
FR2	5.5	7.5	10	7.5	10	13.5	**DH1-35013DN-C54C**
	7.5	10	13.5	11	15	18	**DH1-35018DN-C54C**
	11	15	18	15	20	22	**DH1-35022DN-C54C**
FR3	15	20	22	18.5	25	27	**DH1-35027DN-C54C**
	18.5	25	27	22	30	34	**DH1-35034DN-C54C**
	22	30	34	30	40	41	**DH1-35041DN-C54C**
FR4	30	40	41	37	50	52	**DH1-35052DN-C54C**
	37	50	52	45	60	62	**DH1-35062DN-C54C**
	45	60	62	55	75	80	**DH1-35080DN-C54C**
FR5	55	75	80	75	100	100	**DH1-35100DN-C54C**
	75	100	100	90	125	125	**DH1-35125DN-C54C**
	90	125	125	110	150	144	**DH1-35144DN-C54C**
FR6	110	150	144	150	200	208	**DH1-35208DN-C54C**
	150	200	208	187	250	250	**DH1-35250DN-C54C**

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



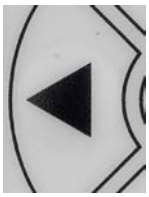
Keypad buttons

Buttons description

Table 10. 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.
	Auto	**Auto:** This button switches the drive into the auto control place.
 	Up Down	**Up and down arrows:** • Move either up or down a menu list to select the desired menu item. • Editing a parameter bit by bit, while the active digit is scrolled. • Increase/decrease the reference value of the selected parameter. • In parameter comparison mode, scroll through the parameters of which current value is different from comparison parameter value. • In parameter page when in read mode, move to the previous or next brother parameter of this parameter.

Table 10. Keypad buttons, continued

Icon	Button	Description
	Left	**Left arrow:** • Navigation button, movement to left when editing a parameter digit by digit. • Backs up one step. • 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/Off:** This button operates as the motor stop button for normal operation and places the drive in the off control location. The default is for this button to always be active. It can be changed in parameter P4.1.3 to only when "Keypad" is selected as the control source. • Motor stop from the keypad. • Transitions drive into an Off control location preventing start from any control source.
	Start	**Start/Hand:** This button operates as motor start button for normal operation when the "Keypad" is selected as the active control source, as well as selects the Hand control place location. When Keypad is the reference place after hitting the start button, it will jump directly to the Keypad Ref Screen. Places drive into Hand Control place. Hitting start again if keypad is the control location will start the Drive.

LED lights

Table 11. 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).
Auto	**Auto:** Hand/Off: If the Hand or Off control place is selected, the light will be off. Auto: If the Auto 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 will 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 go 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." When indicates "OFF" it indicates the drive will not accept a command from the Hand or Auto Control place.
- **PAR/MON/FLT/OPE/QSW/FAV/TPM/BUx.**—If the current page is parameter menu, display is "PAR". If monitor menu, then display is "MON". If fault menu, then display is "FLT". If operation menu, then display is "OPE". If quick start wizard, then display is "QSW". If optional card menu, then display is "BOA". If favorite menu, then display is "FAV". If main menu, then display is "TPM". "BUx" indicates the drive being a backup drive when in the redundant drive system.

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

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

The fourth line is Value line, which 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

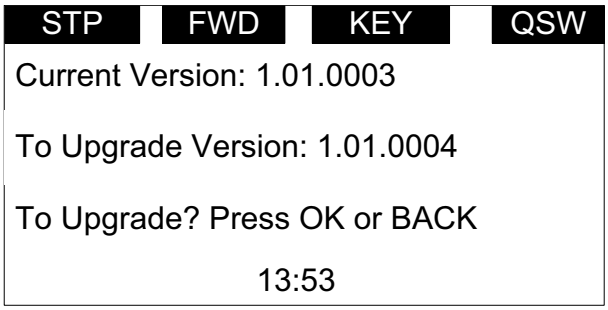
LCD shall show the welcome page when power on. See **Figure 6**.

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.

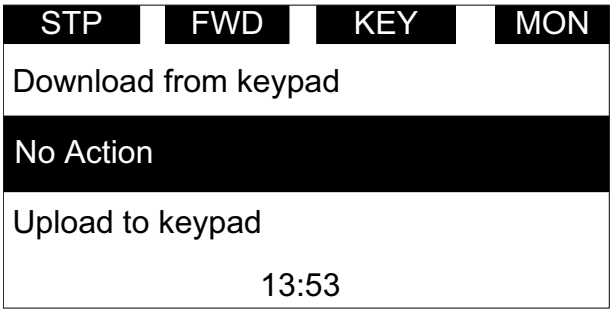
Figure 7. Upgrade page



Auto backup page

If keypad is plugged into a new drive, then auto backup page will be shown to instruct 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 12. Soft keys

Bypass Enabled

Keypad Display	Soft Key 1	Soft Key 2
Main menu page	Bypass	Jog
Group node page	Bypass	REVERSE/FORWARD
Parameter node page	Bypass	Null/Favorite
favorite page	Bypass	Delete
fault page	Bypass	REVERSE/FORWARD
Monitor Page	Bypass	REVERSE/FORWARD

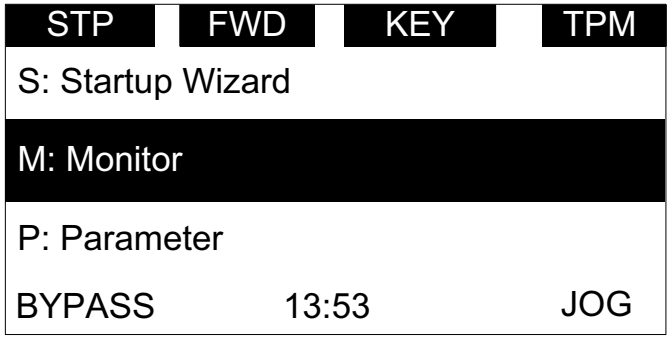
Bypass Disabled

Keypad Display	Soft Key 1	Soft Key 2
Main menu page	Null	Jog
Group node page	REVERSE/FORWARD	Menu
Parameter node page	Null/Favorite	Menu
favorite page	Delete	Menu
fault page	REVERSE/FORWARD	Menu
Monitor Page	REVERSE/FORWARD	Menu

***Note:** If Para ID2412 or Para ID2413 is set to hidden, it will hide this value.

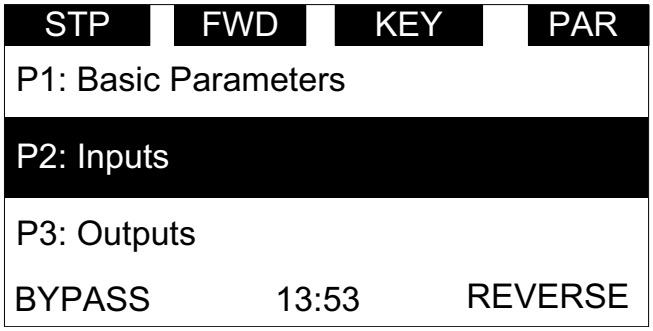
1. In the main menu (root node), "JOG" shall be shown on the right. If bypass is enabled, then "BYPASS" shall be shown on the left. Otherwise, it will not be shown. See **Figure 9**.

Figure 9. Main menu



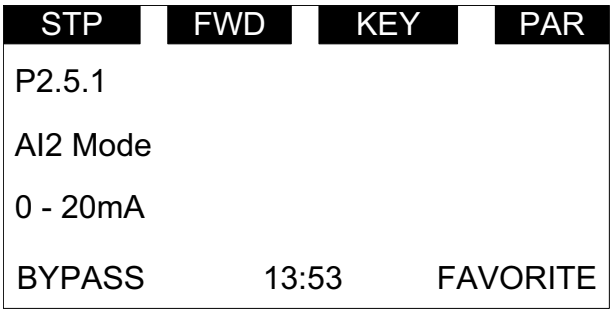
2. For the parameter group, the two soft keys "REVERSE/FORWARD" and "BYPASS" shall be shown. See **Figure 10.**

Figure 10. Parent node page



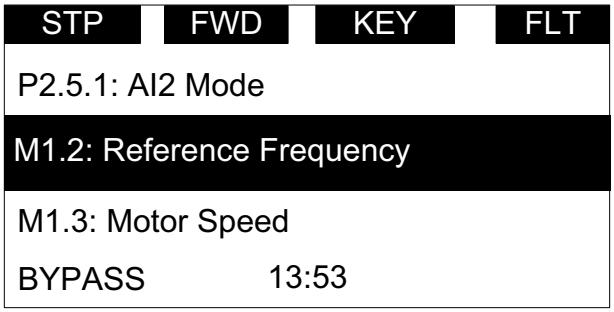
3. For the parameter menu, if this parameter hasn't been added into the favorite list, two soft keys "FAVORITE" and "BYPASS" shall be shown. If it has been added into the favorite list, only one soft key "BYPASS" is shown in the right.

Figure 11. Parameter page



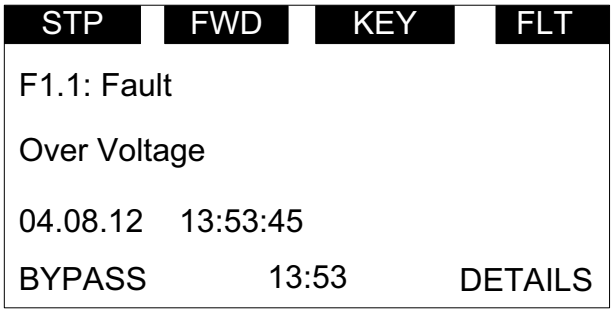
4. If one parameter has been added to the favorite list, it shall appear in the favorite menu. Then when you enter into the favorite menu, two soft keys "DELETE" and "BYPASS" shall be shown, and "DELETE" means you can delete the selected parameter from favorite list. See **Figure 12.**

Figure 12. Parameter page from favorite menu



5. For the fault group, two soft keys "DETAILS" and "BYPASS" shall be shown. See **Figure 14.** For more information, see **Page 16.**

Figure 13. Fault page

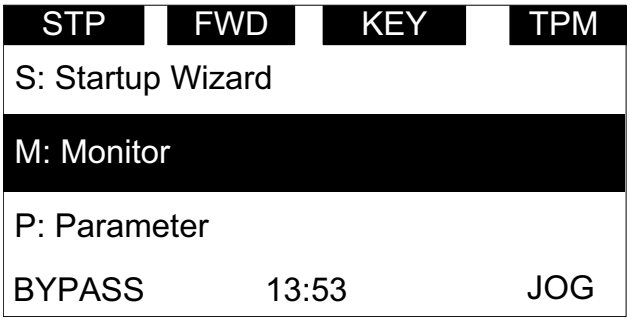


Chapter 3—Menu overview

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.

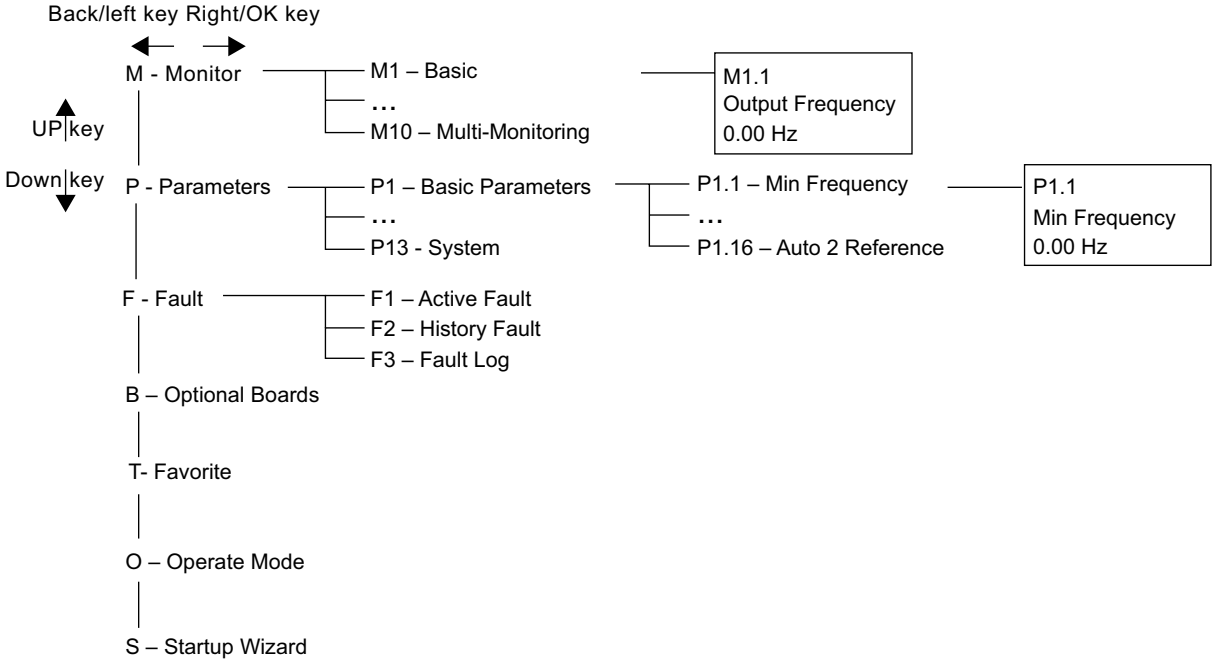
Figure 14. Main menu page



Menu navigation

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

Figure 15. Main menu navigation



Menu structure

Table 13. Keypad menus

Item	Description
Monitor	M1 - Basic
	M2 - IO Status
	M3 - Optional Boards
	M4 - Energy savings
	M5 - FB Monitor Menu
	M6 - PID Monitor
	M7 - Timer/Interval Control
	M8- User Defined Output
	M9 - MWH Monitor
	M10 - Multi-Monitoring
Parameter	P1 - Basic Parameter
	P2 - Inputs
	P3 - Outputs
	P4 - Drive Control
	P5 - Motor Control
	P6 - Protections
	P7 - PID Controller 1
	P8 - PID Controller 2
	P9 - Fire Mode
	P10 - Bypass
	P11 - Real Time Clock
	P12 - Communictions
	P13 - System
Fault	F1 - Active Fault
	F2 - History fault
	F3 - Fault Log
Option Boards	B1 - Slot A
	B2 - Slot B
Favorite	
Operate Menu	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 Reference
	R12 - PID1 Keypad Set Point 1
	R13 - PID1 Keypad Set Point 2
Startup Wizard	S - Startup Wizard

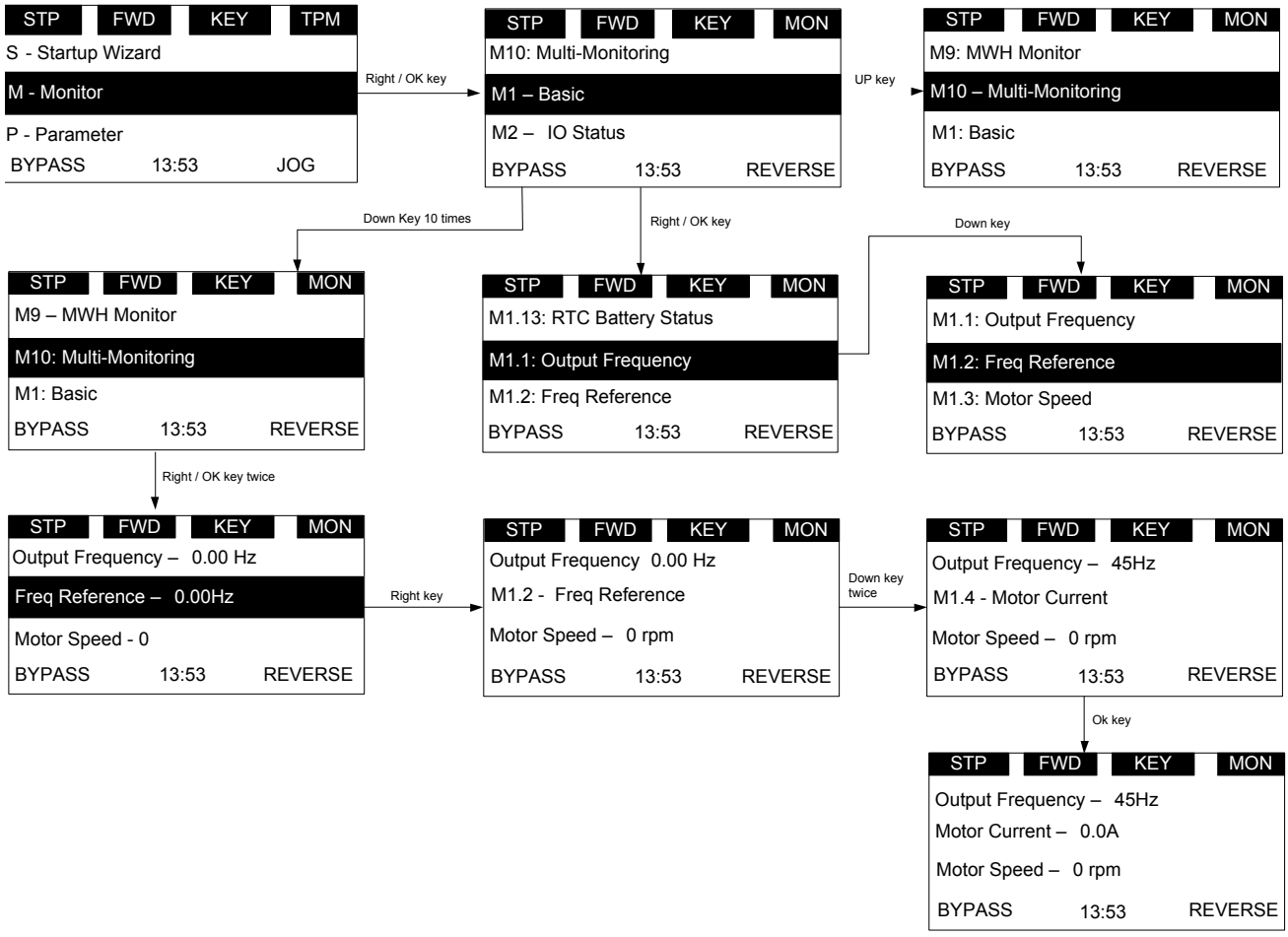
Note: Will vary depending on application selected

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.

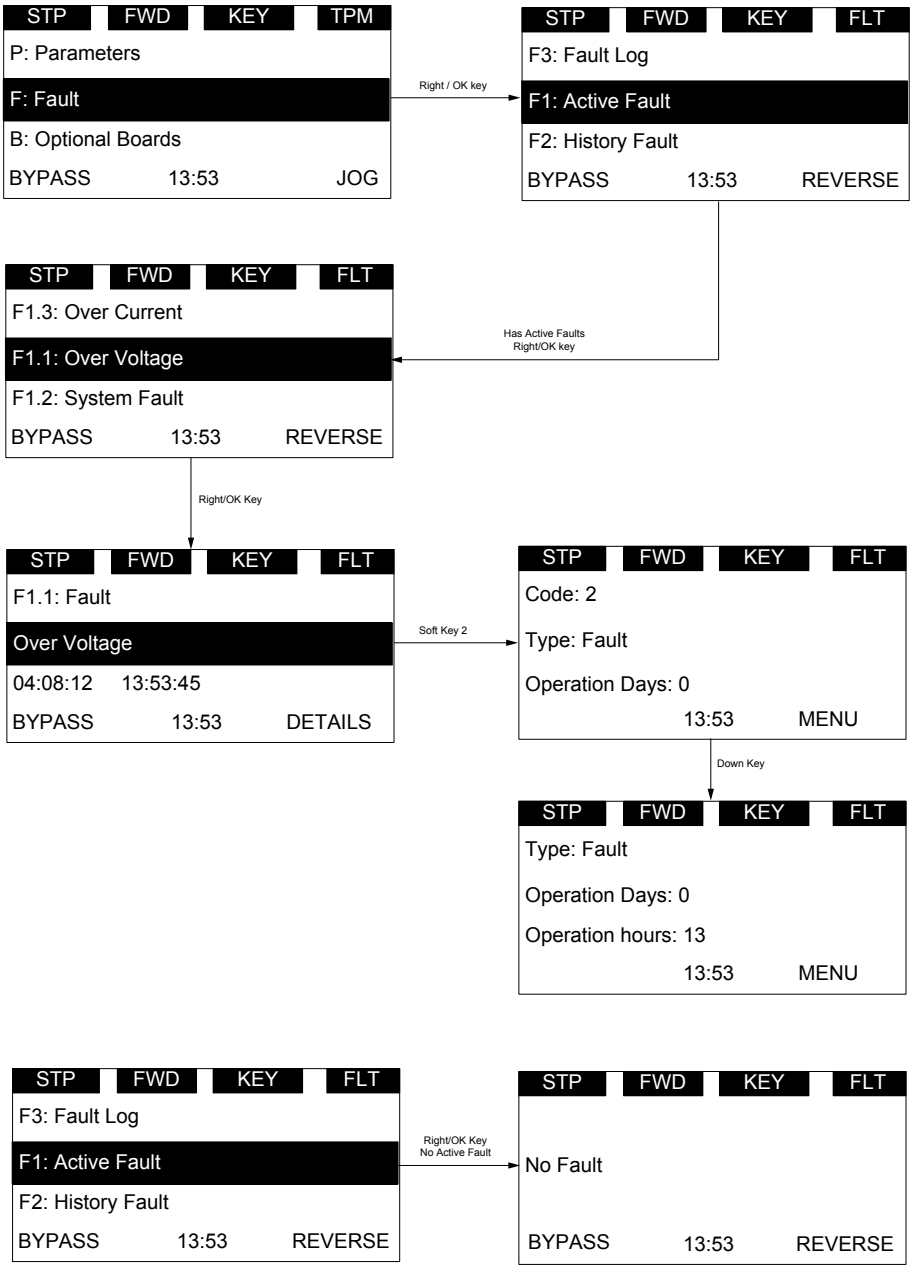
If there is no active fault/history fault, then "No fault" shall be shown.

Active fault

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

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

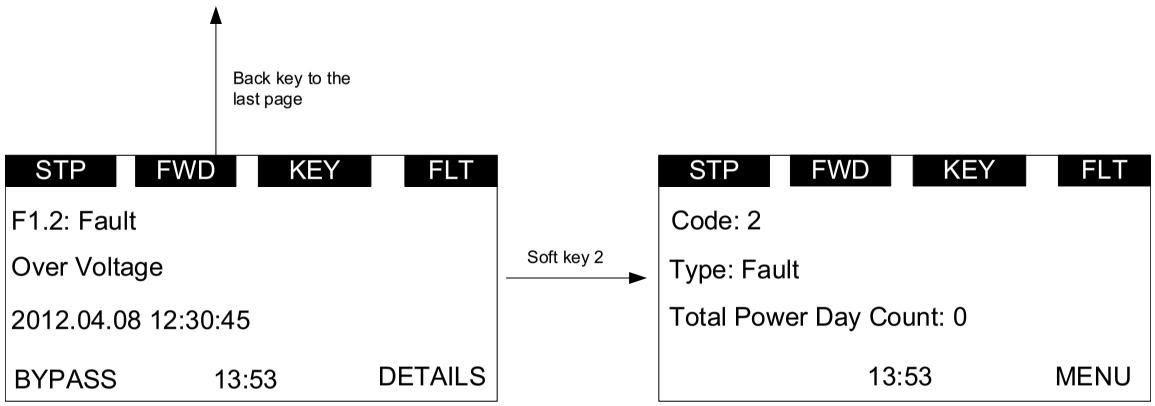
Figure 17. Active faults



Pop-up fault

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

Figure 18. Pop-up active faults



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

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

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

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

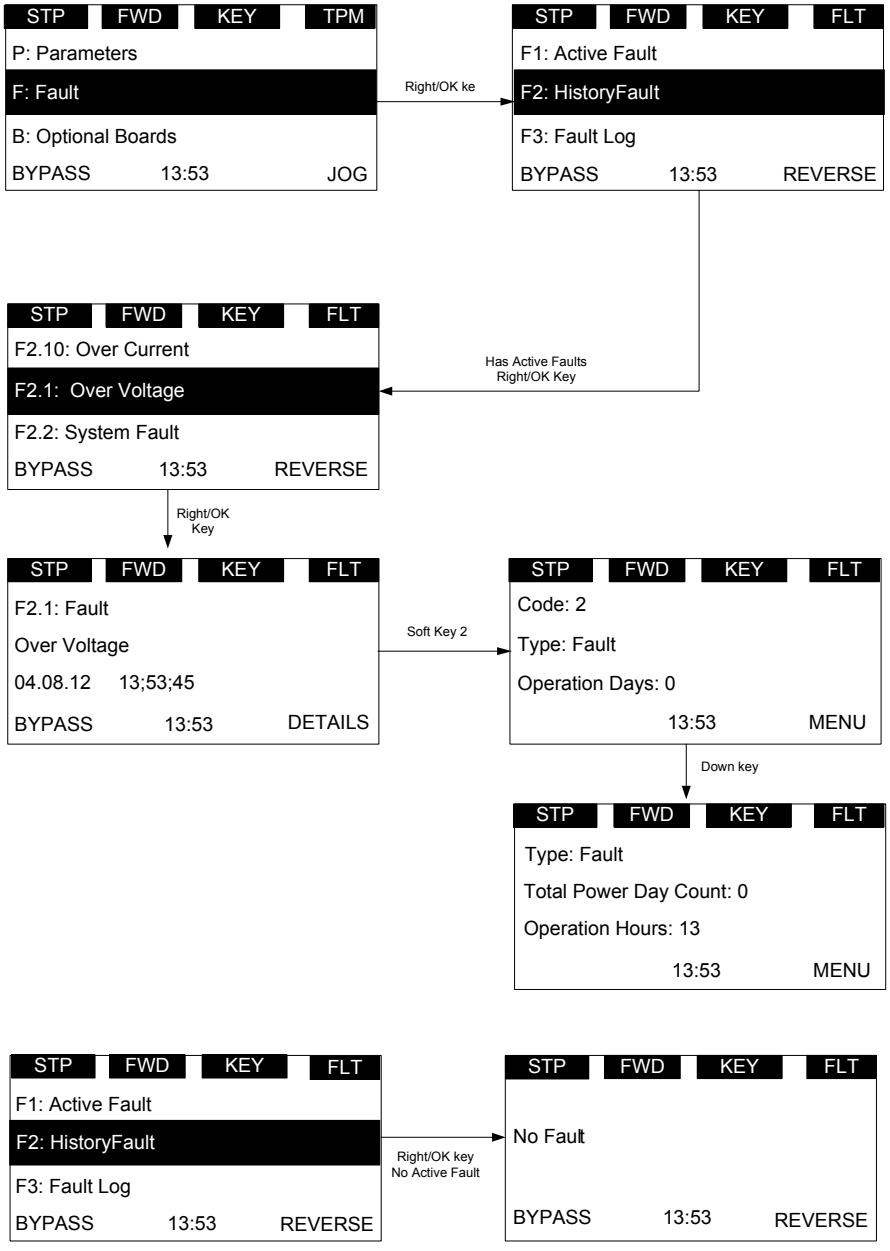
The page for active faults and pop-up faults are the same, except one: the response to the "Back" key. In active faults page, if the Back key is pressed, it returns to the last level menu. In pop-up faults page, it returns to the last page.

Fault history

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

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

Figure 19. Fault history



Fault Log

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

P — Parameter

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

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

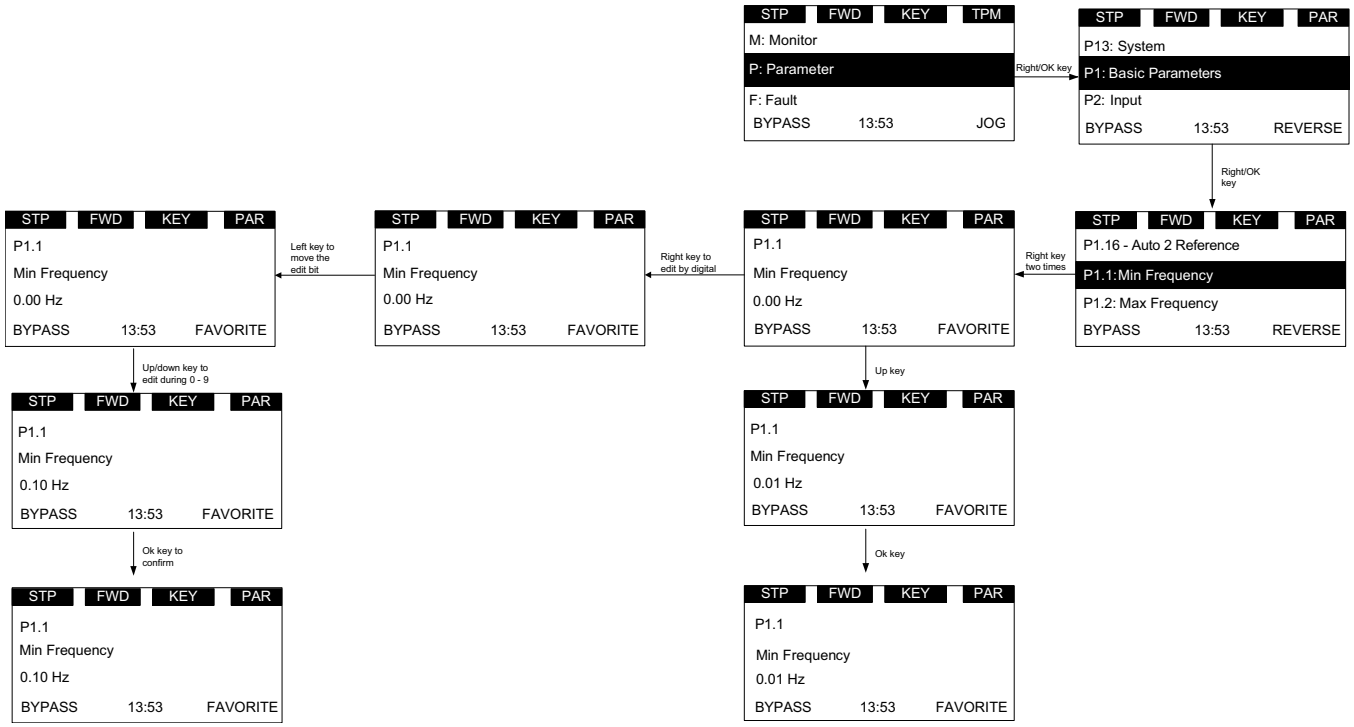
In parameter page, the parameter name shall be shown in the third line (such as Min Frequency).

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

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

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

Figure 20. Parameter setting



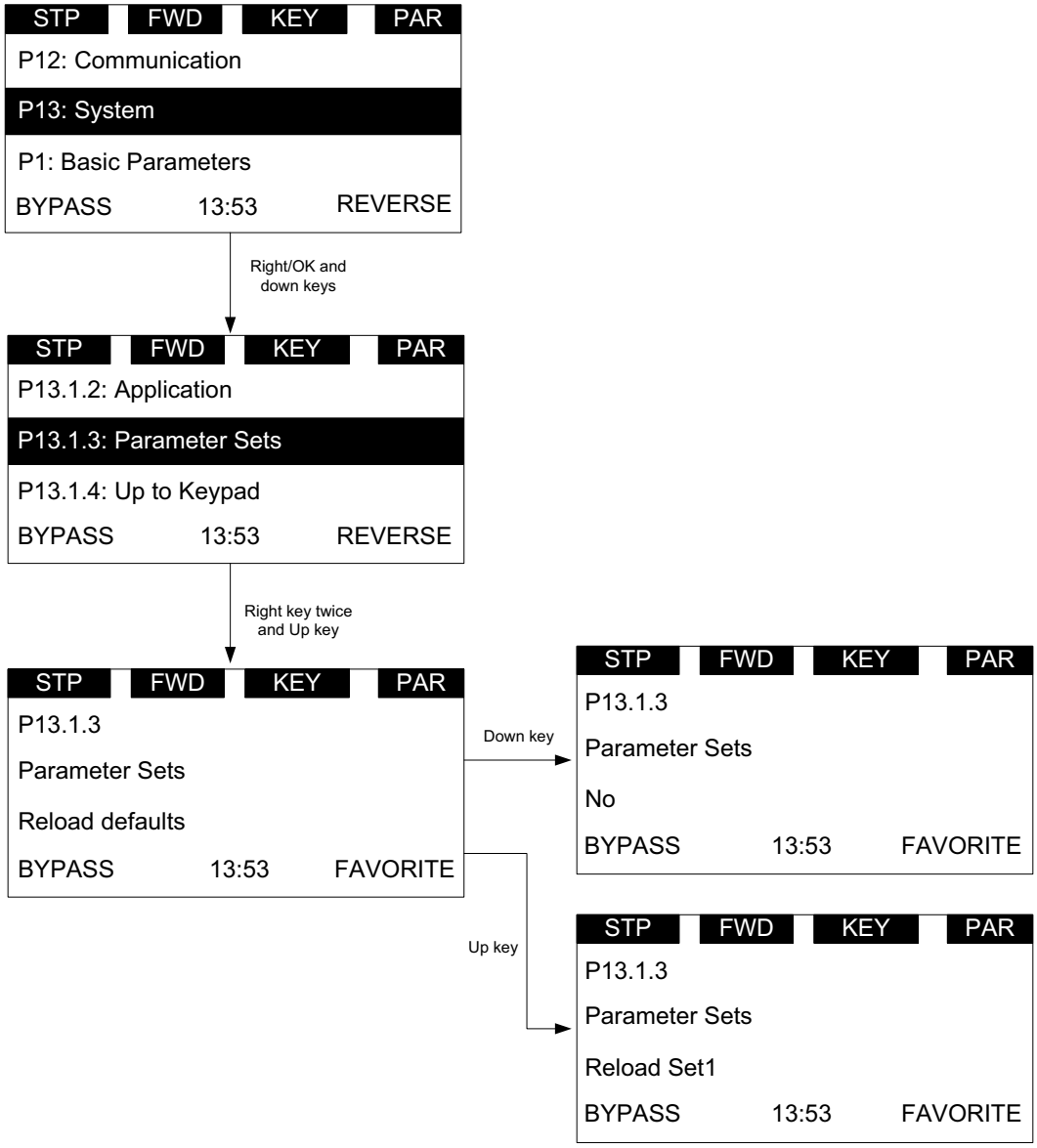
There are several special pages:

1. P13.1.3 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

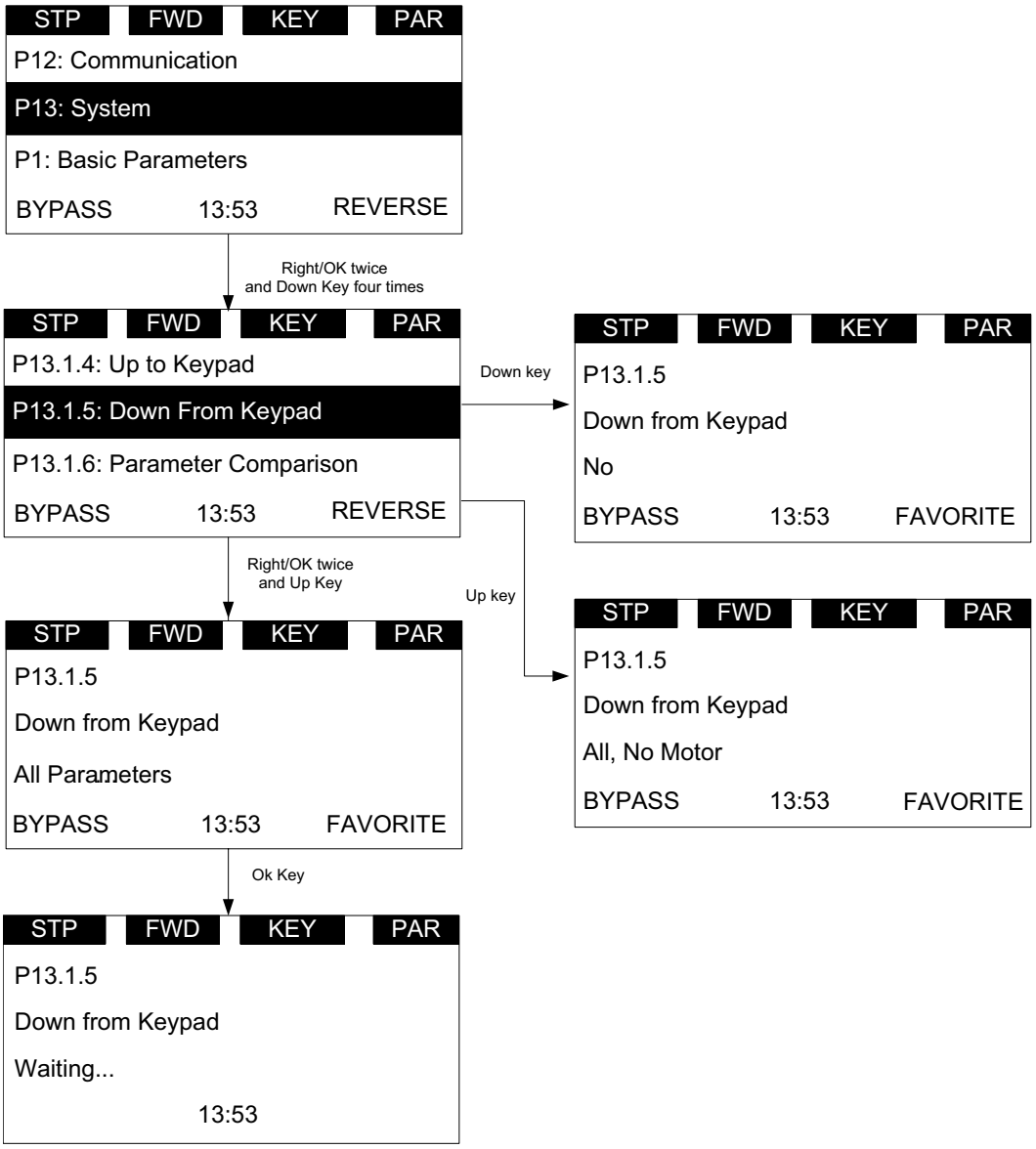


2. Up to keypad and P13.1.5 Down from keypad

   During this operation, "waiting…" shall flash, which means it is in process. When it is finished, "OK" shall be shown. This stores the parameters to keypad for transferring.

Down from keypad is to download parameters from keypad to drive. Up to keypad takes the parameters from the drive and loads them to the keypad.

Figure 22. Down from keypad



3. P13.1.6 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.

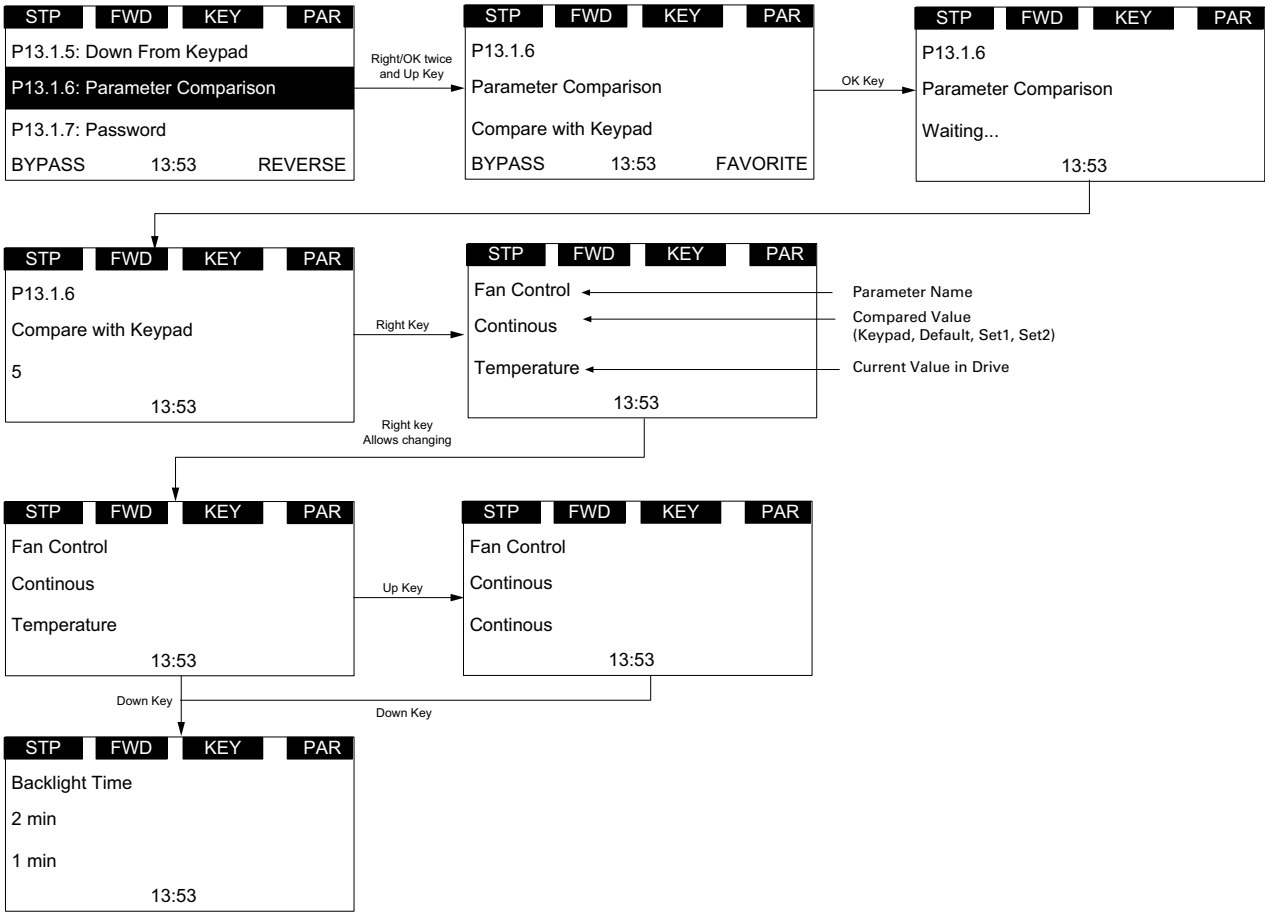
   If the user wants to modify the current value, user shall be able to enter the edit mode by right key.

   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. P13.1.7 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 24**.

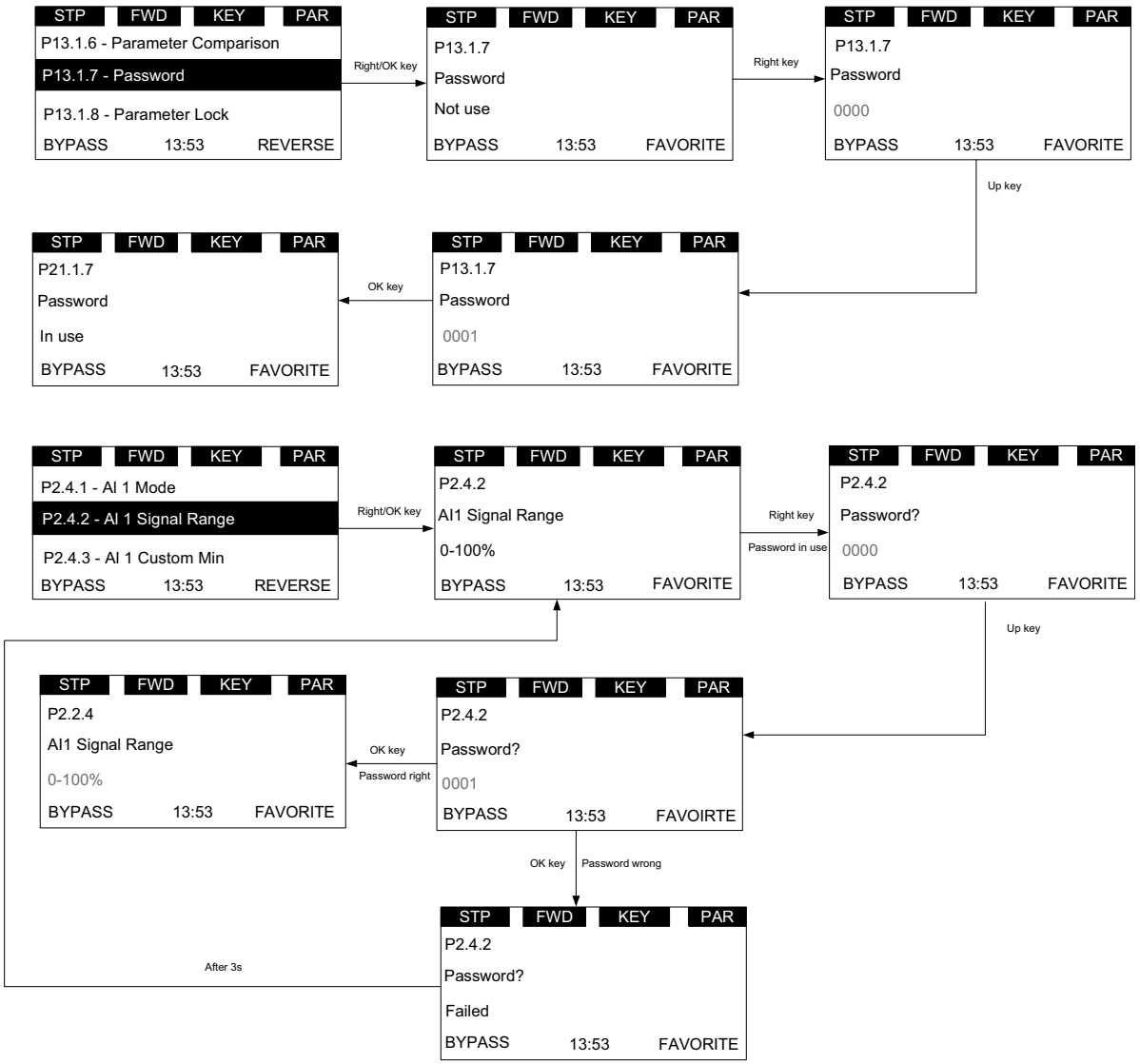
   Enter the password setting page. If the password is 0000, then the "Not use" shall be shown. If the password is not 0000, then the "in use" shall be shown.

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

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

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

Figure 24. Password



Value edit

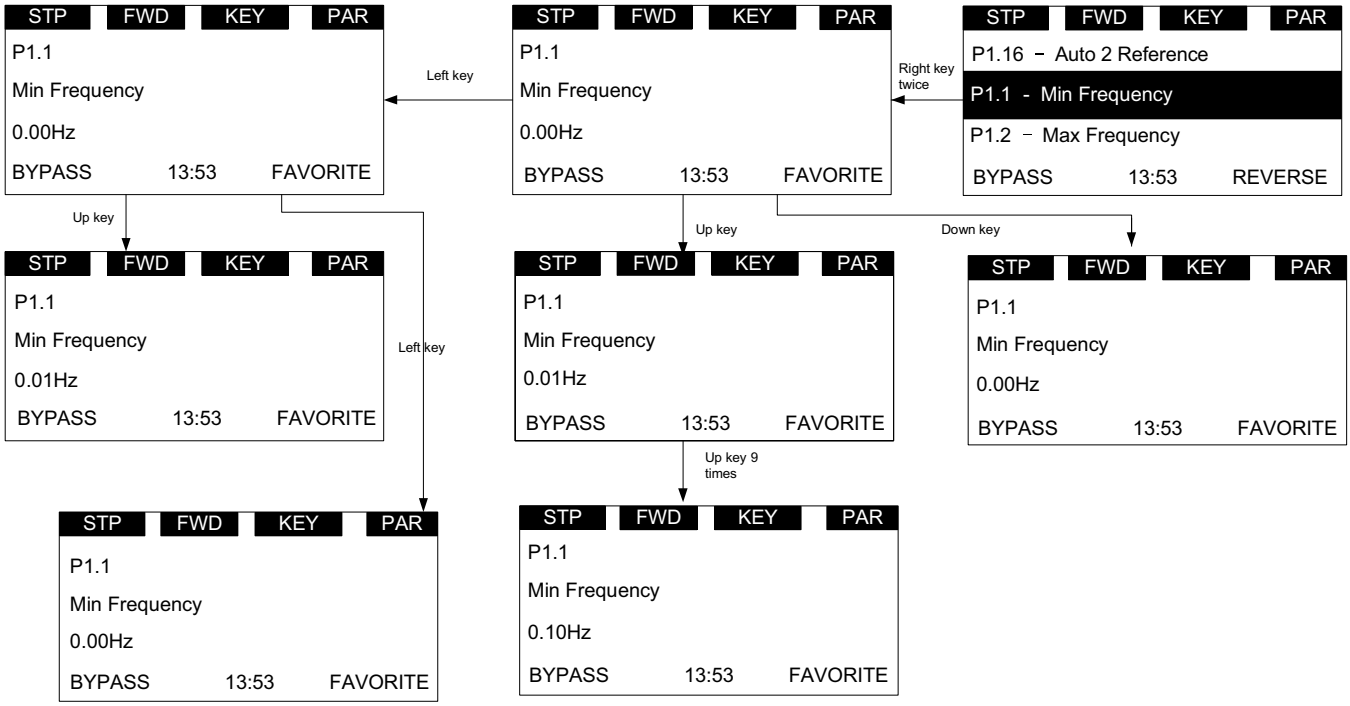
This topic shows the methods to edit value, and what will happen to edit value when password is in use and parameter lock is enabled.

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

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

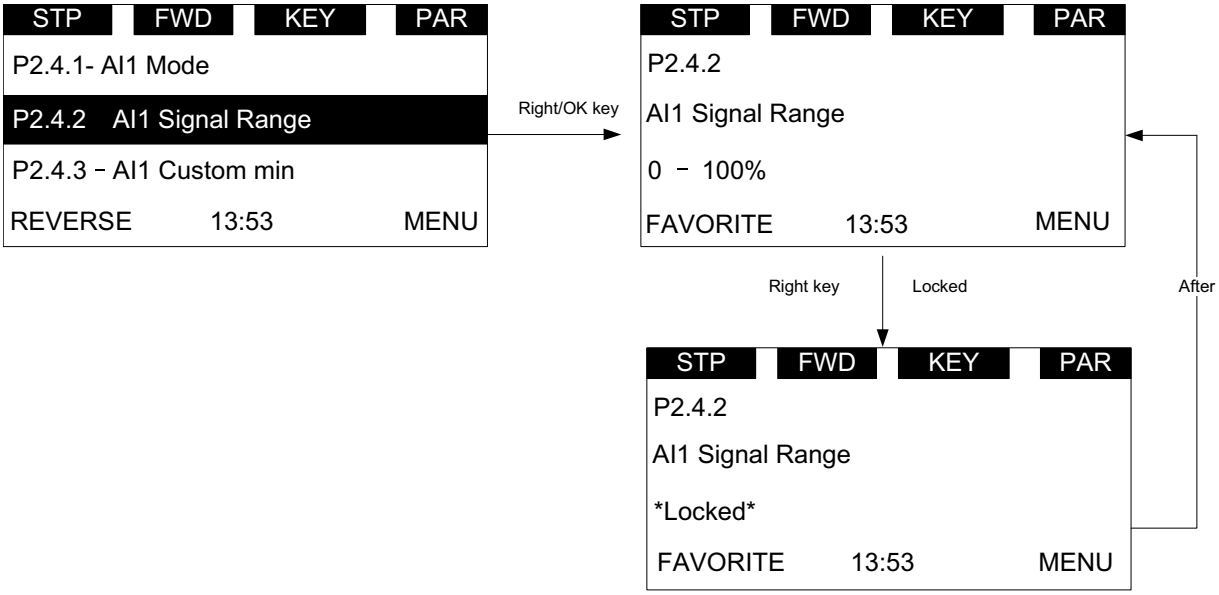
User shall use Left/Right key to change the current editable bit. When editing one number, it increases/decreases circularly, for example, pressing Up key can change to 9 from 0.

Figure 25. Edit parameter value



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

Figure 26. Parameter locked



T—Favorite

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

If a parameter has not been added into the favorite list, the soft keys "FAVORITE" will be shown in parameter page (see **Figure 11** on **Page 13**). 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 11** on **Page 13**).

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 this menu, the Startup Wizard will begin.

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

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

Startup wizard

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

Up/Down buttons.

Use these to change value.

OK button.

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

Back/Reset button.

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

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

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

Table 14. Startup Wizard instructions

Item	Description	
1	Startup Wizard	Press OK?
2	Application	0 = Basic
		1 = PID
		2 = Advanced
3	Language	0 = English
		1 = Chinese
		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: 0.1A
		Max: 500.0A
9	Current Limit	Min: Ih*1/10
		Max: Ih*2
10	Motor Nom Speed	Min: Ih*1/10
		Max: Ih*2
11	Motor PF	Min: 0.30
		Max: 1.0
12	Motor Nom Voltage	Min: 180V
		Max: 690V
13	Motor Nom Frequency	Min: 30.00 Hz
		Max: 400.00 Hz
14	Accel Time 1	Min: 0.1 sec
		Max:3000.0 sec
15	Decel Time 1	Min: 0.1 sec
		Max:3000.0 sec
16	Hand Control Place	0 = Keypad
		1 = I/O Terminal Start 1
		2 = I/O Terminal Start 2
		3 = Fieldbus
17	Hand Reference	0 = AI1
		1 = AI2
		2 = Slot A: AI1
		3 = Slot B: AI1
		4 = AI1 Joystick
		5 = AI2 Joystick
		6 = Keypad
		7 = Fieldbus
		9 = Max Frequency
		10 = AI1 + AI2
		11 = AI1 - AI2
		12 = AI2 - AI1

Table 14. Startup Wizard instructions, continued

Item	Description	
		13 = AI1 * AI2
		14 = AI1 or AI2
		15 = Min (AI1,AI2)
		16 = Max (AI1,AI2)
		17 = PID1 Control Output
		18 = PID2 Control Output
18	Auto 1 Control Place	0 = I/O terminal Start 1
		1 = Fieldbus
		2 = I/O terminal start 2
		3 = Keypad
19	Auto 1 Reference	0 = AI1
		1 = AI2
		2 = Slot A: AI1
		3 = Slot B: AI1
		4 = AI1 Joystick
		5 = AI2 Joystick
		6 = Keypad
		7 = Fieldbus
		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
20	Bypass Enabled	0 = Disabled
		1 = Enabled
21	Application Mini-Wizard	Press OK?

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").

PID and Advanced Application 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 15. 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—Basic application

The Basic Application is designed for preloaded application sets for use with HVAC specific terminology and functions. It has the patent Active Energy Control algorithm that will improve your efficiency as well as minimize losses in your motor throughout the defined speed range. It provides the ability for the user to define its Hand and Auto control and reference signals with the standard Off condition as well. 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 Basic Application.

Basic Application includes functions:

- Bypass Control
- Fire Mode
- Pre heat/cold weather mode
- Hand/Off/Auto in individual button for easy change of control mode.
- Programmable Protections
- Programmable digital/analog input/output function
- Programmable start/stop signal logic
- Voltage and Current limiters
- Energy Savings Calculator
- Two independent set of Acceleration/Deceleration ramps
- Skip frequency
- Start source (Local/Remote control function)
- Reference source
- Flying start
- Volts per Hertz control programmable
- Real time clock—RTC time display
- Auto restart on fault to drive or bypass
- Programmable switching frequency
- Multi-Preset speeds
- Fan control
- DC brake

I/O controls

- **Terminal To Function (TTF) Programming**

  The design behind the programming of the digital inputs in the DH1 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 DH1 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 in Appendix A 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.

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 ID190 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 "Force closed" the drive would always be in a start mode when in that control location.

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.

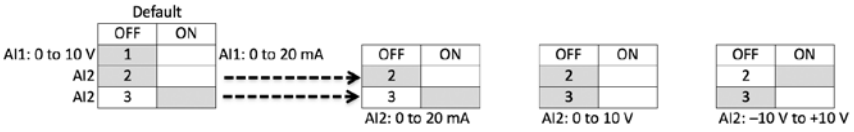
Example:

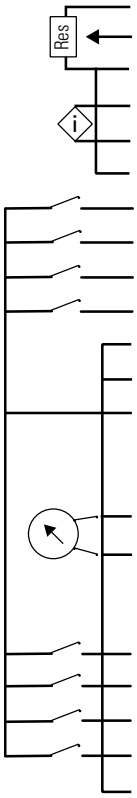
If we set Run Enable to DigIN:TimeChannel1 the drive will be enabled when the timer assigned to Time Channel 1 is active or High, and would not be enabled when the Time Channel is inactive or Low.

Basic application control I/O configuration

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

Table 16. I/O connection



External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10V	Ref. Output Voltage	-	10VDC Supply Source
	2	AI1+ ①	Analog Input 1	0-10V	Voltage Speed Reference (Programmable to 4-20mA)
	3	AI1-	Analog Input 1 Ground	-	Analog Input 1 Common (Ground)
	4	AI2+ ①	Analog Input 2	4-20mA	Current Speed Reference (Programmable to 0-10V)
	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	Fire Mode	Enables drive into Fire Mode
	9	DIN7	Digital Input 7\TI+	Bypass Start	Enables drive into Bypass mode waiting for drive start
	10	DIN8	Digital Input 8\TI-	Force Auto	Input forces drive into Auto Control place
	11	CMB	DI5 to DI8 Common	Grounded	Allows source input
	12	GND	I/O Signal Ground	-	I/O Ground for Reference and Control
	13	24Vo	+24VDC Output	-	Control voltage output (100mA Max)
	14	DO1	Digital Output 1	Ready	Shows the drive is ready to run
	15	24Vo	+24VDC Output	-	Control voltage output (100mA 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 - 60Hz (4-20mA)
	18	AO2+	Analog Output 2	Motor Current	Shows Motor current of motor 0-FLA (4-20mA)
	19	24Vi	+24VDC 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	Fault	Relay output 3 shows VFD is Faulted
	28	R1NC	Relay 1 Normally Closed	Bypass Run	Relay output 1 shows VFD is in a bypass run state
	29	R1CM	Relay 1 Common		
	30	R1NO	Relay 1 Normally Open		
	31	R3CM	Relay 3 Common	Fault	Relay output 3 shows VFD is Faulted
	32	R2NC	Relay 2 Normally Closed	Run	Relay output 2 shows VFD is in a drive run 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—ground (as shown by dashed line). If using +10 V for AI1 or AI2, terminals 3, 5, and 6 need to be jumpered together.
① AI1+ and AI2+ Support 10K potentiometer.

Table 17. 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
BACnet IP Communications	Ethernet
Modbus TCP Communications	Ethernet
RS-485 Serial Port ①	
Upload/Download Parameters	
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.

Control I/O configuration

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

Basic application—parameters list

On the next pages you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given in Appendix A, "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

Monitor

Table 18. Basic—M1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1.1	Output Frequency			Hz		1	
M1.2	Freq Reference			Hz		24	
M1.3	Motor Speed			rpm		2	
M1.4	Motor Current			A		3	
M1.5	Motor Torque			%		4	
M1.6	Motor Power			%		5	
M1.7	Motor Voltage			V		6	
M1.8	DC-link Voltage			V		7	
M1.9	Unit Temperature			Deg. C		8	
M1.10	Motor Temperature			%		9	
M1.11	Latest Fault Code					28	
M1.12	Instant Motor Power			kW		1686	
M1.13	RTC Battery Status					583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = OverVoltage

Table 19. IO Status—M2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M2.1	Analog Input 1			Varies		10	
M2.2	Analog Input 2			Varies		11	
M2.3	Analog Output 1			Varies		25	
M2.4	Analog Output 2			Varies		575	
M2.5	DI1, DI2, DI3					12	
M2.6	DI4, DI5, DI6					13	
M2.7	DI7, DI8					576	
M2.8	DO1, Virtual RO1, Virtual RO2					14	
M2.9	RO1, RO2, RO3					557	
M2.10	Control board DI status					3214	
M2.11	Control board DI status					3248	
M2.12	SlotA DI status					3249	

Table 20. Optional Boards — M3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M3.1	PT100 Temperature			Deg. C	1000.0	27	

Table 21. Energy Savings — M4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M4.1	Energy Savings			Varies	0.000	2120	

Table 22. FB Monitor Menu — M5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M5.1	Control Board DIDO Status					2209	Bit 0 = DI1_Status Bit 1 = DI2_Status Bit 2 = DI3_Status Bit 3 = DI4_Status Bit 4 = DI5_Status Bit 5 = DI6_Status Bit 6 = DI7_Status Bit 7 = DI8_Status Bit 8 = DO1_Status Bit 9 = RO1_Status Bit 10 = RO2_Status Bit 11 = RO3_Status Bit 12 = SlotA with board Bit 13 = SlotB with board Bit 14 = Virtual_RO1_Status Bit 15 = Virtual_RO2_Status
M5.2	SlotA DIDO Status					2210	Bit 0 = IO1_DI1 Bit 1 = IO1_DI2 Bit 2 = IO1_DI3 Bit 3 = IO1_DO1 Bit 4 = IO1_DO2 Bit 5 = IO1_DO3 Bit 6 = IO3_RO1 Bit 7 = IO3_RO2 Bit 8 = IO3_RO3 Bit 9 = IO5_AC1 Bit 10 = IO5_AC2 Bit 11 = IO5_AC3 Bit 12 = IO5_AC4 Bit 13 = IO5_AC5 Bit 14 = IO5_AC6
M5.3	SlotB DIDO Status					2211	Bit 0 = IO1_DI1 Bit 1 = IO1_DI2 Bit 2 = IO1_DI3 Bit 3 = IO1_DO1 Bit 4 = IO1_DO2 Bit 5 = IO1_DO3 Bit 6 = IO3_RO1 Bit 7 = IO3_RO2 Bit 8 = IO3_RO3 Bit 9 = IO5_AC1 Bit 10 = IO5_AC2 Bit 11 = IO5_AC3 Bit 12 = IO5_AC4 Bit 13 = IO5_AC5 Bit 14 = IO5_AC6 Bit 15 = Not Used
M5.4	Application Status Word					29	Bit 0 = MC_Ready Bit 1 = MC_Run Bit 2 = MC_Fault or Fault Trip Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning or AR Bit 7 = MC_ZeroSpeed Bit 8 = IO Control Indicator Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Control Indicator

Table 22. FB Monitor Menu — M5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M5.4	Application Status Word					29	Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 = Run Bypass Bit 14 = External Brake Control Bit 15 = In Bypass Mode Bit 0 = Status Word Bit0 Bit 1 = Status Word Bit1 Bit 2 = Status Word Bit2 Bit 3 = Status Word Bit3 Bit 4 = Status Word Bit4 Bit 5 = Status Word Bit5 Bit 6 = Status Word Bit6 Bit 8 - 15 = Not Used
M5.5	Standard Status Word					2414	Bit 0 = See PAR ID 2415 (default = Ready) Bit 1 = See PAR ID 2416 (default = Run) Bit 2 = See PAR ID 2417 (default = Fault) Bit 3 = See PAR ID 2418 (default = Fault Invert) Bit 4 = See PAR ID 2419 (default = Warning) Bit 5 = See PAR ID 2420 (default = Reversed) Bit 6 = See PAR ID 2421 (default = At Speed) Bit 7 = See PAR ID 2422 (default = Zero Frequency) Bit 8 - 15 = Not Used
M5.6	FB Status Word					2101	Bit 0 = Ready Bit 1 = Run Bit 2 = Direction Bit 3 = Fault Bit 4 = Warning Bit 5 = At reference Bit 6 = Bypass Bit 7 = run enable Bit 8 = HOA status Bit 9 = HOA status Bit 10 = Run Delay Time Bit 11 = Not Used Bit 12 = Not Used Bit 13 = Not Used Bit 14 = Not Used Bit 15 = Not Used
M5.7	FB Control Word					2001	Bit 0 = Run_Stop Bit 1 = Forward_Rev Bit 2 = FaultReset Bit 3 = FB input data 1 Bit 4 = FB input data 2 Bit 5 = FB input data 3 Bit 6 = FB input data 4 Bit 7 = Bypass Bit 8 = FB_Ctrl Bit 9 = FB_Ref Bit 10 = HOA control Bit 11 = HOA control Bit 12 = Not Used Bit 13 = Not Used Bit 14 = Not Used Bit 15 = Not Used
M5.8	FB Speed Reference	0.00	100.00	%		2003	

Table 23. User Defined Output — M8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M8.1	Output			Varies		2445	
M8.2	Reference			Varies		2447	

Table 24. MWH Monitor — M9

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M9.1	Total MWh Count			Mwh		601	
M9.2	Total Power Day Count					603	
M9.3	Total Power Hr Count					606	
M9.4	Trip MWh Count			Mwh		604	
M9.5	Trip Power Day Count					636	
M9.6	Trip Power Hr Count					637	
M9.7	Total Run Time Count					2827	
M9.8	Number of Starts					2830	
M9.9	Trip Run Time Count					2829	

Table 25. Multi-Monitoring — M11

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M11.1	Multi-Monitoring				2,1,3,2,1,3,2,1,3	1753	

Parameters

Table 26. Basic Parameters — P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1	Min Frequency	0.00	See Par ID 102	Hz	20.00	101	
P1.2 ①	Max Frequency	See Par ID 101	400.00	Hz	MaxFreqMFG	102	
P1.3	Accel Time 1	0.1	3000.0	s	20.00	103	
P1.4	Decel Time 1	0.1	3000.0	s	20.00	104	
P1.5 ①	Motor Nom Current	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrVT	486	
P1.6 ①	Motor Nom Speed	300	20000	rpm	MotorNomSpeedMFG	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	MotorNomVoltMFG	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	MotorNomFreqMFG	488	
P1.10 ①	HOA Source				0	2465	0 = I/O Terminal/Keypad/ Fieldbus 1 = Keypad 2 = IO Terminal 3 = Fieldbus
P1.11	Hand Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.12 ①②	Hand Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 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)

Note: ① Parameter value can only be changed after the drive has stopped.

Table 26. Basic Parameters — P1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.13	Auto 1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal Start 2 3 = Keypad
P1.14 ①②	Auto 1 Reference				1	137	See Par ID 136
P1.15	Auto 2 Control Place				1	138	See Par ID 135
P1.16 ①②	Auto 2 Reference				7	139	See Par ID 136
P1.17	Frequency reference upper limit	See Par ID 101	See Par ID 102	Hz	50.00	2840	
P1.18	Frequency reference upper limit source				0	2841	0 = Not Used 1 = Freq Ref upper 2 = AI1 3 = AI2
P1.20	Compressor table version					1769	
P1.21	Compressor type selection				0	1770	

Inputs

Table 27. Basic Setting — P2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1 ①	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P2.1.2 ①	Damper Time Out	1	32500	s	5	484	
P2.1.3 ①	Damper Delay	1	32500	s	5	485	
P2.1.4	AI Ref Scale Min Value	0.00	See Par ID 145	Hz	0.00	144	
P2.1.5	AI Ref Scale Max Value	See Par ID 144	400.00	Hz	0.00	145	

Table 28. Digital Input — P2.2

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P2.2.1 ①	IO Terminal 1 Start Stop Logic				0	143	0 = Forward - Reverse 1 = Start - Reverse 2 = Start - Enable 3 = 3 Wire Control
P2.2.2 ②⑤	IO Terminal 1 Start Signal 1				2	190	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1

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 28. Digital Input — P2.2, continued

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P2.2.2 ②⑤	IO Terminal 1 Start Signal 1				2	190	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
P2.2.3 ②⑤	IO Terminal 1 Start Signal 2				3	191	See Par ID 190
P2.2.4 ①	IO Terminal 2 Start Stop Logic				0	2206	See Par ID 143
P2.2.5 ②⑤	IO Terminal 2 Start Signal 1				2	2207	See Par ID 190
P2.2.6 ②⑤	IO Terminal 2 Start Signal 2				3	2208	See Par ID 190
P2.2.7 ①	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P2.2.8 ②③	Reverse				0	198	See Par ID 190
P2.2.9 ②③	Ext. Fault 1 NO				4	192	See Par ID 190
P2.2.10 ②③	Ext. Fault 1 NC				1	193	See Par ID 190
P2.2.11	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 12 = Torque Limit
P2.2.12 ②③	Ext. Fault 2 NO				0	2293	See Par ID 190
P2.2.13 ②③	Ext. Fault 2 NC				1	2294	See Par ID 190
P2.2.14	Ext. Fault 2 Text				1	2298	See Par ID 2297
P2.2.15 ②③	Ext. Fault 3 NO				0	2295	See Par ID 190
P2.2.16 ②③	Ext. Fault 3 NC				1	2296	See Par ID 190
P2.2.17	Ext. Fault 3 Text				2	2299	See Par ID 2297
P2.2.18 ②④	Fault Reset				5	200	See Par ID 190
P2.2.19 ②③	Run Enable				1	194	See Par ID 190
P2.2.20 ②③	Preset Speed B0				6	205	See Par ID 190
P2.2.21 ②③	Preset Speed B1				0	206	See Par ID 190
P2.2.22 ②③	Preset Speed B2				0	207	See Par ID 190
P2.2.23 ②③	Jog Enable				0	199	See Par ID 190
P2.2.24 ②③	Accel/Decel Time Set				0	195	See Par ID 190

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

Table 28. Digital Input — P2.2, continued

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P2.2.25 ②③	Accel/Decel Prohibit				0	201	See Par ID 190
P2.2.26 ②④	No Access To Param				0	215	See Par ID 190
P2.2.27 ②③	Auto Control				9	196	See Par ID 190
P2.2.28 ②③	Hand Control				0	197	See Par ID 190
P2.2.29 ②③	Auto 1/2 Select				0	209	See Par ID 190
P2.2.30 ②③	HOA On/Off				1	2395	See Par ID 190
P2.2.32 ②④	Parameter Set1/2 Sel				0	2312	See Par ID 190
P2.2.33 ②③	AI Ref Source Select				0	208	See Par ID 190
P2.2.34 ②③	Bypass Start				8	218	See Par ID 190
P2.2.35 ②③	Bypass Overload				0	1246	See Par ID 190
P2.2.40 ②③	DC Brake Active				0	202	See Par ID 190
P2.2.42 ②③	Fire Mode				7	220	See Par ID 190
P2.2.43 ②③	Fire Mode Ref 1/2 Select				0	221	See Par ID 190
P2.2.44 ②③	Fire Mode Reverse				0	2119	See Par ID 190
P2.2.48	OP Cont Interlock NO				0	2801	See Par ID 190
P2.2.49	OP Cont Interlock NC				1	2802	See Par ID 190
P2.2.53 ③	CP Interlock NC				1	2894	See Par ID 190

Table 29. Preset Speed — P2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.3.1	Preset Speed 1	0.00	See Par ID 102	Hz	5.00	105	
P2.3.2	Preset Speed 2	0.00	See Par ID 102	Hz	10.00	106	
P2.3.3	Preset Speed 3	0.00	See Par ID 102	Hz	15.00	118	
P2.3.4	Preset Speed 4	0.00	See Par ID 102	Hz	20.00	119	
P2.3.5	Preset Speed 5	0.00	See Par ID 102	Hz	25.00	120	
P2.3.6	Preset Speed 6	0.00	See Par ID 102	Hz	30.00	121	
P2.3.7	Preset Speed 7	0.00	See Par ID 102	Hz	35.00	122	
P2.3.8	Jog Reference	See Par ID 101	See Par ID 102	Hz	0.00	117	

Table 30. AI1 Settings — P2.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.4.1	AI1 Mode				1	222	0 = 0 - 20 mA 1 = 0 -10 V
P2.4.2	AI1 Signal Range				0	175	0 = 0-100%/0-20mA/0-10V 1 = 20-100%/4-20mA/2-10V 2 = Customized
P2.4.3	AI1 Custom Min	0.00	See Par ID 177	%	0.00	176	
P2.4.4	AI1 Custom Max	See Par ID 176	100.00	%	100.00	177	
P2.4.5	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.4.6	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted

Notes: ② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed.

Table 31. AI2 Settings — P2.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.5.1	AI2 Mode				0	223	0 = 0 - 20 mA 1 = 0 -10 V 2 = -10 - +10 V
P2.5.2	AI2 Signal Range				1	183	0 = 0-100%/0-20mA/ 0-10V/-10-10V 1 = 20-100%/4-20mA/ 2-10V/-6-10V 2 = Customized
P2.5.3	AI2 Custom Min	0.00	See Par ID 185	%	0.00	184	
P2.5.4	AI2 Custom Max	See Par ID 184	100.00	%	100.00	185	
P2.5.5	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.5.6	AI2 Signal Invert				0	189	See Par ID 181

Outputs

Table 32. Digital Output — P3.1

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P3.1.1 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 = Ocurrent Fault 15 = Ovolt Fault 16 = Uvolt Fault 17 = 4mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Auto 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 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv

Note: ② Parameter value will be set to be default when changing macros.

Table 32. Digital Output — P3.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1.1 ②	DO1 Function				1	151	51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = Fieldbus RTU Fault 65 = Fieldbus TCP Fault 66 = Fieldbus MSTP Fault 67 = Fieldbus EIP Fault 68 = Fieldbus SlotA Fault 69 = Fieldbus SlotB Fault 70 = Fieldbus SMD Fault 78 = CP Interlock Fault
P3.1.2 ②	RO1 Function				62	152	See Par ID 151
P3.1.3	RO1 On Delay	0.0	320.0	s	0.0	2112	
P3.1.4	RO1 Off Delay	0.0	320.0	s	0.0	2113	
P3.1.5 ②	RO2 Function				2	153	See Par ID 151
P3.1.6	RO2 On Delay	0.0	320.0	s	0.0	2114	
P3.1.7	RO2 Off Delay	0.0	320.0	s	0.0	2115	
P3.1.8 ②	RO3 Function				3	538	See Par ID 151
P3.1.9	RO3 On Delay	0.0	320.0	s	0.0	2116	
P3.1.10	RO3 Off Delay	0.0	320.0	s	0.0	2117	
P3.1.11	RO3 Reverse				0	2118	0 = No 1 = Yes
P3.1.12 ②	Virtual RO1 Function				0	2463	See Par ID 151
P3.1.13 ②	Virtual RO2 Function				0	2464	See Par ID 151
P3.1.14	Virtual RO1 On Delay	0.0	320.0	s	0.0	2848	
P3.1.15	Virtual RO1 Off Delay	0.0	320.0	s	0.0	2849	
P3.1.16	Virtual RO2 On Delay	0.0	320.0	s	0.0	2850	
P3.1.17	Virtua lRO2 Off Delay	0.0	320.0	s	0.0	2851	

Table 33. Supervisions — P3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.2.1 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P3.2.2	Freq Limit 1 Supv Val	0.00	See Par ID 102	Hz	0.00	155	
P3.2.3	Freq Limit 1 Supv Hyst	0.10	1.00	Hz	0.10	2200	
P3.2.4 ②	Freq Limit 2 Supv				0	157	See Par ID 154
P3.2.5	Freq Limit 2 Supv Val	0.00	See Par ID 102	Hz	0.00	158	
P3.2.6	Freq Limit 2 Supv Hyst	0.10	1.00	Hz	0.10	2201	
P3.2.7 ②	Torque Limit Supv				0	159	See Par ID 154
P3.2.8 ②	Torque Limit Supv Val	-1000.0	1000.0	%	100.0	160	
P3.2.9	Torque Limit Supv Hyst	1.0	5.0	%	1.0	2202	
P3.2.10	Ref Limit Supv				0	161	See Par ID 154
P3.2.11	Ref Limit Supv Val	0.00	See Par ID 102	Hz	0.00	162	

Note: ② Parameter value will be set to be default when changing macros.

Table 33. Supervisions — P3.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.2.12	Ref Limit Supv Hyst	0.10	1.00	Hz	0.10	2203	
P3.2.13	Temp Limit Supv				0	165	See Par ID 154
P3.2.14	Temp Limit Supv Val	-10.0	75.0	Deg. C	40.0	166	
P3.2.15	Temp Limit Supv Hyst	1.0	10.0	Deg. C	1.0	2204	
P3.2.16	Power Limit Supv				0	167	See Par ID 154
P3.2.17	Power Limit Supv Val	-200.0	200.0	%	0.0	168	
P3.2.18	Power Limit Supv Hyst	0.1	10.0	%	0.1	2205	
P3.2.19	AI Supv Select				0	170	0 = AI1 1 = AI2
P3.2.20	AI Limit Supv				0	171	See Par ID 154
P3.2.21	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P3.2.22	AI Supv Hyst	0.00	10.00	%	1.00	2198	
P3.2.23 ②	Motor Current 1 Supv				0	2189	See Par ID 154
P3.2.24	Motor Current 1 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190	
P3.2.25	Motor Current 1 Supv Hyst	0.1	1.0	A	0.1	2196	
P3.2.26 ②	Motor Current 2 Supv				0	2191	See Par ID 154
P3.2.27	Motor Current 2 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192	
P3.2.28	Motor Current 2 Supv Hyst	0.1	1.0	A	0.1	2197	
P3.2.29	Second AI Supv Select				0	2193	See Par ID 170
P3.2.30	Second AI Limit Supv				0	2194	See Par ID 154
P3.2.31	Second AI Limit Supv Val	0.00	100.00	%	0.00	2195	
P3.2.32	Second AI Supv Hyst	0.00	10.00	%	1.00	2199	

Table 34. Analog Output 1 — P3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.3.1	AO1 Mode				0	227	See Par ID 222
P3.3.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0-Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 19 = AI1 20 = AI2 21 = Output Freq (-2-+2N) 22 = Motor Torque (-2-+2N) 23 = Motor Power (-2-+2N) 24 = PT100 Temperature 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2 35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current (-2-+2N)
P3.3.3	AO1 Minimum				1	149	0 = 0V / 0 mA 1 = 2V / 4 mA
P3.3.4	AO1 Filter Time	0.00	10.00	s	1.00	147	
P3.3.5	AO1 Scale	10	1000	%	100	150	
P3.3.6	AO1 Inversion				0	148	See Par ID 181
P3.3.7	AO1 Offset	-100.00	100.00	%	0.00	173	

Note: ② Parameter value will be set to be default when changing macros.

Table 35. Analog Output 2 — P3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.4.1	AO2 Mode				0	228	See Par ID 222
P3.4.2 ②	AO2 Function				4	229	See Par ID 146
P3.4.3	AO2 Minimum				1	232	See Par ID 149
P3.4.4	AO2 Filter Time	0.00	10.00	s	1.00	230	
P3.4.5	AO2 Scale	10	1000	%	100	233	
P3.4.6	AO2 Inversion				0	231	See Par ID 181
P3.4.7	AO2 Offset	-100.00	100.00	%	0.00	234	

Drive Control

Table 36. Basic Setting — P4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1.1	Keypad Reference	See Par ID 101	See Par ID 102	Hz	20.00	141	
P4.1.2	Keypad Direction				0	116	0 = Forward 1 = Reverse
P4.1.3	Keypad Stop				1	114	0 = Enabled-Keypad Operation 1 = Always Enabled
P4.1.4	Hand Key Enable				0	1724	0 = Enabled 1 = Disabled
P4.1.5 ①	Reverse Enable				0	1679	0 = Disabled 1 = Enabled
P4.1.6	Change PhaseSequence Motor				0	2515	0 = Change Disable 1 = Change Enable
P4.1.7	Power Up HOA Select				0	1685	0 = Hold Last 1 = Hand Control 2 = Auto control 3 = Off
P4.1.8	Bumpless Enable				0	2462	See Par ID 1679
P4.1.9	Run Delay Time	0	32500	s	0	2423	
P4.1.10	Start Mode				0	252	0 = Ramp 1 = Flying Start
P4.1.11	Stop Mode				0	253	0 = Coasting 1 = Ramp
P4.1.12	Ramp 1 Shape	0.0	10.0	s	0.0	247	
P4.1.13	Ramp 2 Shape	0.0	10.0	s	0.0	248	
P4.1.14	Accel Time 2	0.1	3000.0	s	10.0	249	
P4.1.15	Decel Time 2	0.1	3000.0	s	10.0	250	
P4.1.16	Power Loss Function				0	267	0 = Disabled
P4.1.17	Power Loss Time	0.3	5.0	s	2.0	268	
P4.1.18 ①	2nd Stage Ramp Frequency	See Par ID 101	See Par ID 102	Hz	30.00	2444	
P4.1.19	Run Remove Stop Mode				0	2667	See Par ID 253

Note: ② Parameter value will be set to be default when changing macros.

Table 37. Brake — P4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.2.1 ①	DC-Brake Current	DriveNomCurrCT*15/100	DriveNomCurrCT*15/10	A	DriveNomCurrCT*1/2	254	
P4.2.2 ①	Start DC-Brake Time	0.00	600.00	s	0.00	263	
P4.2.3 ①	Stop DC-Brake Frequency	0.10	10.00	Hz	1.50	262	
P4.2.4 ①	Stop DC-Brake Time	0.00	600.00	s	0.00	255	
P4.2.5 ①	Brake Chopper Define				0	251	0 = Disabled 1 = B(Run) T(Rdy) 2 = External 3 = B(Rdy) T(Rdy) 4 = B(Run) T(No)
P4.2.6 ①	Flux Brake						0 = Off 1 = On
P4.2.7 ①	Flux Brake Current	ActiveMotorNomCurr*1/10	See Par ID 107	A	ActiveMotorNomCurr*1/2	265	

Table 38. Skip Frequency — P4.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.3.1	Skip Range Ramp Factor	0.1	10.0		1.0	264	
P4.3.2	Skip F1 Low Limit	0.00	See Par ID 257	Hz	0.00	256	
P4.3.3	Skip F1 High Limit	See Par ID 256	400.00	Hz	0.00	257	
P4.3.4	Skip F2 Low Limit	0.00	See Par ID 259	Hz	0.00	258	
P4.3.5	Skip F2 High Limit	See Par ID 258	400.00	Hz	0.00	259	
P4.3.6	Skip F3 Low Limit	0.00	See Par ID 261	Hz	0.00	260	
P4.3.7	Skip F3 High Limit	See Par ID 260	400.00	Hz	0.00	261	

Table 39. Energy Savings Calc — P4.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.4.1	Currency				0	2122	0 = $ 1 = £ 2 = € 3 = ¥ 4 = Rs 5 = R$ 6 = Fr 7 = kr
P4.4.2	Energy Cost			Varies	0.00	2123	
P4.4.3	Data Type				0	2124	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P4.4.4	Energy Savings Reset					2125	0 = Not Reset 1 = Reset

Table 40. Foldback — P4.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.6.1	IGBT Temperature			Deg. C		776	
P4.6.2	Foldback status					1771	0 = Inactive 1 = Active 2 = On hold
P4.6.3	Foldback output frequency			Hz		1772	
P4.6.4	Foldback output speed			rpm		1773	
P4.6.5	Foldback enable				0	1774	See Par ID 1679
P4.6.6	Foldback temperature	0	120	Deg. C	80	1775	
P4.6.7	Recovering temperature	0	120	Deg. C	70	1776	
P4.6.8	Foldback speed reduce rate	0	200	rpm/s	20	1777	
P4.6.9	Foldback minimum speed	0	10000	rpm	2000	1778	
P4.6.10	Foldback fault timeout	0	200	s	30	1779	

Note: ① Parameter value can only be changed after the drive has stopped.

Motor Control

Table 41. Basic Setting — P5.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1.1 ①②	Motor Control Mode				0	287	0 = Freq Control 1 = Speed Control
P5.1.2 ①	Current Limit	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT*2	107	
P5.1.3 ①	V/Hz Optimization				0	109	See Par ID 1679
P5.1.4 ①	V/Hz Ratio				0	108	0 = Linear 1 = Squared 2 = Programmable 3 = Linear + Flux Optimization
P5.1.5 ①	Field Weakening Point	8.00	400.00	Hz	FieldWeakPointMFG	289	
P5.1.6 ①	Voltage at FWP	10.00	200.00	%	100.00	290	
P5.1.7 ①	V/Hz Mid Frequency	0.00	See Par ID 289	Hz	VHzCurveMidFreqMFG	291	
P5.1.8 ①	V/Hz Mid Voltage	0.00	100.00	%	100.00	292	
P5.1.9 ①	Zero Frequency Voltage	0.00	40.00	%	0.00	293	
P5.1.10	Switching Frequency	MinSwitchFreq	MaxSwitchFreq	kHz	DefaultSwitchFreqCT	288	
P5.1.11	Sine Filter Enable				0	1665	See Par ID 1679
P5.1.12 ①	OverVoltage Control				1	294	See Par ID 1679
P5.1.15 ①	Overmodulation Enable				0	2835	See Par ID 1679
P5.1.32 ①	Stator Resistor	0.001	65.535	ohm	0.001	771	
P5.1.34	V/F Stable Kd	0	3000	%	100	1656	
P5.1.35	V/F Stable Kq	0	3000	%	100	1657	
P5.1.45	Identification				0	299	0 = No Action 1 = Identification Only Stator Resistor
P5.1.46	Slip Compensation Coefficient	0	500	%	100	1664	

Table 42. Second Motor Parameter — P5.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.2.6	V/F Stable Kd	0	3000	%	100	1656	
P5.2.7	V/F Stable Kq	0	3000	%	100	1657	
P5.2.8 ①	Stator Resistor 2	0.001	65.535	ohm	0.033	1419	

Table 43. Foldback — P4.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.6.1	IGBT Temperature			Deg. C		776	
P4.6.2	Foldback status					1771	0 = Inactive 1 = Active 2 = On hold
P4.6.3	Foldback output frequency			Hz		1772	
P4.6.4	Foldback output speed			rpm		1773	
P4.6.5	Foldback enable				0	1774	See Par ID 1679
P4.6.6	Foldback temperature	0	120	Deg. C	80	1775	
P4.6.7	Recovering temperature	0	120	Deg. C	70	1776	
P4.6.8	Foldback speed reduce rate	0	200	rpm/s	20	1777	
P4.6.9	Foldback minimum speed	0	10,000	rpm	2000	1778	
P4.6.10	Foldback fault timeout	0	200	s	30	1779	

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.

Protections

Table 44. Motor — P6.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.1.1 ①	Output Phase Fault				2	308	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P6.1.2 ①	Ground Fault				2	309	See Par ID 308
P6.1.3	Ground Fault Limit	0	30	%	15	2158	
P6.1.4 ①	Motor Thermal Protection				2	310	See Par ID 308
P6.1.5	Motor Thermal F0 Current	0.0	150.0	%	40.00	311	
P6.1.7 ①	Stall Protection				0	313	See Par ID 308
P6.1.8	Stall Current Limit	0.1	ActiveMotor NomCurr*2	A	ActiveMotor NomCurr		
P6.1.9	Stall Time Limit	1.0	120.0	s	15.0		
P6.1.10	Stall Frequency Limit	1.00	See Par ID 102	Hz	15.00		
P6.1.11 ①	Underload Protection				0		
P6.1.12	Underload Fnom Torque	10.0	150.0	%	50.0		
P6.1.13	Underload F0 Torque	5.0	150.0	%	10.0		
P6.1.14	Underload Time Limit	2.00	600.00	s	20.00		
P6.1.15 ①	Thermistor Fault Response				2		
P6.1.16 ①	PT100 Fault Response				2		
P6.1.17	Preheat Mode				0		
P6.1.18 ②	Preheat Control Source				31	2160	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = SlotA PT100 Temp Channel 1 33 = SlotA PT100 Temp Channel 2 33 = SlotA PT100 Temp Channel 2 34 = SlotA PT100 Temp Channel 3 35 = SlotA 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 44. Motor — P6.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.1.18 ②	Preheat Control Source				31	2160	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
P6.1.19	Preheat Enter Temp	-20.0	20.0	Deg. C	10.0	2161	
P6.1.20	Preheat Quit Temp	-10.0	40.0	Deg. C	20.0	2162	
P6.1.21	Preheat Output Volt	0.0	20.0	%	2.0	2163	

Table 45. Drive — P6.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.2.1	Line Start Lockout				2	750	0 = Disabled, No Change 1 = Enable, No Change 2 = Disabled, Changed 3 = Enable, Changed
P6.2.2	Fault Reset Start				0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset
P6.2.3 ①	4mA Input Fault				0	306	0 = No Action 1 = Warning 2 = Warning: Previous Freq 3 = Warning: Preset Freq 4 = Fault 5 = Fault, Coast
P6.2.4 ①	4mA Fault Frequency	0.00	See Par ID 102	Hz	0.00	331	
P6.2.5 ①	External Fault				2	307	See Par ID 308
P6.2.6 ①	Input Phase Fault				2	332	See Par ID 308
P6.2.7 ①	Uvolt Fault Response				2	330	See Par ID 308
P6.2.8 ①	Unit Under Temp Prot				2	1564	See Par ID 308
P6.2.9 ①	RTC Fault				1	955	See Par ID 308
P6.2.10 ①	Replace Battery Fault Response				1	1256	See Par ID 308
P6.2.11 ①	Replace Fan Fault Response				1	1257	See Par ID 308
P6.2.12	Cold Weather Mode				0	2126	See Par ID 1679
P6.2.13	Cold Weather Volt. Level	0.0	20.0	%	2.0	2127	
P6.2.14	Cold Weather Time Out	0	10	min	3	2128	
P6.2.15	Cold Weather Password					2129	
P6.2.16	Under Temp Fault Override					2130	See Par ID 2118
P6.2.17	STO Fault Response				2	2427	0 = No Action 1 = Warning 2 = Fault
P6.2.18	Warning Operation Mode				1	2657	0 = No Action 1 = Warning, No Store 2 = Warning, Store
P6.2.19	Fan Protection				2	2664	See Par ID 308
P6.2.20	Under Voltage Trip Level	DCLinkUnder VoltStopLimit	DCLinkOver VoltStopLimit	V	DCLinkUnder VoltProtectLimit	2666	
P6.2.21 ①	OP Cont Interlock Protection				2	2831	See Par ID 308
P6.2.22 ①	CP Interlock Run Protection				2	2895	See Par ID 308
P6.2.23 ①	CP Interlock Stop Protection				1	2896	0 = No Action 1 = Warning, No Store

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

Table 46. Communication — P6.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.3.1①	Fieldbus Fault Response				2	334	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast 4 = Warning, Coast 5 = Warning, Auto Switch To Local 6 = Warning, Auto Switch To Preset Speed 1
P6.3.2 ①	OPTCard Fault Response				2	335	See Par ID 308
P6.3.3 ①	IP Address Confliction Resp				1	1678	See Par ID 308
P6.3.4 ①	Keypad Comm Fault Response				2	2157	See Par ID 308

Table 47. Auto Restart — P6.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.4.1	AR Wait Time	1.00	300.00	s	1.00	321	
P6.4.2	AR Trail Time	0.00	600.00	s	30.00	322	
P6.4.3	AR Start Function				0	323	0 = Flying Start From Stop Frequency 1 = Ramp 2 = Flying Start From Max Frequency
P6.4.4	Undervoltage Attempts	0	10		1	324	
P6.4.5	OverVoltage Attempts	0	10		1	325	
P6.4.6	OverCurrent Attempts	0	3		0	326	
P6.4.7	4mA Fault Attempts	0	10		0	327	
P6.4.8	Motor Temp Fault Attempts	0	10		0	329	
P6.4.9	External Fault Attempts	0	10		0	328	
P6.4.10	Underload Attempts	0	10		0	336	
P6.4.11	OP Cont Interlock Attempts	0	10		0	2803	
P6.4.12	CP Interlock Attempts	0	10		1	2897	

Table 48. Fire Mode — P9

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.1 ①	Fire Mode Function				0	535	0 = Closing Contact 1 = Opening Contact
P9.2 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
P9.3	Fire Mode Min Frequency	See Par ID 101	See Par ID 102	Hz	MotorNomFreqMFG	537	
P9.4	Fire Mode Freq Ref 1	0.0	100.0	%	75.0	565	
P9.5	Fire Mode Freq Ref 2	0.0	100.0	%	100.0	564	
P9.6	Fire Mode Test Enable					2443	See Par ID 1679

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.

Bypass

Table 49. Basic Setting — P10.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.1.1 ①	Bypass Enable				1	1418	See Par ID 1679
P10.1.2 ①	Bypass Start Delay	1	32765	s	1	544	
P10.1.3 ①	Auto Bypass				1	542	See Par ID 1679
P10.1.4 ①	Auto Bypass Delay	0	32765	s	10	543	
P10.1.5 ①	OverCurrent Bypass Enable				1	547	See Par ID 1679
P10.1.6 ①	IGBT Fault Bypas Enable				1	546	See Par ID 1679
P10.1.7 ①	4mA Fault Bypass Enable				1	548	See Par ID 1679
P10.1.8 ①	UnderVoltage Bypass Enable				1	545	See Par ID 1679
P10.1.9 ①	OverVoltage Bypass Enable				1	549	See Par ID 1679
P10.1.10 ①	Motor OverTemp Bypass Enable				1	1698	See Par ID 1679
P10.1.11 ①	UnderLoad Bypass Enable				1	1699	See Par ID 1679
P10.1.12 ①	External Bypass Enable				1	1700	See Par ID 1679
P10.1.13 ①	Charge Switch Fault Bypass Enable				1	1701	See Par ID 1679
P10.1.14 ①	Saturation Trip Fault Bypass Enable				1	1702	See Par ID 1679
P10.1.15 ①	Under Temp Fault Bypass Enable				1	1703	See Par ID 1679
P10.1.16 ①	EEPROM Fault Bypass Enable				1	1704	See Par ID 1679
P10.1.17 ①	Control Board EEPROM Fault Bypass Enable)				1	1705	See Par ID 1679
P10.1.18 ①	Watchdog Fault Bypass Enable				1	1706	See Par ID 1679
P10.1.19 ①	Fan Cooling Fault Bypass Enable				1	1707	See Par ID 1679
P10.1.20 ①	Keypad Com Fault Bypass Enable				1	1708	See Par ID 1679
P10.1.21 ①	Option Card Fault Bypass Enable				1	1709	See Par ID 1679
P10.1.22 ①	RTC Clock Fault Bypass Enable				1	1710	See Par ID 1679
P10.1.23 ①	Ctrl Board OverTemp Fault Bypass Enable				1	1711	See Par ID 1679
P10.1.24 ①	Speed Search Start Fault Bypass Enable				1	1712	See Par ID 1679
P10.1.25 ①	Fieldbus Fault Bypass Enable				1	1713	See Par ID 1679

Communication

Table 50. FB Process Data Input Sel — P12.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1.1	FB Process Data Input 1 Sel	0	3000		0	2533	
P12.1.2	FB Process Data Input 2 Sel	0	See Par ID 2533		2542	2534	
P12.1.3	FB Process Data Input 3 Sel	0	See Par ID 2533		2550	2535	
P12.1.4	FB Process Data Input 4 Sel	0	See Par ID 2533		0	2536	
P12.1.5	FB Process Data Input 5 Sel	0	See Par ID 2533		0	2537	
P12.1.6	FB Process Data Input 6 Sel	0	See Par ID 2533		0	2538	
P12.1.7	FB Process Data Input 7 Sel	0	See Par ID 2533		0	2539	
P12.1.8	FB Process Data Input 8 Sel	0	See Par ID 2533		0	2540	

Note: ① Parameter value can only be changed after the drive has stopped.

Table 51. FB Process Data Output Sel — P12.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.2.1	FB Process Data Output 1 Sel				1	1556	
P12.2.2	FB Process Data Output 2 Sel				2	1557	
P12.2.3	FB Process Data Output 3 Sel				3	1558	
P12.2.4	FB Process Data Output 4 Sel				4	1559	
P12.2.5	FB Process Data Output 5 Sel				5	1560	
P12.2.6	FB Process Data Output 6 Sel				6	1561	
P12.2.7	FB Process Data Output 7 Sel				7	1562	
P12.2.8	FB Process Data Output 8 Sel				28	1563	
P12.2.9 ②	Standard Status Word Bit0 Function Select				1	2415	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 13 = OverHeat Fault 14 = Ocurrent Fault 15 = Ovolt Fault 16 = Uvolt Fault 17 = 4mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Auto 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 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = Fieldbus RTU Fault 65 = Fieldbus TCP Fault 66 = Fieldbus MSTP Fault 67 = Fieldbus EIP Fault 68 = Fieldbus SlotA Fault

Note: ② Parameter value will be set to be default when changing macros.

Table 51. FB Process Data Output Sel — P12.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.2.9 ②	Standard Status Word Bit0 Function Select				1	2415	69 = Fieldbus SlotB Fault 70 = Fieldbus SMD Fault 78 = CP Interlock Fault
P12.2.10 ②	Standard Status Word Bit1 Function Select				2	2416	See Par ID 2415
P12.2.11 ②	Standard Status Word Bit2 Function Select				3	2417	See Par ID 2415
P12.2.12 ②	Standard Status Word Bit3 Function Select				4	2418	See Par ID 2415
P12.2.13 ②	Standard Status Word Bit4 Function Select				5	2419	See Par ID 2415
P12.2.14 ②	Standard Status Word Bit5 Function Select				6	2420	See Par ID 2415
P12.2.15 ②	Standard Status Word Bit6 Function Select				7	2421	See Par ID 2415
P12.2.16 ②	Standard Status Word Bit7 Function Select				8	2422	See Par ID 2415

RS-485 Bus

Table 52. Basic Setting — P12.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.1.1 ①⑥	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP

Table 53. Modbus RTU — P12.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.2.1 ①⑥	Slave Address	1	247		1	587	
P12.3.2.2 ①⑥	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P12.3.2.3 ①⑥	Parity Type				2	585	0 = None and 2 stop bits 1 = Odd and 1 stop bit 2 = Even and 1 stop bit 3 = None and 1 stop bit
P12.3.2.4	Modbus RTU Protocol Status					588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P12.3.2.5	Comm Timeout Modbus RTU	0	60000	ms	10000	593	
P12.3.2.6	Modbus RTU Fault Response					2516	0 = in Fieldbus Control 1 = in all Control

Table 54. BACnet MS/TP — P12.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.3.1 ①⑥	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P12.3.3.2 ①⑥	MSTP Device Address	0	127		1	595	
P12.3.3.3 ①⑥	MSTP Instance Number	0	4194302		Varies	596	
P12.3.3.4	MSTP Comm Timeout	0	60000	ms	10000	598	
P12.3.3.5	MSTP Protocol Status					599	0 = Stopped 1 = Operational 2 = Faulted
P12.3.3.6	MSTP Fault Code					600	0 = None 1 = Sole Master
P12.3.3.7	MSTP Fault Response				0	2526	See Par ID 2516
P12.3.3.8 ①	MSTP Max Master				127	1537	

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.
⑥ Reset after modification.

Table 55. SA Bus — P12.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.4.3 ①⑥	SA Bus Instance Number	0	4194302		0	1728	
P12.3.4.4	SA Bus Comm Timeout	0	60000		10000	1730	
P12.3.4.5	SA Bus Protocol Status					1731	See Par ID 599
P12.3.4.6	SA Bus Fault Response				0	1732	See Par ID 2516

Ethernet Bus

Table 56. Basic Setting — P12.4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.1.1 ①⑥	IP Address Mode				1	1500	0 = Static IP 1 = DHCP with AutoIP
P12.4.1.2	Active IP Address					1507	
P12.4.1.3	Active Subnet Mask					1509	
P12.4.1.4	Active Default Gateway					1511	
P12.4.1.5	MAC Address					1513	
P12.4.1.6 ①⑥	Static IP Address				192.168.1.254	1501	
P12.4.1.7 ①⑥	Static Subnet Mask				255.255.255.0	1503	
P12.4.1.8 ①⑥	Static Default Gateway				192.168.1.1	1505	
P12.4.1.9 ①⑥	Enable BACnetIP				0	1725	See Par ID 1679
P12.4.1.10 ①⑥	Modbus TCP enable				0	1942	0 = Disable 1 = Enable

Table 57. Modbus TCP — P12.4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.2.1	Connection Limit				5	609	
P12.4.2.2	Modbus TCP Unit ID				1	610	
P12.4.2.3	Comm Timeout Modbus TCP	0	60000	ms	10000	611	
P12.4.2.4	Modbus TCP Protocol Status					612	See Par ID 611
P12.4.2.5	Modbus TCP Fault Response				0	2517	See Par ID 2516
P12.4.2.6	Modbus TCP Trusted IP Enable				1	74	See Par ID 1679
P12.4.2.7	Trusted IP White List				0xC0.0xA8.0x01. 0xFF.0x00.0x00. 0x00.0x00.0x00. 0x00.0x00.0x00	68	

Table 58. BACnet IP — P12.4.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.3.1 ①⑥	BACnet IP UDP port number				47808	1733	47808 = BAC0 47809 = BAC1 47810 = BAC2 47811 = BAC3 47812 = BAC4 47813 = BAC5 47814 = BAC6 47815 = BAC7 47816 = BAC8 47817 = BAC9 47818 = BACA 47819 = BACB 47820 = BACC 47821 = BACD 47822 = BACE 47823 = BACF
P12.4.3.2 ①⑥	BACnet IP Foreign Device				0	1734	See Par ID 1679

Notes: ① Parameter value can only be changed after the drive has stopped.
⑥ Reset after modification.

Table 58. BACnet IP — P12.4.3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.3.3 ①⑥	BACnet IP BBMD IP				0.0.0.0	1735	
P12.4.3.4 ①⑥	BACnet IP BBMD Port				47808	1737	See Par ID 1733
P12.4.3.5 ①⑥	BACnet IP Registration Interval	0	65535		10	1738	
P12.4.3.6	BACnet IP Comm Timeout	0	60000		0	1739	
P12.4.3.7	BACnet IP Protocol Status					1740	See Par ID 599
P12.4.3.8	BACnet IP Fault Behavior				0	1741	See Par ID 2516
P12.4.3.9 ①⑥	BACnetIP Instance Number	0	4194302		Varies	1742	

Table 59. WebUI — P12.4.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.4.1	WebUI Protocol Status					2915	0 = Off 1 = Operational 2 = Faulted
P12.4.4.2	WebUI Fault Response				0	2916	See Par ID 2516
P12.4.4.3	WebUI Communication Timeout	30000	60000	ms	60000	2919	
P12.4.4.4 ①⑥	WebUI Enable				1	2921	See Par ID 1679

System

Table 60. Basic Setting — P13.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.1.1	Language				0	340	0 = English 1 = Block 0—selected language at firmware update 2 = Block 1—selected language at firmware update
P13.1.2 ①	Application					142	0 = Basic 1 = PID 2 = Advanced
P13.1.3 ①	Parameter Sets					619	0 = No 1 = Reload Defaults 2 = Reload Set 1 3 = Reload Set 2 4 = Store Set 1 5 = Store Set 2 6 = Reset 7 = Reload Defaults VM
P13.1.4	Up To Keypad					620	See Par ID 2118
P13.1.5 ①	Down From Keypad					621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters
P13.1.6	Parameter Comparison					623	0 = No 1 = Compare with Keypad 2 = Compare with Default 3 = Compare with Set 1 4 = Compare with Set 2
P13.1.7	Password	0	9999		0	624	
P13.1.8	Parameter Lock				0	625	0 = Change Enable 1 = Change Disable
P13.1.9	Multimonitor Set				0	627	See Par ID 625
P13.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu 4 = Keypad Reference
P13.1.11	Timeout Time	0	65535	s	30	629	

Notes: ① Parameter value can only be changed after the drive has stopped.
⑥ Reset after modification.

Table 60. Basic Setting — P13.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.1.6	Parameter Comparison					623	0 = No 1 = Compare with Keypad 2 = Compare with Default 3 = Compare with Set 1 4 = Compare with Set 2
P13.1.7	Password	0	9999		0	624	
P13.1.8	Parameter Lock				0	625	0 = Change Enable 1 = Change Disable
P13.1.9	Multimonitor Set				0	627	See Par ID 625
P13.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu 4 = Keypad Reference
P13.1.11	Timeout Time	0	65535	s	30	629	
P13.1.12	Contrast Adjust	5	18		12	630	
P13.1.13	Backlight Time	1	65535	min	10	631	
P13.1.14	Fan Control				2	632	0 = Continuous 1 = Temperature 2 = Run Follow 3 = Calculate IGBT Temp
P13.1.15	Keypad ACK Timeout	200	5000	ms	200	633	
P13.1.16	Keypad Retry Number	1	10		5	634	
P13.1.17	Startup Wizard				0	626	0 = Yes 1 = No
P13.1.18	Jog Softkey Hidden				0	2412	See Par ID 1679
P13.1.19	Reverse Softkey Hidden				1	2413	See Par ID 1679
P13.1.20	Output Display Unit				45	2424	0 = % 1 = 1/min 2 = rpm 3 = ppm 4 = pps 5 = l/s 6 = l/min 7 = l/h 8 = kg/s 9 = kg/min 10 = kg/h 11 = m3/s 12 = m3/min 13 = m3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVS 20 = kW 21 = 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

Table 60. Basic Setting — P13.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.1.20	Output Display Unit				45	2424	40 = PA 41 = WC 42 = HG 43 = ft 44 = m 45 = Hz 46 = strokes/min
P13.1.21	Output Display Unit Min	-60000.00	See Par ID 2425	Varies	0.00	2460	
P13.1.22	Output Display Unit Max	See Par ID 2460	60000.00	Varies	Varies	2425	
P13.1.23	Keypad Lock Password	0	9999		0	75	

Table 61. Version Info — P13.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.2.1	Keypad Software Version					640	
P13.2.2	Motor Control Software Version					642	
P13.2.3	Application Software Version					644	
P13.2.4	Software Bundle Version					1714	
P13.3.4	Power Unit Serial Number					1270	
P13.3.5	Control Unit Serial Number					1276	
P13.3.6	Serial Number					1758	

Table 62. Application Info — P13.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.3.1	Brake Chopper					646	See Par ID 2118
P13.3.2	Brake Resistor Status					647	See Par ID 2118
P13.3.3	Serial Number					648	
P13.3.4	Power Unit Serial Number					1270	
P13.3.5	Control Unit Serial Number					1276	
P13.3.6	Serial Number					1758	

Table 63. User Info — P13.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.4.1	Real Time Clock				0.0.0.1:1:13	566	
P13.4.2	Daylight Saving				0	582	0 = Off 1 = EU 2 = US
P13.4.3	Total MWh Count			Mwh		601	
P13.4.4	Total Power Day Count					603	
P13.4.5	Total Power Hr Count					606	
P13.4.6	Trip MWh Count			Mwh		604	
P13.4.7	Clear Trip MWh Count					635	See Par ID 2125
P13.4.8	Trip Power Day Count					636	
P13.4.9	Trip Power Hr Count					637	
P13.4.10	Clear Trip Power Count					639	See Par ID 2125

Table 64. Operate Mode – O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz		1	
O2	Freq Reference			Hz		24	
O3	Motor Speed			rpm		2	
O4	Motor Current			A		3	
O5	Motor Torque			%		4	
O6	Motor Power			%		5	
O7	Motor Voltage			V		6	
O8	DC-link Voltage			V		7	
O9	Unit Temperature			Deg. C		8	
O10	Motor Temperature			%		9	
R11	Keypad Reference	See Par ID 101	See Par ID 102	Hz	20.00	141	

Chapter 6 — PID application

Introduction

The PID Application is designed for preloaded application sets for use with HVAC specific terminology and functions when using PID control loops internal to the drive. This is typically used with pump or fan process systems to maintain a desired set point level. With using the PID Controller reference selection the drive is setup to receive a setpoint level from any of the standard control location and then it also gets a feedback from typically some analog sensor to indicate actual process conditions, then from there it will adjust the output of the drive or an analog output to meet the setpoint level. The reaction of this adjustment on the output is determined by a Gain variable and an integral time for most setups and can include the Derivative time.It also will allow the drive to go into a sleep mode to prevent continue run time and wear on the system.In addition, it includes all the standard settings from the previous Basic Application in addition to a 2nd Motor parameter set for control of 2 different motors with the same drive. It provides the ability for the user to define its Hand and Auto control and reference signals with the standard Off condition as well. 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 PID Application.

PID Application includes functions:

- Bypass Control
- Fire Mode
- Pre heat/cold weather mode
- Hand/Off/Auto in individual button for easy change of control mode
- Damper Control
- Programmable Protections
- Programmable digital/analog input/output function
- Programmable start/stop signal logic
- Voltage and Current limiters
- Energy Savings Calculator
- Two independent set of Acceleration/Deceleration ramps
- Skip frequency
- Start source (Local/Remote control function)
- Reference source
- Flying start
- Volts per Hertz control programmable
- Real time clock—RTC time display
- RTC Timers and Interval control
- Auto restart on fault to drive or bypass
- Programmable switching frequency
- Multi-Preset speeds
- Fan control

I/O controls

- **Terminal To Function (TTF) Programming**

The design behind the programming of the digital inputs in the DH1 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 DH1 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 in Appendix A 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.

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 ID190 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 "Force closed" the drive would always be in a start mode when in that control location.

Example:

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

DIGIN selection

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

Example:

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

Option board DigIN selection

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

Example:

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

Timer channel selection

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

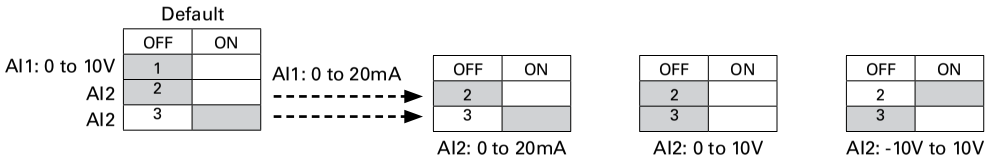
Example:

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

Control I/O configuration

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

Table 65. PID application default I/O connection



External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10V	Ref. Output Voltage	-	10VDC Supply Source
	2	AI1+ ①	Analog Input 1	0-10V	Voltage Speed Reference (Programmable to 4-20mA)
	3	AI1-	Analog Input 1 Ground	-	Analog Input 1 Common (Ground)
	4	AI2+①	Analog Input 2	4-20mA	Current Speed Reference (Programmable to 0-10V)
	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	Fire Mode	Enables drive into Fire Mode
	9	DIN7	Digital Input 7\TI+	Bypass Start	Enables drive into Bypass mode waiting for drive start
	10	DIN8	Digital Input 8\TI-	Force Auto	Input forces drive into Auto Control place
	11	CMB	DI5 to DI8 Common	Grounded	Allows source input
	12	GND	I/O Signal Ground	-	I/O Ground for Reference and Control
	13	24Vo	+24VDC Output	-	Control voltage output (100mA Max)
	14	DO1	Digital Output 1	Ready	Shows the drive is ready to run
	15	24Vo	+24VDC Output	-	Control voltage output (100mA 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 - 60Hz (4-20mA)
	18	AO2+	Analog Output 2	Motor Current	Shows Motor current of motor 0-FLA (4-20mA)
	19	24Vi	+24VDC 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	Fault	Relay output 3 shows VFD is Faulted
	28	R1NC	Relay 1 Normally Closed	Bypass Run	Relay output 1 shows VFD is in a bypass run state
	29	R1CM	Relay 1 Common		
	30	R1NO	Relay 1 Normally Open		
	31	R3CM	Relay 3 Common	Fault	Relay output 3 shows VFD is Faulted
	32	R2NC	Relay 2 Normally Closed	Run	Relay output 2 shows VFD is in a drive run 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—ground (as shown by dashed line). If using +10 V for AI1 or AI2, terminals 3, 5, and 6 need to be jumpered together.
① AI1+ and AI2+ Support 10K potentiometer.

Table 66. 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
BACnet IP Communications	Ethernet
Modbus TCP Communications	Ethernet
RS-485 Serial Port ①	
Upload/Download Parameters	
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.

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 in Appendix A, "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 67. Basic — M1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1.1	Output Frequency			Hz	1		
M1.2	Freq Reference			Hz	24		
M1.3	Motor Speed			rpm	2		
M1.4	Motor Current			A	3		
M1.5	Motor Torque			%	4		
M1.6	Motor Power			%	5		
M1.7	Motor Voltage			V	6		
M1.8	DC-link Voltage			V	7		
M1.9	Unit Temperature			Deg. C	8		
M1.10	Motor Temperature			%	9		
M1.11	Latest Fault Code				28		
M1.12	Instant Motor Power			kW	1686		
M1.13	RTC Battery Status				583		0 = Not Installed 1 = Installed 2 = Change Battery 3 = OverVoltage

Table 68. IO Status — M2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M2.1	Analog Input 1			Varies		10	
M2.2	Analog Input 2			Varies		11	
M2.3	Analog Output 1			Varies		25	
M2.4	Analog Output 2			Varies		575	
M2.5	DI1, DI2, DI3					12	
M2.6	DI4, DI5, DI6					13	
M2.7	DI7, DI8					576	
M2.8	DO1, Virtual RO1, Virtual RO2					14	
M2.9	RO1, RO2, RO3					557	
M2.10	Control board DI status					3214	
M2.11	Control board DI status					3248	
M2.12	SlotA DI status					3249	

Table 69. Optional Boards — M3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M3.1	PT100 Temperature			Deg. C	1000.0	27	

Table 70. Energy Savings — M4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M4.1	Energy Savings			Varies	0.000	2120	

Table 71. FB Monitor Menu — M5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M5.1	Control Board DIDO Status					2209	Bit 0 = DI1_Status Bit 1 = DI2_Status Bit 2 = DI3_Status Bit 3 = DI4_Status Bit 4 = DI5_Status Bit 5 = DI6_Status Bit 6 = DI7_Status Bit 7 = DI8_Status Bit 8 = DO1_Status Bit 9 = RO1_Status Bit 10 = RO2_Status Bit 11 = RO3_Status Bit 12 = SlotA with board Bit 13 = SlotB with board Bit 14 = Virtual_RO1_Status Bit 15 = Virtual_RO2_Status
M5.2	SlotA DIDO Status					2210	Bit 0 = IO1_DI1 Bit 1 = IO1_DI2 Bit 2 = IO1_DI3 Bit 3 = IO1_DO1 Bit 4 = IO1_DO2 Bit 5 = IO1_DO3 Bit 6 = IO3_RO1 Bit 7 = IO3_RO2 Bit 8 = IO3_RO3 Bit 9 = IO5_AC1 Bit 10 = IO5_AC2 Bit 11 = IO5_AC3 Bit 12 = IO5_AC4 Bit 13 = IO5_AC5 Bit 14 = IO5_AC6
M5.3	SlotB DIDO Status					2211	Bit 0 = IO1_DI1 Bit 1 = IO1_DI2 Bit 2 = IO1_DI3 Bit 3 = IO1_DO1 Bit 4 = IO1_DO2 Bit 5 = IO1_DO3 Bit 6 = IO3_RO1 Bit 7 = IO3_RO2 Bit 8 = IO3_RO3 Bit 9 = IO5_AC1 Bit 10 = IO5_AC2 Bit 11 = IO5_AC3 Bit 12 = IO5_AC4 Bit 13 = IO5_AC5 Bit 14 = IO5_AC6 Bit 15 = Not Used
M5.4	Application Status Word					29	Bit 0 = MC_Ready Bit 1 = MC_Run Bit 2 = MC_Fault or Fault Trip Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning or AR Bit 7 = MC_ZeroSpeed Bit 8 = IO Control Indicator Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Control Indicator Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 = Run Bypass Bit 14 = External Brake Control Bit 15 = In Bypass Mode

Table 71. FB Monitor Menu — M5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M5.4	Application Status Word					29	Bit 0 = Status Word Bit0 Bit 1 = Status Word Bit1 Bit 2 = Status Word Bit2 Bit 3 = Status Word Bit3 Bit 4 = Status Word Bit4 Bit 5 = Status Word Bit5 Bit 6 = Status Word Bit6 Bit 8 - 15 = Not Used
M5.5	Standard Status Word					2414	Bit 0 = See PAR ID 2415 (default = Ready) Bit 1 = See PAR ID 2416 (default = Run) Bit 2 = See PAR ID 2417 (default = Fault) Bit 3 = See PAR ID 2418 (default = Fault Invert) Bit 4 = See PAR ID 2419 (default = Warning) Bit 5 = See PAR ID 2420 (default = Reversed) Bit 6 = See PAR ID 2421 (default = At Speed) Bit 7 = See PAR ID 2422 (default = Zero Frequency) Bit 8 - 15 = Not Used
M5.6	FB Status Word					2101	Bit 0 = Ready Bit 1 = Run Bit 2 = Direction Bit 3 = Fault Bit 4 = Warning Bit 5 = At reference Bit 6 = Bypass Bit 7 = run enable Bit 8 = HOA status Bit 9 = HOA status Bit 10 = Run Delay Time Bit 11 = Not Used Bit 12 = Not Used Bit 13 = Not Used Bit 14 = Not Used Bit 15 = Not Used
M5.7	FB Control Word					2001	Bit 0 = Run_Stop Bit 1 = Forward_Rev Bit 2 = FaultReset Bit 3 = FB input data 1 Bit 4 = FB input data 2 Bit 5 = FB input data 3 Bit 6 = FB input data 4 Bit 7 = Bypass Bit 8 = FB_Ctrl Bit 9 = FB_Ref Bit 10 = HOA control Bit 11 = HOA control Bit 12 = Not Used Bit 13 = Not Used Bit 14 = Not Used Bit 15 = Not Used
M5.8	FB Speed Reference	0.00	100.00	%		2003	

Table 72. PID Monitor — M6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M6.1	PID1 Set Point			Varies		16	
M6.2	PID1 Feedback			Varies		18	
M6.3	PID1 Error Value			Varies		20	
M6.4	PID1 Output			%		22	
M6.5	PID1 Status					23	0 = Stopped 1 = Running 2 = Sleep Mode
M6.6	PID2 Set Point			Varies		32	
M6.7	PID2 Feedback			Varies		34	
M6.8	PID2 Error Value			Varies		36	
M6.9	PID2 Output			%		38	
M6.10	PID2 Status					39	See Par ID 23

Table 73. Timer/Interval Control — M7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M7.1	TC1, TC2, TC3					558	
M7.2	Interval 1					559	0 = Inactive 1 = Active
M7.3	Interval 2					560	See Par ID 559
M7.4	Interval 3					561	See Par ID 559
M7.5	Interval 4					562	See Par ID 559
M7.6	Interval 5					563	See Par ID 559
M7.7	Timer 1			s	0	569	
M7.8	Timer 2			s	0	571	
M7.9	Timer 3			s	0	573	

Table 74. User Defined Output — M8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M8.1	Output			Varies		2445	
M8.2	Reference			Varies		2447	

Table 75. MWH Monitor — M9

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M9.1	Total MWh Count			Mwh		601	
M9.2	Total Power Day Count					603	
M9.3	Total Power Hr Count					606	
M9.4	Trip MWh Count			Mwh		604	
M9.5	Trip Power Day Count					636	
M9.6	Trip Power Hr Count					637	
M9.7	Total Run Time Count					2827	
M9.8	Number of Starts					2830	
M9.9	Trip Run Time Count					2829	

Table 76. Multi-Monitoring — M11

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M11.1	Multi-Monitoring				2,1,3,2,1,3,2,1,3	1753	

Parameters

Table 77. Basic Parameters — P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1	Min Frequency	0.00	See Par ID 102	Hz	20.00	101	
P1.2 ①	Max Frequency	See Par ID 101	400.00	Hz	MaxFreqMFG	102	
P1.3	Accel Time 1	0.1	3000.0	s	20.00	103	
P1.4	Decel Time 1	0.1	3000.0	s	20.00	104	
P1.5 ①	Motor Nom Current	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrVT	486	
P1.6 ①	Motor Nom Speed	300	20000	rpm	Varies	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	Varies	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	Varies	488	
P1.10 ①	HOA Source				0	2465	0 = I/O Terminal/Keypad/Fieldbus 1 = Keypad 2 = IO Terminal 3 = Fieldbus
P1.11	Hand Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.12 ①②	Hand Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 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
P1.13	Auto 1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal Start 2 3 = Keypad
P1.14 ①②	Auto 1 Reference				1	137	See Par ID 136
P1.15	Auto 2 Control Place				1	138	See Par ID 135
P1.16 ①②	Auto 2 Reference				7	139	See Par ID 136
P1.17	Frequency reference upper limit	See Par ID 101	See Par ID 102	Hz	50.00	2840	
P1.18	Frequency reference upper limit source				0	2841	0 = Not Used 1 = Freq Ref upper 2 = AI1 3 = AI2
P1.20	Compressor table version					1769	
P1.21	Compressor type selection				0	1770	

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.

Inputs

Table 78. Basic Setting — P2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1 ①	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P2.1.2 ①	Damper Time Out	1	32500	s	5	484	
P2.1.3 ①	Damper Delay	1	32500	s	5	485	
P2.1.4	AI Ref Scale Min Value	0.00	See Par ID 145	Hz	0.00	144	
P2.1.5	AI Ref Scale Max Value	See Par ID 144	400.00	Hz	0.00	145	

Table 79. Digital Input — P2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.2.1 ①	IO Terminal 1 Start Stop Logic				0	143	0 = Forward - Reverse 1 = Start - Reverse 2 = Start - Enable 3 = 3 Wire Control
P2.2.2 ②⑤	IO Terminal 1 Start Signal 1					190	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = RO1 Function 32 = RO2 Function 33 = RO3 Function 34 = Virtual RO1 Function 35 = Virtual RO2 Function
P2.2.3 ②⑤	IO Terminal 1 Start Signal 2					191	See Par ID 190
P2.2.4 ①	IO Terminal 2 Start Stop Logic					2206	See Par ID 143
P2.2.5 ②⑤	IO Terminal 2 Start Signal 1					2207	See Par ID 190
P2.2.6 ②⑤	IO Terminal 2 Start Signal 2					2208	See Par ID 190
P2.2.7 ①	Thermistor Input Selection					881	0 = Digital Input 1 = Thermistor Input

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.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 79. Digital Input — P2.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.2.8 ②③	Reverse					198	See Par ID 190
P2.2.9 ②③	Ext. Fault 1 NO					192	See Par ID 190
P2.2.10 ②③	Ext. Fault 1 NC					193	See Par ID 190
P2.2.11	Ext. Fault 1 Text					2297	0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage 12 = Torque Limit
P2.2.12 ②③	Ext. Fault 2 NO				0	2293	See Par ID 190
P2.2.13 ②③	Ext. Fault 2 NC				1	2294	See Par ID 190
P2.2.14	Ext. Fault 2 Text				1	2298	See Par ID 2297
P2.2.15 ②③	Ext. Fault 3 NO				0	2295	See Par ID 190
P2.2.16 ②③	Ext. Fault 3 NC				1	2296	See Par ID 190
P2.2.17	Ext. Fault 3 Text				2	2299	See Par ID 2297
P2.2.18 ②④	Fault Reset				5	200	See Par ID 190
P2.2.19 ②③	Run Enable				1	194	See Par ID 190
P2.2.20 ②③	Preset Speed B0				6	205	See Par ID 190
P2.2.21 ②③	Preset Speed B1				0	206	See Par ID 190
P2.2.22 ②③	Preset Speed B2				0	207	See Par ID 190
P2.2.23 ②③	Jog Enable				0	199	See Par ID 190
P2.2.24 ②③	Accel/Decel Time Set				0	195	See Par ID 190
P2.2.25 ②③	Accel/Decel Prohibit				0	201	See Par ID 190
P2.2.26 ②④	No Access To Param				0	215	See Par ID 190
P2.2.27 ②③	Auto Control				9	196	See Par ID 190
P2.2.28 ②③	Hand Control				0	197	See Par ID 190
P2.2.29 ②③	Auto 1/2 Select				0	209	See Par ID 190
P2.2.30 ②③	HOA On/Off				1	2395	See Par ID 190
P2.2.31 ②③	Second Motor Para Select				0	217	See Par ID 190
P2.2.32 ②④	Parameter Set1/2 Sel				0	2312	See Par ID 190
P2.2.33 ②③	AI Ref Source Select				0	208	See Par ID 190
P2.2.34 ②③	Bypass Start				8	218	See Par ID 190
P2.2.35 ②③	Bypass Overload				0	1246	See Par ID 190
P2.2.36 ②③	PID1 Control Enable				1	550	See Par ID 190
P2.2.37 ②③	PID2 Control Enable				1	553	See Par ID 190
P2.2.38 ②③	PID1 Set Point Select				0	351	See Par ID 190
P2.2.39 ②③	PID2 Set Point Select				0	352	See Par ID 190
P2.2.40 ②③	DC Brake Active				0	202	See Par ID 190
P2.2.41 ②③	Smoke Mode				0	219	See Par ID 190
P2.2.42 ②③	Fire Mode				7	220	See Par ID 190
P2.2.43 ②③	Fire Mode Ref 1/2 Select				0	221	See Par ID 190
P2.2.44 ②③	Fire Mode Reverse				0	2119	See Par ID 190

Notes: ② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed.
④ Input function is edge sensed.

Table 79. Digital Input — P2.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.2.45 ③	Start Timer 1				0	224	See Par ID 190
P2.2.46 ③	Start Timer 2				0	225	See Par ID 190
P2.2.47 ③	Start Timer 3				0	226	See Par ID 190
P2.2.48 ②③	OP Cont Interlock NO				0	2801	See Par ID 190
P2.2.49 ②③	OP Cont Interlock NC				1	2802	See Par ID 190
P2.2.53 ①	CP Interlock NC				1	2894	See Par ID 190

Table 80. Preset Speed — P2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.3.1	Preset Speed 1	0.00	See Par ID 102	Hz	5.00	105	
P2.3.2	Preset Speed 2	0.00	See Par ID 102	Hz	10.00	106	
P2.3.3	Preset Speed 3	0.00	See Par ID 102	Hz	15.00	118	
P2.3.4	Preset Speed 4	0.00	See Par ID 102	Hz	20.00	119	
P2.3.5	Preset Speed 5	0.00	See Par ID 102	Hz	25.00	120	
P2.3.6	Preset Speed 6	0.00	See Par ID 102	Hz	30.00	121	
P2.3.7	Preset Speed 7	0.00	See Par ID 102	Hz	35.00	122	
P2.3.8	Jog Reference	See Par ID 101	See Par ID 102	Hz	5.00	117	

Table 81. AI1 Settings — P2.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.4.1	AI1 Mode				1	222	0 = 0 - 20 mA 1 = 0 -10 V
P2.4.2	AI1 Signal Range				0	175	0 = 0-100%/0-20mA/0-10V 1 = 20-100%/4-20mA/2-10V 2 = Customized
P2.4.3	AI1 Custom Min	0.00	See Par ID 177	%	0.00	176	
P2.4.4	AI1 Custom Max	See Par ID 176	100.00	%	100.00	177	
P2.4.5	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.4.6	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted

Table 82. AI2 Settings — P2.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.5.1	AI2 Mode				0	223	0 = 0 - 20 mA 1 = 0 -10 V 2 = -10 - +10 V
P2.5.2	AI2 Signal Range				1	183	0 = 0-100%/0-20mA/0-10V/-10-10V 1 = 20-100%/4-20mA/2-10V/-6-10V 2 = Customized
P2.5.3	AI2 Custom Min	0.00	See Par ID 185	%	0.00	184	
P2.5.4	AI2 Custom Max	See Par ID 184	100.00	%	100.00	185	
P2.5.5	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.5.6	AI2 Signal Invert				0	189	See Par ID 181

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.

Outputs

Table 83. Digital Output — P3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1.1 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 = Ocurrent Fault 15 = Ovolt Fault 16 = Uvolt Fault 17 = 4mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Auto 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 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 43 = Motor 1 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 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = Fieldbus RTU Fault 65 = Fieldbus TCP Fault 66 = Fieldbus MSTP Fault 67 = Fieldbus EIP Fault 68 = Fieldbus SlotA Fault 69 = Fieldbus SlotB Fault 70 = Fieldbus SWD Fault 78 = CP Interlock Fault
P3.1.2 ②	RO1 Function				62	152	See Par ID 151
P3.1.3	RO1 On Delay	0.0	320.0	s	0.0	2112	

Note: ② Parameter value will be set to be default when changing macros.

Table 83. Digital Output — P3.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1.4	RO1 Off Delay	0.0	320.0	s	0.0	2113	
P3.1.5 ②	RO2 Function				2	153	See Par ID 151
P3.1.6	RO2 On Delay	0.0	320.0	s	0.0	2114	
P3.1.7	RO2 Off Delay	0.0	320.0	s	0.0	2115	
P3.1.8 ②	RO3 Function				3	538	See Par ID 151
P3.1.9	RO3 On Delay	0.0	320.0	s	0.0	2116	
P3.1.10	RO3 Off Delay	0.0	320.0	s	0.0	2117	
P3.1.11	RO3 Reverse				0	2118	0 = No 1 = Yes
P3.1.12 ②	Virtual RO1 Function				0	2463	See Par ID 151
P3.1.13 ②	Virtual RO2 Function				0	2464	See Par ID 151
P3.1.14	Virtual RO1 On Delay	0.0	320.0	s	0.0	2848	
P3.1.15	Virtual RO1 Off Delay	0.0	320.0	s	0.0	2849	
P3.1.16	Virtual RO2 On Delay	0.0	320.0	s	0.0	2850	
P3.1.17	Virtua lRO2 Off Delay	0.0	320.0	s	0.0	2851	

Table 84. Supervisions — P3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.2.1 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P3.2.2	Freq Limit 1 Supv Val	0.00	See Par ID 102	Hz	0.00	155	
P3.2.3	Freq Limit 1 Supv Hyst	0.10	1.00	Hz	0.10	2200	
P3.2.4 ②	Freq Limit 2 Supv				0	157	See Par ID 154
P3.2.5	Freq Limit 2 Supv Val	0.00	See Par ID 102	Hz	0.00	158	
P3.2.6	Freq Limit 2 Supv Hyst	0.10	1.00	Hz	0.10	2201	
P3.2.7 ②	Torque Limit Supv				0	159	See Par ID 154
P3.2.8 ②	Torque Limit Supv Val	-1000.0	1000.0	%	100.0	160	
	Torque Limit Supv Hyst	1.0	5.0	%	1.0	2202	
P3.2.10	Ref Limit Supv				0	161	See Par ID 154
P3.2.11	Ref Limit Supv Val	0.00	See Par ID 102	Hz	0.00	162	
P3.2.12	Ref Limit Supv Hyst	0.10	1.00	Hz	0.10	2203	
P3.2.13	Temp Limit Supv				0	165	See Par ID 154
P3.2.14	Temp Limit Supv Val	-10.0	75.0	Deg. C	40.0	166	
P3.2.15	Temp Limit Supv Hyst	1.0	10.0	Deg. C	1.0	2204	
P3.2.16	Power Limit Supv				0	167	See Par ID 154
P3.2.17	Power Limit Supv Val	-200.0	200.0	%	0.0	168	
P3.2.18	Power Limit Supv Hyst	0.1	10.0	%	0.1	2205	
P3.2.19	AI Supv Select				0	170	0 = AI1 1 = AI2
P3.2.20	AI Limit Supv				0	171	See Par ID 154
P3.2.21	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P3.2.22	AI Supv Hyst	0.00	10.00	%	1.00	2198	
P3.2.23 ②	Motor Current 1 Supv				0	2189	See Par ID 154
P3.2.24	Motor Current 1 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190	
P3.2.25	Motor Current 1 Supv Hyst	0.1	1.0	A	0.1	2196	
P3.2.26 ②	Motor Current 2 Supv				0	2191	See Par ID 154
P3.2.27	Motor Current 2 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192	
P3.2.28	Motor Current 2 Supv Hyst	0.1	1.0	A	0.1	2197	

Note: ② Parameter value will be set to be default when changing macros.

Table 84. Supervisions — P3.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.2.29	Second AI Supv Select				0	2193	See Par ID 170
P3.2.30	Second AI Limit Supv				0	2194	See Par ID 154
P3.2.31	Second AI Limit Supv Val	0.00	100.00	%	0.00	2195	
P3.2.32	Second AI Supv Hyst	0.00	10.00	%	1.00	2199	
P3.2.33	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P3.2.34	PID1 Superv Upper Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1347	
P3.2.35	PID1 Superv Lower Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1349	
P3.2.36	PID1 Superv Delay	0	3000	s	0	1351	
P3.2.37	PID2 Superv Enable				0	1408	See Par ID 1346
P3.2.38	PID2 Superv Upper Limit	See Par ID 1360	See Par ID 1362	Varies	0.00	1409	
P3.2.39	PID2 Superv Lower Limit	See Par ID 1360	See Par ID 1362	Varies	0.00	1411	
P3.2.40	PID2 Superv Delay	0	3000	s	0	1413	

Table 85. Analog Output 1 — P3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.3.1	AO1 Mode				0	227	See Par ID 222
P3.3.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0-Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 9 = PID1 Setpoint 10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 14 = PID2 Setpoint 15 = PID2 Feedback 1 16 = PID2 Feedback 2 17 = PID2 Control Error Value 18 = PID2 Control Output 19 = AI1 20 = AI2 21 = Output Freq (-2-+2N) 22 = Motor Torque (-2-+2N) 23 = Motor Power (-2-+2N) 24 = PT100 Temperature 25 = FB Process Data Input 1 26 = FB Process Data Input 2 27 = FB Process Data Input 3 28 = FB Process Data Input 4 29 = FB Process Data Input 5 30 = FB Process Data Input 6 31 = FB Process Data Input 7 32 = FB Process Data Input 8 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2 35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current (-2-+2N)
P3.3.3	AO1 Minimum				1	149	0 = 0V / 0 mA 1 = 2V / 4 mA
P3.3.4	AO1 Filter Time	0.00	10.00	s	1.00	147	

Note: ② Parameter value will be set to be default when changing macros.

Table 85. Analog Output 1 — P3.3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.3.5	AO1 Scale	10	1000	%	100	150	
P3.3.6	AO1 Inversion				0	148	See Par ID 181
P3.3.7	AO1 Offset	-100.00	100.00	%	0.00	173	

Table 86. Analog Output 2 — P3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.4.1	AO2 Mode				0	228	See Par ID 222
P3.4.2 ②	AO2 Function				4	229	See Par ID 146
P3.4.3	AO2 Minimum				1	232	See Par ID 149
P3.4.4	AO2 Filter Time	0.00	10.00	s	1.00	230	
P3.4.5	AO2 Scale	10	1000	%	100	233	
P3.4.6	AO2 Inversion				0	231	See Par ID 181
P3.4.7	AO2 Offset	-100.00	100.00	%	0.00	234	

Drive Control

Table 87. Basic Setting — P4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1.1	Keypad Reference	See Par ID 101	See Par ID 102	Hz	20.00	141	
P4.1.2	Keypad Direction				0	116	0 = Forward 1 = Reverse
P4.1.3	Keypad Stop				1	114	0 = Enabled-Keypad Operation 1 = Always Enabled
P4.1.4	Hand Key Enable				0	1724	0 = Enabled 1 = Disabled
P4.1.5 ①	Reverse Enable				0	1679	See Par ID 1346
P4.1.6	Change PhaseSequence Motor				0	2515	0 = Change Disable 1 = Change Enable
P4.1.7	Power Up HOA Select				0	1685	0 = Hold Last 1 = Hand Control 2 = Auto control 3 = Off
P4.1.8	Bumpless Enable				0	2462	See Par ID 1346
P4.1.9	Run Delay Time	0	32500	s	0	2423	
P4.1.10	Start Mode				0	252	0 = Ramp 1 = Flying Start From Stop Frequency 2 = Flying Start From Max Frequency
P4.1.11	Stop Mode				0	253	0 = Coasting 1 = Ramp
P4.1.12	Ramp 1 Shape	0.0	10.0	s	0.0	247	
P4.1.13	Ramp 2 Shape	0.0	10.0	s	0.0	248	
P4.1.14	Accel Time 2	0.1	3000.0	s	10.0	249	
P4.1.15	Decel Time 2	0.1	3000.0	s	10.0	250	
P4.1.16	Power Loss Function				0	267	0 = Disabled
P4.1.17	Power Loss Time	0.3	5.0	s	2.0	268	
P4.1.18 ①	2nd Stage Ramp Frequency	See Par ID 101	See Par ID 102	Hz	30.00	2444	
P4.1.19	Run Remove Stop Mode					2667	See Par ID 253

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. Brake — P4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.2.1①	DC-Brake Current	DriveNomCurrCT*15/100	DriveNomCurrCT*15/10	A	DriveNomCurrCT*1/2	254	
P4.2.2 ①	Start DC-Brake Time	0.00	600.00	s	0.00	263	
P4.2.3 ①	Stop DC-Brake Frequency	0.10	10.00	Hz	1.50	262	
P4.2.4 ①	Stop DC-Brake Time	0.00	600.00	s	0.00	255	
P4.2.5 ①	Brake Chopper Define				0	251	0 = Disabled 1 = B(Run) T(Rdy) 2 = External 3 = B(Rdy) T(Rdy) 4 = B(Run) T(No)
P4.2.6 ①	Flux Brake				0	266	0 = Off 1 = On
P4.2.7 ①	Flux Brake Current	ActiveMotorNomCurr*1/10	See Par ID 107	A	ActiveMotorNomCurr*1/2	265	

Table 89. Skip Frequency — P4.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.3.1	Skip Range Ramp Factor	0.1	10.0		1.0	264	
P4.3.2	Skip F1 Low Limit	0.00	See Par ID 257	Hz	0.00	256	
P4.3.3	Skip F1 High Limit	See Par ID 256	400.00	Hz	0.00	257	
P4.3.4	Skip F2 Low Limit	0.00	See Par ID 259	Hz	0.00	258	
P4.3.5	Skip F2 High Limit	See Par ID 258	400.00	Hz	0.00	259	
P4.3.6	Skip F3 Low Limit	0.00	See Par ID 261	Hz	0.00	260	
P4.3.7	Skip F3 High Limit	See Par ID 260	400.00	Hz	0.00	261	

Table 90. Energy Savings Calc — P4.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.4.1	Currency				0	2122	0 = $ 1 = £ 2 = € 3 = ¥ 4 = Rs 5 = R$ 6 = Fr 7 = kr
P4.4.2	Energy Cost			Varies	0.00	2123	
P4.4.3	Data Type				0	2124	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P4.4.4	Energy Savings Reset					2125	0 = Not Reset 1 = Reset

Table 91. Foldback — P4.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.6.1	IGBT Temperature			Deg. C		776	
P4.6.2	Foldback status					1771	0 = Inactive 1 = Active 2 = On hold
P4.6.3	Foldback output frequency			Hz		1772	
P4.6.4	Foldback output speed			rpm		1773	
P4.6.5	Foldback enable				0	1774	See Par ID 1346
P4.6.6	Foldback temperature	0	120	Deg. C	80	1775	
P4.6.7	Recovering temperature	0	120	Deg. C	70	1776	

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. Foldback — P4.6, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.6.8	Foldback speed reduce rate	0	200	rpm/s	20	1777	
P4.6.9	Foldback minimum speed	0	10,000	rpm	2000	1778	
P4.6.10	Foldback fault timeout	0	200	s	30	1779	

Motor Control

Table 92. Basic Setting — P5.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1.1 ①②	Motor Control Mode				0	287	0 = Freq Control 1 = Speed Control
P5.1.2 ①	Current Limit	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT*2	107	
P5.1.3 ①	V/Hz Optimization				0	109	See Par ID 1346
P5.1.4 ①	V/Hz Ratio				0	108	0 = Linear 1 = Squared 2 = Programmable 3 = Linear + Flux Optimization
P5.1.5 ①	Field Weakening Point	8.00	400.00	Hz	Varies	289	
P5.1.6 ①	Voltage at FWP	10.00	200.00	%	100.00	290	
P5.1.7 ①	V/Hz Mid Frequency	0.00	See Par ID 289	Hz	Varies	291	
P5.1.8 ①	V/Hz Mid Voltage	0.00	100.00	%	100.00	292	
P5.1.9 ①	Zero Frequency Voltage	0.00	40.00	%	0.00	293	
P5.1.10	Switching Frequency	MinSwitchFreq	MaxSwitchFreq	kHz	DefaultSwitchFreqCT	288	
P5.1.11	Sine Filter Enable				0	1665	See Par ID 1346
P5.1.12 ①	OverVoltage Control				1	294	See Par ID 1346
P5.1.15 ①	Overmodulation Enable				0	2835	See Par ID 1346
P5.1.32 ①	Stator Resistor	0.001	65.535	ohm	0.001	771	
P5.1.34	V/F Stable Kd	0	3000	%	100	1656	
P5.1.35	V/F Stable Kq	0	3000	%	100	1657	
P5.1.45 ②	Identification				0	299	0 = No Action 1 = Identification Only Stator Resistor
P5.1.46	Slip Compensation Coefficient	0	500	%	100	1664	

Table 93. Second Motor Parameter — P5.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.2.1 ①	Motor Nom Current 2	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT	577	
P5.2.2 ①	Motor Nom Speed 2	300	20000	rpm	Varies	578	
P5.2.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P5.2.4 ①	Motor Nom Volt 2	180	690	V	Varies	580	
P5.2.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	Varies	581	
P5.2.6	V/F Stable Kd	0	3000	%	100	1656	
P5.2.7	V/F Stable Kq	0	3000	%	100	1657	
P5.2.8 ①	Stator Resistor 2	0.001	65.535	ohm	0.033	1419	

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.

Protections

Table 94. Motor — P6.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.1.1 ①	Output Phase Fault				2	308	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P6.1.2 ①	Ground Fault				2	309	See Par ID 308
P6.1.3	Ground Fault Limit	0	30	%	15	2158	
P6.1.4 ①	Motor Thermal Protection				2	310	See Par ID 308
P6.1.5	Motor Thermal F0 Current	0.0	150.0	%	40.00	311	
P6.1.7 ①	Stall Protection				0	313	See Par ID 308
P6.1.8	Stall Current Limit	0.1	ActiveMotorNomCurr*2	A	ActiveMotorNomCurr	314	
P6.1.9	Stall Time Limit	1.0	120.0	s	15.0	315	
P6.1.10	Stall Frequency Limit	1.00	See Par ID 102	Hz	15.00	316	
P6.1.11 ①	Underload Protection				0	317	See Par ID 308
P6.1.12	Underload Fnom Torque	10.0	150.0	%	50.0	318	
P6.1.13	Underload F0 Torque	5.0	150.0	%	10.0	319	
P6.1.14	Underload Time Limit	2.00	600.00	s	20.00	320	
P6.1.15 ①	Thermistor Fault Response				2	333	See Par ID 308
P6.1.16 ①	PT100 Fault Response				2	337	See Par ID 308
P6.1.17	Preheat Mode				0	2159	See Par ID 1346
P6.1.18 ②	Preheat Control Source				31	2160	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = SlotA PT100 Temp Channel 1 33 = SlotA PT100 Temp Channel 2 34 = SlotA PT100 Temp Channel 3 35 = SlotA Max PT100 Temp 36 = SlotB PT100 Temp Channel 1

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

Table 94. Motor — P6.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.1.18 ②	Preheat Control Source				31	2160	37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = SlotB Max PT100 Temp 40 = SlotA and SlotB Max PT100 Temp
P6.1.19	Preheat Enter Temp	-20.0	20.0	Deg. C	10.0	2161	
P6.1.20	Preheat Quit Temp	-10.0	40.0	Deg. C	20.0	2162	
P6.1.21	Preheat Output Volt	0.0	20.0	%	2.0	2163	

Table 95. Drive — P6.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.2.1	Line Start Lockout				2	750	0 = Disabled, No Change 1 = Enable, No Change 2 = Disabled, Changed 3 = Enable, Changed
P6.2.2	Fault Reset Start				0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset
P6.2.3 ①	4mA Input Fault				0	306	0 = No Action 1 = Warning 2 = Warning: Previous Freq 3 = Warning: Preset Freq 4 = Fault 5 = Fault, Coast
P6.2.4 ①	4mA Fault Frequency	0.00	See Par ID 102	Hz	0.00	331	
P6.2.5 ①	External Fault				2	307	See Par ID 308
P6.2.6 ①	Input Phase Fault				2	332	See Par ID 308
P6.2.7 ①	Uvolt Fault Response				2	330	See Par ID 308
P6.2.8 ①	Unit Under Temp Prot				2	1564	See Par ID 308
P6.2.9 ①	RTC Fault				1	955	See Par ID 308
P6.2.10 ①	Replace Battery Fault Response				1	1256	See Par ID 308
P6.2.11 ①	Replace Fan Fault Response				1	1257	See Par ID 308
P6.2.12	Cold Weather Mode				0	2126	See Par ID 1346
P6.2.13	Cold Weather Volt. Level	0.0	20.0	%	2.0	2127	
P6.2.14	Cold Weather Time Out	0	10	min	3	2128	
P6.2.15	Cold Weather Password					2129	
P6.2.16	Under Temp Fault Override					2130	See Par ID 2118
P6.2.17	STO Fault Response				2	2427	0 = No Action 1 = Warning 2 = Fault
P6.2.18	Warning Operation Mode				1	2657	0 = No Action 1 = Warning, No Store 2 = Warning, Store
P6.2.19	Fan Protection				2	2664	See Par ID 308
P6.2.20	Under Voltage Trip Level	DCLinkUnderVolt StopLimit	DCLinkOverVolt StopLimit	V	DCLinkUnderVolt ProtectLimit	2666	
P6.2.21 ①	OP Cont Interlock Protection				2	2831	See Par ID 308
P6.2.22 ①	CP Interlock Run Protection				2	2895	See Par ID 308
P6.2.23 ①	CP Interlock Stop Protection				1	2896	0 = No Action 1 = Warning, No Store

Note: ① Parameter value can only be changed after the drive has stopped.

Table 96. Communication — P6.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.3.1 ①	Fieldbus Fault Response				2	334	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast 4 = Warning, Coast
P6.3.2 ①	OPTCard Fault Response				2	335	See Par ID 308
P6.3.3 ①	IP Address Confliction Resp				1	1678	See Par ID 308
P6.3.4 ①	Keypad Comm Fault Response				2	2157	See Par ID 308

Table 97. Auto Restart — P6.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.4.1	AR Wait Time	1.00	300.00	s	1.00	321	
P6.4.2	AR Trail Time	0.00	600.00	s	30.00	322	
P6.4.3	AR Start Function				0	323	0 = Flying Start 1 = Ramp
P6.4.4	Undervoltage Attempts	0	10		1	324	
P6.4.5	OverVoltage Attempts	0	10		1	325	
P6.4.6	OverCurrent Attempts	0	3		0	326	
P6.4.7	4mA Fault Attempts	0	10		0	327	
P6.4.8	Motor Temp Fault Attempts	0	10		0	329	
P6.4.9	External Fault Attempts	0	10		0	328	
P6.4.10	Underload Attempts	0	10		0	336	
P6.4.11	OP Cont Interlock Attempts	0	10		0	2803	
P6.4.12	CP Interlock Attempts	0	10		1	2897	

PID Controller 1

Table 98. Basic Setting — P7.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1.1	PID1 Control Gain	0.00	200.00	%	100.00	1294	
P7.1.2	PID1 Control ITime	0.00	600.00	s	1.00	1295	
P7.1.3	PID1 Control DTime	0.00	100.00	s	0.00	1296	
P7.1.4 ①	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

Note: ① Parameter value can only be changed after the drive has stopped.

Table 98. Basic Setting — P7.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1.4 ①	PID1 Process Unit				0	1297	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
P7.1.4 ①	PID1 Process Unit				0	1297	40 = PA 41 = WC 42 = HG 43 = ft 44 = m
P7.1.5	PID1 Process Unit Min	-99999.99	See Par ID 1300	Varies	0.00	1298	
P7.1.6	PID1 Process Unit Max	See Par ID 1298	99999.99	Varies	100.00	1300	
P7.1.7	PID1 Process Unit Decimal	0	4		2	1302	
P7.1.8 ①	PID1 Error Inversion				0	1303	See Par ID 181
P7.1.9	PID1 Dead Band	0.00	99999.99	Varies	0.00	1304	
P7.1.10	PID1 Dead Band Delay	0.00	320.00	s	0.00	1306	
P7.1.11	PID1 Ramp Time	0.00	300.00	s	0.00	1311	

Table 99. Monitor — P7.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.2.1	FB PID1 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2542	
P7.2.2	FB PID1 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2544	
P7.2.3	FB PID1 Feedback 1			%		2550	
P7.2.4	FB PID1 Feedback 2			%		2551	
P7.2.5	FB PID1 Feedforward 1			%		2554	
P7.2.6	FB PID1 Feedforward 2			%		2555	

Setpoint

Table 100. Basic — P7.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.3.1.1	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307	
P7.3.1.2	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309	
P7.3.1.3	PID1 Wake Up Action				0	2466	0 = Below Wake Up Level 1 = Above Wake Up Level 2 = Below Wake Up Level (PID ref.) 3 = Above Wake Up Level (PID ref.)
P7.3.1.4	PID1 Sleep Boost level	-9999	9999	Varies	0	2660	
P7.3.1.5	PID1 Sleep Boost Max Time	1	300	s	30	2661	

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. Setpoint 1 — P7.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.3.2.1 ①②	PID1 Set Point 1 Source				1	1312	0 = Not Used 1 = PID1 Keypad Set Point 1 2 = PID1 Keypad Set Point 2 3 = AI1 4 = AI2 5 = Slot A: AI1 6 = Slot B: AI1 7 = FB Process Data Input 1 8 = FB Process Data Input 2 9 = FB Process Data Input 3 10 = FB Process Data Input 4 11 = FB Process Data Input 5 12 = FB Process Data Input 6 13 = FB Process Data Input 7 14 = FB Process Data Input 8 15 = PID2 Output 16 = FB PID1 Set Point 1 17 = FB PID1 Set Point 2
P7.3.2.2	PID1 Set Point 1 Min	-200.00	200.00	%	0.00	1313	
P7.3.2.3	PID1 Set Point 1 Max	-200.00	200.00	%	100.00	1314	
P7.3.2.4 ①	PID1 Set Point 1 Sleep Enable				0	1315	See Par ID 1346
P7.3.2.5 ①	PID1 Set Point 1 Sleep Unit Sel				0	2396	0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback
P7.3.2.6	PID1 Set Point 1 Sleep Level			Varies	0.00	2450	
P7.3.2.7	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P7.3.2.8	PID1 Set Point 1 Wake Up Level	-99999.99	99999.99	Varies	0.00	1318	
P7.3.2.9	PID1 Set Point 1 Boost	-2.0	2.0		1.0	1320	
P7.3.2.10	PID1 Set Point 1 Comp Enable				0	1352	See Par ID 1346
P7.3.2.11	PID1 Set Point 1 Comp Max	-200.00	200.00	%	0.00	1353	

Table 102. Setpoint 2 — P7.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.3.3.1 ①	PID1 Set Point 2 Source				2	1321	0 = Not Used
P7.3.3.2	PID1 Set Point 2 Min	-200.00	200.00	%	0.00	1322	
P7.3.3.3	PID1 Set Point 2 Max	-200.00	200.00	%	100.00	1323	
P7.3.3.4 ①	PID1 Set Point 2 Sleep Enable				0	1324	See Par ID 1346
P7.3.3.5 ①	PID1 Set Point 2 Sleep Unit Sel				0	2397	See Par ID 2396
P7.3.3.6	PID1 Set Point 2 Sleep Level			Varies	0.00	2452	
P7.3.3.7	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P7.3.3.8	PID1 Set Point 2 Wake Up Level	-99999.99	99999.99	Varies	0.00	1327	
P7.3.3.9	PID1 Set Point 2 Boost	-2.0	2.0		1.0	1329	
P7.3.3.10	PID1 Set Point 2 Comp Enable				0	1354	See Par ID 1346
P7.3.3.11	PID1 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1355	

Note: ① Parameter value can only be changed after the drive has stopped.

Feedback

Table 103. Basic — P7.4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.4.1.1 ①	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)
P7.4.1.2	PID1 Feedback Gain	-1000.0	1000.0	%	100.0	1331	

Table 104. Feedback 1 — P7.4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.4.2.1 ①②	PID1 Feedback 1 Source				2	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperature 14 = PID2 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID1 Feedback 1 22 = FB PID1 Feedback 2
P7.4.2.2	PID1 Feedback 1 Min	-200.00	200.00	%	0.00	1333	
P7.4.2.3	PID1 Feedback 1 Max	-200.00	200.00	%	100.00	1334	

Table 105. Feedback 2 — P7.4.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.4.3.1 ①②	PID1 Feedback 2 Source				0	1335	See Par ID 1332
P7.4.3.2	PID1 Feedback 2 Min	-200.00	200.00	%	0.00	1336	
P7.4.3.3	PID1 Feedback 2 Max	-200.00	200.00	%	100.00	1337	

Feedforward

Table 106. Basic — P7.5.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.5.1.1①	PID1 Feedforward Func				0	1338	See Par ID 1330
P7.5.1.2	PID1 Feedforward Gain	-1000.0	1000.0	%	100.0	1339	

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 106. Basic — P7.5.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.5.2.1 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperature 14 = PID2 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3
P7.5.2.1 ①②	PID1 Feedforward 1 Source				0	1340	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
P7.5.2.2	PID1 Feedforward 1 Min	-200.00	200.00	%	0.00	1341	
P7.5.2.3	PID1 Feedforward 1 Max	-200.00	200.00	%	100.00	1342	

Table 107. Feedforward 2 — P7.5.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.5.3.1 ①②	PID1 Feedforward 2 Source				0	1343	See Par ID 1340
P7.5.3.2	PID1 Feedforward 2 Min	-200.00	200.00	%	0.00	1344	
P7.5.3.3	PID1 Feedforward 2 Max	-200.00	200.00	%	100.00	1345	

PID Controller 2

Table 108. Basic Setting — P8.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.1.1	PID2 Control Gain	0.00	200.00	%	100.00	1356	
P8.1.2	PID2 Control I Time	0.00	600.00	s	1.00	1357	
P8.1.3	PID2 Control D Time	0.00	100.00	s	0.00	1358	
P8.1.4 ①	PID2 Process Unit				0	1359	See Par ID 1297
P8.1.5	PID2 Process Unit Min	-99999.99	See Par ID 1362	Varies	0.00	1360	
P8.1.6	PID2 Process Unit Max	See Par ID 1360	99999.99	Varies	100.00	1362	
P8.1.7	PID2 Process Unit Decimal	0	4		2	1364	
P8.1.8 ①	PID2 Error Inversion				0	1365	See Par ID 181
P8.1.9	PID2 Dead Band	0.00	99999.99	Varies	0.00	1366	
P8.1.10	PID2 Dead Band Delay	0.00	320.00	s	0.00	1368	
P8.1.11	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 109. Monitor — P8.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.2.1	FB PID2 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2546	
P8.2.2	FB PID2 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2548	
P8.2.3	FB PID2 Feedback 1			%		2552	
P8.2.4	FB PID2 Feedback 2			%		2553	
P8.2.5	FB PID2 Feedforward 1			%		2556	
P8.2.6	FB PID2 Feedforward 2			%		2557	

Setpoint

Table 110. Basic — P8.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.3.1.1	PID2 Keypad Set Point 1	See Par ID 1360	See Par ID 1362	Varies	0.00	1369	
P8.3.1.2	PID2 Keypad Set Point 2	See Par ID 1360	See Par ID 1362	Varies	0.00	1371	
P8.3.1.3	PID2 Wake Up Action				0	2467	See Par ID 2466
P8.3.1.4	PID2 Sleep Boost level	-9999	9999	Varies	0	2662	
P8.3.1.5	PID2 Sleep Boost Max Time	1	300	s	30	2663	

Table 111. Setpoint 1 — P8.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.3.2.1 ①	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
P8.3.2.2	PID2 Set Point 1 Min	-200.00	200.00	%	0.00	1375	
P8.3.2.3	PID2 Set Point 1 Max	-200.00	200.00	%	100.00	1376	
P8.3.2.4 ①	PID2 Set Point 1 Sleep Enable				0	1377	See Par ID 1346
P8.3.2.5 ①	PID2 Set Point 1 Sleep Unit Sel				0	2398	0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID2 Feedback
P8.3.2.6	PID2 Set Point 1 Sleep Level			Varies	0.00	2454	
P8.3.2.7	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379	
P8.3.2.8	PID2 Set Point 1 WakeUp Level	-99999.99	99999.99	Varies	0.00	1380	
P8.3.2.9	PID2 Set Point 1 Boost	-2.0	2.0		1.0	1382	
P8.3.2.10	PID2 Set Point1 Comp Enable				0	1414	See Par ID 1346
P8.3.2.11	PID2 Set Point1 Comp Max	-200.00	200.00	%	0.00	1415	

Note: ① Parameter value can only be changed after the drive has stopped.

Table 112. Setpoint 2 — P8.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.3.3.1 ①	PID2 Set Point 2 Source				2	1383	See Par ID 1374
P8.3.3.2	PID2 Set Point 2 Min	-200.00	200.00	%	0.00	1384	
P8.3.3.3	PID2 Set Point 2 Max	-200.00	200.00	%	100.00	1385	
P8.3.3.4 ①	PID2 Set Point 2 Sleep Enable				0	1386	See Par ID 1346
P8.3.3.5 ①	PID2 Set Point 2 Sleep Unit Sel				0	2399	See Par ID 2398
P8.3.3.6	PID2 Set Point 2 Sleep Level			Varies	0.00	2456	
P8.3.3.7	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388	
P8.3.3.8	PID2 Set Point 2 WakeUp Level	-99999.99	99999.99	Varies	0.00	1389	
P8.3.3.9	PID2 Set Point 2 Boost	-2.0	2.0		1.0	1391	
P8.3.3.10	PID2 Set Point 2 Comp Enable				0	1416	See Par ID 1346
P8.3.3.11	PID2 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1417	

Feedback

Table 113. Basic — P8.4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.4.1.1 ①	PID2 Feedback Func				0	1392	See Par ID 1330
P8.4.1.2	PID2 Feedback Gain	-1000.0	1000.0	%	100.0	1393	

Table 114. Feedback 1 — P8.4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.4.2.1 ①	PID2 Feedback 1 Source				2	1394	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperature 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
P8.4.2.2	PID2 Feedback 1 Min	-200.00	200.00	%	0.00	1395	
P8.4.2.3	PID2 Feedback 1 Max	-200.00	200.00	%	100.00	1396	

Table 115. Feedback 2 — P8.4.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.4.3.1 ①	PID2 Feedback 2 Source				0	1397	See Par ID 1394
P8.4.3.2	PID2 Feedback 2 Min	-200.00	200.00	%	0.00	1398	
P8.4.3.3	PID2 Feedback 2 Max	-200.00	200.00	%	100.00	1399	

Note: ① Parameter value can only be changed after the drive has stopped.

Feedforward

Table 116. Basic — P8.5.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.5.1.1 ①	PID2 Feedforward Func				0	1400	See Par ID 1330
P8.5.1.2	PID2 Feedforward Gain	-1000.0	1000.0	%	100.0	1401	

Table 117. Feedforward 1 — P8.5.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.5.2.1 ①	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 Temperature 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
P8.5.2.2	PID2 Feedforward 1 Min	-200.00	200.00	%	0.00	1403	
P8.5.2.3	PID2 Feedforward 1 Max	-200.00	200.00	%	100.00	1404	

Table 118. Feedforward 2 — P8.5.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.5.3.1 ①	PID2 Feedforward 2 Source				0	1405	See Par ID 1402
P8.5.3.2	PID2 Feedforward 2 Min	-200.00	200.00	%	0.00	1406	
P8.5.3.3	PID2 Feedforward 2 Max	-200.00	200.00	%	100.00	1407	

Table 119. Fire Mode — P9

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.1 ①	Fire Mode Function				0	535	0 = Closing Contact 1 = Opening Contact
P9.2 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
P9.3	Fire Mode Min Frequency	See Par ID 101	See Par ID 102	Hz	MotorNomFreqMFG	537	
P9.4	Fire Mode Freq Ref 1	0.0	100.0	%	75.0	565	
P9.5	Fire Mode Freq Ref 2	0.0	100.0	%	100.0	564	
P9.6	Fire Mode Test Enable					2443	See Par ID 1346
P9.7 ①	Smoke Purge Frequency	0.0	100.0	%	50.0	554	

Note: ① Parameter value can only be changed after the drive has stopped.

Bypass

Table 120. Basic Setting — P10.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.1.1 ①	Bypass Enable				1	1418	See Par ID 1346
P10.1.2 ①	Bypass Start Delay	1	32765	s	1	544	
P10.1.3 ①	Auto Bypass				1	542	See Par ID 1346
P10.1.4 ①	Auto Bypass Delay	0	32765	s	10	543	
P10.1.5 ①	OverCurrent Bypass Enable				1	547	See Par ID 1346
P10.1.6 ①	IGBT Fault Bypas Enable				1	546	See Par ID 1346
P10.1.7 ①	4mA Fault Bypass Enable				1	548	See Par ID 1346
P10.1.8 ①	UnderVoltage Bypass Enable				1	545	See Par ID 1346
P10.1.9 ①	OverVoltage Bypass Enable				1	549	See Par ID 1346
P10.1.10 ①	Motor OverTemp Bypass Enable				1	1698	See Par ID 1346
P10.1.11 ①	UnderLoad Bypass Enable				1	1699	See Par ID 1346
P10.1.12 ①	External Bypass Enable				1	1700	See Par ID 1346
P10.1.13 ①	Charge Switch Fault Bypass Enable				1	1701	See Par ID 1346
P10.1.14 ①	Saturation Trip Fault Bypass Enable				1	1702	See Par ID 1346
P10.1.15 ①	Under Temp Fault Bypass Enable				1	1703	See Par ID 1346
P10.1.16 ①	EEPROM Fault Bypass Enable				1	1704	See Par ID 1346
P10.1.17 ①	Control Board EEPROM Fault Bypass Enable				1	1705	See Par ID 1346
P10.1.18 ①	Watchdog Fault Bypass Enable				1	1706	See Par ID 1346
P10.1.19 ①	Fan Cooling Fault Bypass Enable				1	1707	See Par ID 1346
P10.1.20 ①	Keypad Com Fault Bypass Enable				1	1708	See Par ID 1346
P10.1.21 ①	Option Card Fault Bypass Enable				1	1709	See Par ID 1346
P10.1.22 ①	RTC Clock Fault Bypass Enable				1	1710	See Par ID 1346
P10.1.23 ①	Ctrl Board OverTemp Fault Bypass Enable				1	1711	See Par ID 1346
P10.1.24 ①	Speed Search Start Fault Bypass Enable				1	1712	See Par ID 1346
P10.1.25 ①	Fieldbus Fault Bypass Enable				1	1713	See Par ID 1346

Table 121. Redundant Drive — P10.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.2.1 ①	Redundant Drive Enable				0	2476	See Par ID 1346
P10.2.2 ①	Drive ID	0	5		0	2278	
P10.2.3	Redundant Run Time Enable				0	2477	See Par ID 1346
P10.2.4	Redundant Run Time Reset					2478	See Par ID 2125
P10.2.5	Redundant RunTime Limit	0.0	300000.0	h	0.0	2479	

Note: ① Parameter value can only be changed after the drive has stopped.

Real Time Clock

Table 122. Interval 1 — P11.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.1.1	Interval 1 Setting				0	2487	0 = Weekly 1 = Daily
P11.1.2	Interval 1 On Time				0	491	
P11.1.3	Interval 1 Off Time				0	493	
P11.1.4	Interval 1 From Day				0	517	0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday
P11.1.5	Interval 1 To Day				0	518	See Par ID 517
P11.1.6	Interval 1 Channel				0	519	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3

Table 123. Interval 2 — P11.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.2.1	Interval 2 Setting				0	2488	See Par ID 2487
P11.2.2	Interval 2 On Time				0	495	
P11.2.3	Interval 2 Off Time				0	497	
P11.2.4	Interval 2 From Day				0	520	See Par ID 517
P11.2.5	Interval 2 To Day				0	521	See Par ID 517
P11.2.6	Interval 2 Channel				0	522	See Par ID 519

Table 124. Interval 3 — P11.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.3.1	Interval 3 Setting				0	2489	See Par ID 2487
P11.3.2	Interval 3 On Time				0	499	
P11.3.3	Interval 3 Off Time				0	501	
P11.3.4	Interval 3 From Day				0	523	See Par ID 517
P11.3.5	Interval 3 To Day				0	524	See Par ID 517
P11.3.6	Interval 3 Channel				0	525	See Par ID 519

Table 125. Interval 4 — P11.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.4.1	Interval 4 Setting				0	2490	See Par ID 2487
P11.4.2	Interval 4 On Time				0	503	
P11.4.3	Interval 4 Off Time				0	505	
P11.4.4	Interval 4 From Day				0	526	See Par ID 517
P11.4.5	Interval 4 To Day				0	527	See Par ID 517
P11.4.6	Interval 4 Channel				0	528	See Par ID 519

Table 126. Interval 5 — P11.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.5.1	Interval 5 Setting				0	2491	See Par ID 2487
P11.5.2	Interval 5 On Time				0	507	
P11.5.3	Interval 5 Off Time				0	509	
P11.5.4	Interval 5 From Day				0	529	See Par ID 517
P11.5.5	Interval 5 To Day				0	530	See Par ID 517
P11.5.6	Interval 5 Channel				0	531	See Par ID 519

Table 127. Timer — P11.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.6.1	Timer 1 Duration	0	72000	s	0	511	
P11.6.2	Timer 1 Channel				0	532	See Par ID 519
P11.6.3	Timer 2 Duration	0	72000	s	0	513	
P11.6.4	Timer 2 Channel				0	533	See Par ID 519
P11.6.5	Timer 3 Duration	0	72000	s	0	515	
P11.6.6	Timer 3 Channel				0	534	See Par ID 519

Communication

Table 128. FB Process Data Input Sel — P12.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1.1	FB Process Data Input 1 Sel	0	3000		0	2533	
P12.1.2	FB Process Data Input 2 Sel	0	See Par ID 2533		2542	2534	
P12.1.3	FB Process Data Input 3 Sel	0	See Par ID 2533		2550	2535	
P12.1.4	FB Process Data Input 4 Sel	0	See Par ID 2533		0	2536	
P12.1.5	FB Process Data Input 5 Sel	0	See Par ID 2533		0	2537	
P12.1.6	FB Process Data Input 6 Sel	0	See Par ID 2533		0	2538	
P12.1.7	FB Process Data Input 7 Sel	0	See Par ID 2533		0	2539	
P12.1.8	FB Process Data Input 8 Sel	0	See Par ID 2533		0	2540	

Table 129. FB Process Data Output Sel — P12.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.2.1	FB Process Data Output 1 Sel				1	1556	
P12.2.2	FB Process Data Output 2 Sel				2	1557	
P12.2.3	FB Process Data Output 3 Sel				3	1558	
P12.2.4	FB Process Data Output 4 Sel				4	1559	
P12.2.5	FB Process Data Output 5 Sel				5	1560	
P12.2.6	FB Process Data Output 6 Sel				6	1561	
P12.2.7	FB Process Data Output 7 Sel				7	1562	
P12.2.8	FB Process Data Output 8 Sel				28	1563	

Table 129. FB Process Data Output Sel — P12.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.2.9 ②	Standard Status Word Bit0 Function Select				1	2415	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 11 = PID1 Superv 12 = PID2 Superv 13 = OverHeat Fault 14 = Ocurrent Fault 15 = Ovolt Fault 16 = Uvolt Fault 17 = 4mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Auto 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 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 43 = Motor 1 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 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = Fieldbus RTU Fault 65 = Fieldbus TCP Fault 66 = Fieldbus MSTP Fault 67 = Fieldbus EIP Fault 68 = Fieldbus SlotA Fault 69 = Fieldbus SlotB Fault 70 = Fieldbus SWD Fault 78 = CP Interlock Fault
P12.2.10 ②	Standard Status Word Bit1 Function Select				2	2416	See Par ID 2415
P12.2.11 ②	Standard Status Word Bit2 Function Select				3	2417	See Par ID 2415
P12.2.12 ②	Standard Status Word Bit3 Function Select				4	2418	See Par ID 2415

Note: ② Parameter value will be set to be default when changing macros.

Table 129. FB Process Data Output Sel — P12.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.2.13 ②	Standard Status Word Bit4 Function Select				5	2419	See Par ID 2415
P12.2.14 ②	Standard Status Word Bit5 Function Select				6	2420	See Par ID 2415
P12.2.15 ②	Standard Status Word Bit6 Function Select				7	2421	See Par ID 2415
P12.2.16 ②	Standard Status Word Bit7 Function Select				8	2422	See Par ID 2415

RS-485 Bus

Table 130. Basic Setting — P12.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.1.1 ①⑥	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP

Table 131. Modbus RTU — P12.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.2.1 ①⑥	Slave Address	1	247		1	587	
P12.3.2.2 ①⑥	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P12.3.2.3 ①⑥	Parity Type				2	585	0 = None 1 = Odd 2 = Even 3 = None and 1 stop bit
P12.3.2.4	Modbus RTU Protocol Status					588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P12.3.2.5	Comm Timeout Modbus RTU	0	60000	ms	10000	593	
P12.3.2.6	Modbus RTU Fault Response				0	2516	0 = in Fieldbus Control 1 = in all Control

Table 132. BACnet MS/TP — P12.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.3.1 ①⑥	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P12.3.3.2 ①⑥	MSTP Device Address	0	127		1	595	
P12.3.3.3 ①⑥	MSTP Instance Number	0	4194302		Varies	596	
P12.3.3.4	MSTP Comm Timeout	0	60000	ms	10000	598	
P12.3.3.5	MSTP Protocol Status					599	0 = Stopped 1 = Operational 2 = Faulted
P12.3.3.6	MSTP Fault Code					600	0 = None 1 = Sole Master
P12.3.3.7	MSTP Fault Response				0	2526	See Par ID 2516
P12.3.3.8 ①	MSTP Max Master				127	1537	

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.
⑥ Reset after modification.

Table 133. Basic Setting — 12.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.4.3 ①	SA Bus Instance Number	0	4194302		0	1728	
P12.3.4.4	SA Bus Comm Timeout	0	60000		10000	1730	
P12.3.4.5	SA Bus Protocol Status					1731	See Par ID 599
P12.3.4.6	SA Bus Fault Response				0	1732	See Par ID 2516

Ethernet Bus

Table 134. Basic Setting — P12.4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.1.1 ①⑥	IP Address Mode				1	1500	0 = Static IP 1 = DHCP with AutoIP
P12.4.1.2	Active IP Address					1507	
P12.4.1.3	Active Subnet Mask					1509	
P12.4.1.4	Active Default Gateway					1511	
P12.4.1.5	MAC Address					1513	
P12.4.1.6 ①⑥	Static IP Address				192.168.1.254	1501	
P12.4.1.7 ①⑥	Static Subnet Mask				255.255.255.0	1503	
P12.4.1.8 ①⑥	Static Default Gateway				192.168.1.1	1505	
P12.4.1.9 ①⑥	Enable BACnetIP				0	1725	See Par ID 1346
P12.4.1.10 ①⑥	Modbus TCP enable				0	1942	0 = Disable 1 = Enable

Table 135. Basic Setting — 12.4.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.4.1	WebUI Protocol Status					2915	0 = Off 1 = Operational 2 = Faulted
P12.4.4.2	WebUI Fault Response				0	2916	See Par ID 2516
P12.4.4.3	WebUI Communication Timeout	30000	60000	ms	60000	2919	
P12.4.4.4 ①	WebUI Enable				1	2921	See Par ID 1346

Table 136. Modbus TCP — P12.4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.2.1	Connection Limit				5	609	
P12.4.2.2	Modbus TCP Unit ID				1	610	
P12.4.2.3	Comm Timeout Modbus TCP	0	60000	ms	10000	611	
P12.4.2.4	Modbus TCP Protocol Status					612	See Par ID 599
P12.4.2.5	Modbus TCP Fault Response				0	2517	See Par ID 2516
P12.4.2.6	Modbus TCP Trusted IP Enable				1	74	See Par ID 1346
P12.4.2.7	Trusted IP White List				0xC0.0xA8. 0x01.0xFF. 0x00.0x00. 0x00.0x00. 0x00.0x00. 0x00.0x00	68	

Notes: ① Parameter value can only be changed after the drive has stopped.
⑥ Reset after modification.

Table 137. BACnet IP — P12.4.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.3.1 ①⑥	BACnet IP UDP port number				47808	1733	47808 = BAC0 47809 = BAC1 47810 = BAC2 47811 = BAC3 47812 = BAC4 47813 = BAC5 47814 = BAC6 47815 = BAC7 47816 = BAC8 47817 = BAC9 47818 = BACA 47819 = BACB 47820 = BACC 47821 = BACD 47822 = BACE 47823 = BACF
P12.4.3.2 ①⑥	BACnet IP Foreign Device				0	1734	See Par ID 1346
P12.4.3.3 ①⑥	BACnet IP BBMD IP				0.0.0.0	1735	
P12.4.3.4 ①⑥	BACnet IP BBMD Port				47808	1737	See Par ID 1733
P12.4.3.5 ①⑥	BACnet IP Registration Interval	0	65535		10	1738	
P12.4.3.6	BACnet IP Comm Timeout	0	60000		0	1739	
P12.4.3.7	BACnet IP Protocol Status					1740	See Par ID 599
P12.4.3.8	BACnet IP Fault Behavior				0	1741	See Par ID 2516
P12.4.3.9 ①⑥	BACnetIP Instance Number	0	4194302		Varies	1742	

Table 138. WebUI — 12.4.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.4.1	WebUI Protocol Status					2915	0 = Off 1 = Operational 2 = Faulted
P12.4.4.2	WebUI Fault Response				0	2916	See Par ID 2516
P12.4.4.3	WebUI Communication Timeout	30000	60000	ms	60000	2919	
P12.4.4.4 ①	WebUI Enable				1	2921	See Par ID 1346

Notes: ① Parameter value can only be changed after the drive has stopped.
⑥ Reset after modification.

System

Table 139. Basic Setting — P13.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.1.1	Language				0	340	0 = English 1 = Block 0—selected language at firmware update 2 = Block 1—selected language at firmware update
P13.1.2 ①	Application					142	0 = Basic 1 = PID 2 = Advanced
P13.1.3 ①	Parameter Sets					619	0 = No 1 = Reload Defaults 2 = Reload Set 1 3 = Reload Set 2 4 = Store Set 1 5 = Store Set 2 6 = Reset 7 = Reload Defaults VM
P13.1.4	Up To Keypad					620	See Par ID 2118
P13.1.5 ①	Down From Keypad					621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters
P13.1.6	Parameter Comparison					623	0 = No 1 = Compare with Keypad 2 = Compare with Default 3 = Compare with Set 1 4 = Compare with Set 2
P13.1.7	Password	0	9999		0	624	
P13.1.8	Parameter Lock				0	625	0 = Change Enable 1 = Change Disable
P13.1.9	Multimonitor Set				0	627	See Par ID 625
P13.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu 4 = Keypad Reference
P13.1.11	Timeout Time	0	65535	s	30	629	
P13.1.12	Contrast Adjust	5	18		12	630	
P13.1.13	Backlight Time	1	65535	min	10	631	
P13.1.14	Fan Control				2	632	0 = Continuous 1 = Temperature 2 = Run Follow 3 = Calculate IGBT Temp
P13.1.15	Keypad ACK Timeout	200	5000	ms	200	633	
P13.1.16	Keypad Retry Number	1	10		5	634	
P13.1.17	Startup Wizard				0	626	0 = Yes 1 = No
P13.1.18	Jog Softkey Hidden				0	2412	See Par ID 1346
P13.1.19	Reverse Softkey Hidden				1	2413	See Par ID 1346

Table 139. Basic Setting — P13.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.1.20	Output Display Unit				45	2424	0 = % 1 = 1/min 2 = rpm 3 = ppm 4 = pps 5 = l/s 6 = l/min 7 = l/h 8 = kg/s 9 = kg/min 10 = kg/h 11 = m3/s 12 = m3/min 13 = m3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVS 20 = kW 21 = Deg. C 22 = GPM 23 = gal/s 24 = gal/min 25 = gal/h 26 = lb/s 27 = lb/min 28 = lb/h 29 = CFM 40 = PA 41 = WC 42 = HG 43 = ft 44 = m 45 = Hz 46 = strokes/min
P13.1.21	Output Display Unit Min	-60000.00	See Par ID 2425	Varies	0.00	2460	
P13.1.22	Output Display Unit Max	See Par ID 2460	60000.00	Varies	Varies	2425	
P13.1.23	Keypad Lock Password	0	9999		0	75	

Table 140. Version Info — P13.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.2.1	Keypad Software Version					640	
P13.2.2	Motor Control Software Version					642	
P13.2.3	Application Software Version					644	
P13.2.4	Software Bundle Version					1714	

Table 141. Application Info — P13.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.3.1	Brake Chopper					646	See Par ID 2118
P13.3.2	Brake Resistor Status					647	See Par ID 2118
P13.3.3	Serial Number					648	
P13.3.4	Power Unit Serial Number					1270	
P13.3.5	Control Unit Serial Number					1276	
P13.3.6	Serial Number					1758	

Table 142. User Info — P13.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.4.1	Real Time Clock				0.0.0.1:1:13	566	
P13.4.2	Daylight Saving				0	582	0 = Off 1 = EU 2 = US
P13.4.3	Total MWh Count			Mwh		601	
P13.4.4	Total Power Day Count					603	
P13.4.5	Total Power Hr Count					606	
P13.4.6	Trip MWh Count			Mwh		604	
P13.4.7	Clear Trip MWh Count					635	See Par ID 2125
P13.4.8	Trip Power Day Count					636	
P13.4.9	Trip Power Hr Count					637	
P13.4.10	Clear Trip Power Count					639	See Par ID 2125

Table 143. Operate Mode — O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz		1	
O2	Freq Reference			Hz		24	
O3	Motor Speed			rpm		2	
O4	Motor Current			A		3	
O5	Motor Torque			%		4	
O6	Motor Power			%		5	
O7	Motor Voltage			V		6	
O8	DC-link Voltage			V		7	
O9	Unit Temperature			Deg. C		8	
O10	Motor Temperature			%		9	
R11	Keypad Reference	See Par ID 101	See Par ID 102	Hz	20.00	141	
R12	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307	
R13	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309	

Chapter 7—Advanced application parameter

The Advanced Application is designed for a large subset of applications in the HVAC industry. It includes some advanced timer and logic control to operate in addition to the Basic and PID applications functions listed earlier. It is designed to make use of the standard HOA control along with the control operations that would be used in advanced setups. Below is a list of features that is available.

Advanced Application includes functions:

- Bypass Control
- Fire Mode
- Damper Control
- Pre heat/cold weather mode
- Hand/Off/Auto in individual button for easy change of control mode.
- Damper Control
- Programmable Protections
- Programmable digital/analog input/output function
- Programmable start/stop signal logic
- Voltage and Current limiters
- Energy Savings Calculator
- Two independent set of Acceleration/Deceleration ramps
- Skip frequency
- Start source (Local/Remote control function)
- Reference source
- Flying start
- Volts per Hertz control programmable
- Real time clock—RTC time display
- RTC Timers and Interval control
- Auto restart on fault to drive or bypass
- Programmable switching frequency
- Multi-Preset speeds
- Fan control
- Joystick Control
- Logic Functions
- Bumpless transition between Hand and Auto
- Drooping

I/O Controls

- **Terminal To Function (TTF) Programming**

  The design behind the programming of the digital inputs in the DH1 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 DH1 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 in Appendix A 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. 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 ID190 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 "Force closed" the drive would always be in a start mode when in that control location.

Example:

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

DIGIN selection

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

Example:

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

Option board DigIN selection

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

Example:

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

Timer channel selection

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

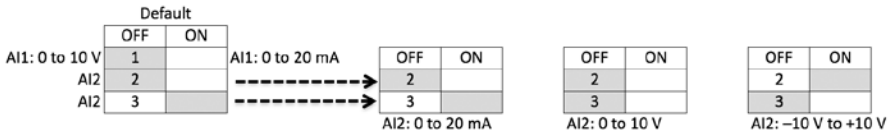
Example:

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

Control I/O configuration

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

Table 144. Advanced Application Default I/O Configuration



External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10V	Ref. Output Voltage	-	10VDC Supply Source
Res	2	AI1+ ①	Analog Input 1	0-10V	Voltage Speed Reference (Programmable to 4-20mA)
	3	AI1-	Analog Input 1 Ground	-	Analog Input 1 Common (Ground)
	4	AI2+ ①	Analog Input 2	4-20mA	Current Speed Reference (Programmable to 0-10V)
i	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	Fire Mode	Enables drive into Fire Mode
	9	DIN7	Digital Input 7\TI+	Bypass Start	Enables drive into Bypass mode waiting for drive start
	10	DIN8	Digital Input 8\TI-	Force Auto	Input forces drive into Auto Control place
	11	CMB	DI5 to DI8 Common	Grounded	Allows source input
	12	GND	I/O Signal Ground	-	I/O Ground for Reference and Control
	13	24Vo	+24VDC Output	-	Control voltage output (100mA Max)
	14	DO1	Digital Output 1	Ready	Shows the drive is ready to run
	15	24Vo	+24VDC Output	-	Control voltage output (100mA 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 - 60Hz (4-20mA)
	18	AO2+	Analog Output 2	Motor Current	Shows Motor current of motor 0-FLA (4-20mA)
	19	24Vi	+24VDC 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	Fault	Relay output 3 shows VFD is Faulted
	28	R1NC	Relay 1 Normally Closed	Bypass Run	Relay output 1 shows VFD is in a bypass run state
	29	R1CM	Relay 1 Common		
	30	R1NO	Relay 1 Normally Open		
	31	R3CM	Relay 3 Common	Fault	Relay output 3 shows VFD is Faulted
	32	R2NC	Relay 2 Normally Closed	Run	Relay output 2 shows VFD is in a drive run 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—ground (as shown by dashed line). If using +10 V for AI1 or AI2, terminals 3, 5, and 6 need to be jumpered together.
① AI1+ and AI2+ Support 10K potentiometer.

Table 145. 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
BACnet 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.

Advanced application—Parameters List

On the next pages you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given in the Appendix A. 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

Monitor

Table 146. Basic — M1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1.1	Output Frequency			Hz		1	
M1.2	Freq Reference			Hz		24	
M1.3	Motor Speed			rpm		2	
M1.4	Motor Current			A		3	
M1.5	Motor Torque			%		4	
M1.6	Motor Power			%		5	
M1.7	Motor Voltage			V		6	
M1.8	DC-link Voltage			V		7	
M1.9	Unit Temperature			Deg. C		8	
M1.10	Motor Temperature			%		9	
M1.11	Latest Fault Code					28	
M1.12	Instant Motor Power			kW		1686	
M1.13	RTC Battery Status					583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = OverVoltage

Table 147. IO Status — M2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M2.1	Analog Input 1			Varies		10	
M2.2	Analog Input 2			Varies		11	
M2.3	Analog Output 1			Varies		25	
M2.4	Analog Output 2			Varies		575	
M2.5	DI1, DI2, DI3					12	
M2.6	DI4, DI5, DI6					13	
M2.7	DI7, DI8					576	
M2.8	DO1,Virtual RO1,Virtual RO2					14	
M2.9	RO1, RO2, RO3					557	
M2.10	Control board DI status					3214	
M2.11	Control board DI status					3248	
M2.12	SlotA DI status					3249	

Table 148. Optional Boards — M3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M3.1	PT100 Temperature			Deg. C	1000.0	27	

Table 149. Energy Savings — M4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M4.1	Energy Savings			Varies	0.000	2120	

Table 150. FB Monitor Menu — M5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M5.1	Control Board DIDO Status					2209	Bit 0 = DI1_Status Bit 1 = DI2_Status Bit 2 = DI3_Status Bit 3 = DI4_Status Bit 4 = DI5_Status Bit 5 = DI6_Status Bit 6 = DI7_Status Bit 7 = DI8_Status Bit 8 = DO1_Status Bit 9 = RO1_Status Bit 10 = RO2_Status Bit 11 = RO3_Status Bit 12 = SlotA with board Bit 13 = SlotB with board Bit 14 = Virtual_RO1_Status Bit 15 = Virtual_RO2_Status
M5.2	SlotA DIDO Status					2210	Bit 0 = IO1_DI1 Bit 1 = IO1_DI2 Bit 2 = IO1_DI3 Bit 3 = IO1_DO1 Bit 4 = IO1_DO2 Bit 5 = IO1_DO3 Bit 6 = IO3_RO1 Bit 7 = IO3_RO2 Bit 8 = IO3_RO3 Bit 9 = IO5_AC1 Bit 10 = IO5_AC2 Bit 11 = IO5_AC3 Bit 12 = IO5_AC4 Bit 13 = IO5_AC5 Bit 14 = IO5_AC6
M5.3	SlotB DIDO Status					2211	Bit 0 = IO1_DI1 Bit 1 = IO1_DI2 Bit 2 = IO1_DI3 Bit 3 = IO1_DO1 Bit 4 = IO1_DO2 Bit 5 = IO1_DO3 Bit 6 = IO3_RO1 Bit 7 = IO3_RO2 Bit 8 = IO3_RO3 Bit 9 = IO5_AC1 Bit 10 = IO5_AC2 Bit 11 = IO5_AC3 Bit 12 = IO5_AC4 Bit 13 = IO5_AC5 Bit 14 = IO5_AC6 Bit 15 = Not Used

Table 150. FB Monitor Menu — M5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M5.4	Application Status Word					29	Bit 0 = MC_Ready Bit 1 = MC_Run Bit 2 = MC_Fault or Fault Trip Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning or AR Bit 7 = MC_ZeroSpeed Bit 8 = IO Control Indicator Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Control Indicator Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 = Run Bypass Bit 14 = External Brake Control Bit 15 = In Bypass Mode
							Bit 0 = Status Word Bit0 Bit 1 = Status Word Bit1 Bit 2 = Status Word Bit2 Bit 3 = Status Word Bit3 Bit 4 = Status Word Bit4 Bit 5 = Status Word Bit5 Bit 6 = Status Word Bit6 Bit 8 - 15 = Not Used
M5.5	Standard Status Word					2414	Bit 0 = See PAR ID 2415 (default = Ready) Bit 1 = See PAR ID 2416 (default = Run) Bit 2 = See PAR ID 2417 (default = Fault) Bit 3 = See PAR ID 2418 (default = Fault Invert) Bit 4 = See PAR ID 2419 (default = Warning) Bit 5 = See PAR ID 2420 (default = Reversed) Bit 6 = See PAR ID 2421 (default = At Speed) Bit 7 = See PAR ID 2422 (default = Zero Frequency) Bit 8 - 15 = Not Used
M5.6	FB Status Word					2101	Bit 0 = Ready Bit 1 = Run Bit 2 = Direction Bit 3 = Fault Bit 4 = Warning Bit 5 = At reference Bit 6 = Bypass Bit 7 = run enable Bit 8 = HOA status Bit 9 = HOA status Bit 10 = Run Delay Time Bit 11 = Not Used Bit 12 = Not Used Bit 13 = Not Used Bit 14 = Not Used Bit 15 = Not Used
M5.7	FB Control Word					2001	Bit 0 = Run_Stop Bit 1 = Forward_Rev Bit 2 = FaultReset Bit 3 = FB input data 1 Bit 4 = FB input data 2 Bit 5 = FB input data 3 Bit 6 = FB input data 4 Bit 7 = Bypass Bit 8 = FB_Ctrl Bit 9 = FB_Ref

Table 150. FB Monitor Menu — M5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M5.7	FB Control Word					2001	Bit 10 = HOA control Bit 11 = HOA control Bit 12 = Not Used Bit 13 = Not Used Bit 14 = Not Used Bit 15 = Not Used
M5.8	FB Speed Reference	0.00	100.00	%		2003	

Table 151. PID Monitor — M6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M6.1	PID1 Set Point			Varies		16	
M6.2	PID1 Feedback			Varies		18	
M6.3	PID1 Error Value			Varies		20	
M6.4	PID1 Output			%		22	
M6.5	PID1 Status					23	0 = Stopped 1 = Running 2 = Sleep Mode
M6.6	PID2 Set Point			Varies		32	
M6.7	PID2 Feedback			Varies		34	
M6.8	PID2 Error Value			Varies		36	
M6.9	PID2 Output			%		38	
M6.10	PID2 Status					39	See Par ID 23

Table 152. Timer/Interval Control — M7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M7.1	TC1, TC2, TC3					558	
M7.2	Interval 1					559	0 = Inactive 1 = Active
M7.3	Interval 2					560	See Par ID 559
M7.4	Interval 3					561	See Par ID 559
M7.5	Interval 4					562	See Par ID 559
M7.6	Interval 5					563	See Par ID 559
M7.7	Timer 1			s	0	569	
M7.8	Timer 2			s	0	571	
M7.9	Timer 3			s	0	573	

Table 153. User Defined Output — M8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M8.1	Output			Varies		2445	
M8.2	Reference			Varies		2447	

Table 154. MWH Monitor — M9

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M9.1	Total MWh Count			Mwh		601	
M9.2	Total Power Day Count					603	
M9.3	Total Power Hr Count					606	
M9.4	Trip MWh Count			Mwh		604	
M9.5	Trip Power Day Count					636	
M9.6	Trip Power Hr Count					637	
M9.7	Total Run Time Count					2827	
M9.8	Number of Starts					2830	
M9.9	Trip Run Time Count					2829	

Table 155. Multi-Monitoring — M11

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M11.1	Multi-Monitoring				2,1,3,2,1,3,2,1,3	1753	

Parameters

Table 156. Basic Parameters — P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1	Min Frequency	0.00	See Par ID 102	Hz	20.00	101	
P1.2 ①	Max Frequency	See Par ID 101	400.00	Hz	Varies	102	
P1.3	Accel Time 1	0.1	3000.0	s	20.00	103	
P1.4	Decel Time 1	0.1	3000.0	s	20.00	104	
P1.5 ①	Motor Nom Current	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrVT	486	
P1.6 ①	Motor Nom Speed	300	20000	rpm	Varies	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	Varies	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	Varies	488	
P1.10 ①	HOA Source				0	2465	0 = I/O Terminal/ Keypad/Fieldbus 1 = Keypad 2 = IO Terminal 3 = Fieldbus
P1.11	Hand Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.12 ①②	Hand 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
P1.13	Auto 1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal Start 2 3 = Keypad
P1.14 ①②	Auto 1 Reference				1	137	See Par ID 136
P1.15	Auto 2 Control Place				1	138	See Par ID 135

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. Basic Parameters — P1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.16 ①②	Auto 2 Reference				7	139	See Par ID 136
P1.17	Frequency reference upper limit	See Par ID 101	See Par ID 102	Hz	50.00	2840	
P1.18	Frequency reference upper limit source				0	2841	0 = Not Used 1 = Freq Ref upper 2 = AI1 3 = AI2
P1.19 ①②	Motor Type Selection				0	1820	0 = Inverter duty 1 = IPM 2 = SPM
P1.20	Compressor table version					1769	
P1.21	Compressor type selection				0	1770	

Table 157. Basic Setting — P2.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1 ①	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P2.1.2 ①	Damper Time Out	1	32500	s	5	484	
P2.1.3 ①	Damper Delay	1	32500	s	5	485	
P2.1.4	AI Ref Scale Min Value	0.00	See Par ID 145	Hz	0.00	144	
P2.1.5	AI Ref Scale Max Value	See Par ID 144	400.00	Hz	0.00	145	

Table 158. Digital Input — P2.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.2.1 ①	IO Terminal 1 Start Stop Logic				0	143	0 = Forward - Reverse 1 = Start - Reverse 2 = Start - Enable 3 = Start Pulse - Stop Pulse
P2.2.2 ②⑤	IO Terminal 1 Start Signal 1				2	190	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4

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.
⑤ Input function is edge sensed when using StartP/StopP start logic.

Table 158. Digital Input — P2.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.2.2 ②⑤	IO Terminal 1 Start Signal 1				2	190	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
P2.2.3 ②⑤	IO Terminal 1 Start Signal 2				3	191	See Par ID 190
P2.2.4 ①	IO Terminal 2 Start Stop Logic				0	2206	See Par ID 143
P2.2.5 ②⑤	IO Terminal 2 Start Signal 1				2	2207	See Par ID 190
P2.2.6 ②⑤	IO Terminal 2 Start Signal 2				3	2208	See Par ID 190
P2.2.7 ①	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P2.2.8 ②③	Reverse				0	198	See Par ID 190
P2.2.9 ②③	Ext. Fault 1 NO				4	192	See Par ID 190
P2.2.10 ②③	Ext. Fault 1 NC				1	193	See Par ID 190
P2.2.11	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 12 = Torque Limit
P2.2.12 ②③	Ext. Fault 2 NO				0	2293	See Par ID 190
P2.2.13 ②③	Ext. Fault 2 NC				1	2294	See Par ID 190
P2.2.14	Ext. Fault 2 Text				1	2298	See Par ID 2297
P2.2.15 ②③	Ext. Fault 3 NO				0	2295	See Par ID 190
P2.2.16 ②③	Ext. Fault 3 NC				1	2296	See Par ID 190
P2.2.17	Ext. Fault 3 Text				2	2299	See Par ID 2297
P2.2.18 ②④	Fault Reset				5	200	See Par ID 190
P2.2.19 ②③	Run Enable				1	194	See Par ID 190
P2.2.20 ②③	Preset Speed B0				6	205	See Par ID 190
P2.2.21 ②③	Preset Speed B1				0	206	See Par ID 190
P2.2.22 ②③	Preset Speed B2				0	207	See Par ID 190
P2.2.23 ②③	Jog Enable				0	199	See Par ID 190
P2.2.24 ②③	Accel/Decel Time Set				0	195	See Par ID 190
P2.2.25 ②③	Accel/Decel Prohibit				0	201	See Par ID 190
P2.2.26 ②④	No Access To Param				0	215	See Par ID 190
P2.2.27 ②③	Auto Control				9	196	See Par ID 190
P2.2.28 ②③	Hand Control				0	197	See Par ID 190
P2.2.29 ②③	Auto 1/2 Select				0	209	See Par ID 190
P2.2.30 ②③	HOA On/Off				1	2395	See Par ID 190

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

Table 158. Digital Input — P2.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.2.31 ②③	Second Motor Para Select				0	217	See Par ID 190
P2.2.32 ②④	Parameter Set1/2 Sel				0	2312	See Par ID 190
P2.2.33 ②③	AI Ref Source Select				0	208	See Par ID 190
P2.2.34 ②③	Bypass Start				8	218	See Par ID 190
P2.2.35 ②③	Bypass Overload				0	1246	See Par ID 190
P2.2.36 ②③	PID1 Control Enable				1	550	See Par ID 190
P2.2.37 ②③	PID2 Control Enable				1	553	See Par ID 190
P2.2.38 ②③	PID1 Set Point Select				0	351	See Par ID 190
P2.2.39 ②③	PID2 Set Point Select				0	352	See Par ID 190
P2.2.40 ②③	DC Brake Active				0	202	See Par ID 190
P2.2.41 ②③	Smoke Mode				0	219	See Par ID 190
P2.2.42 ②③	Fire Mode				7	220	See Par ID 190
P2.2.43 ②③	Fire Mode Ref 1/2 Select				0	221	See Par ID 190
P2.2.44 ②③	Fire Mode Reverse				0	2119	See Par ID 190
P2.2.45 ③	Start Timer 1				0	224	See Par ID 190
P2.2.46 ③	Start Timer 2				0	225	See Par ID 190
P2.2.47 ③	Start Timer 3				0	226	See Par ID 190
P2.2.48 ②③	OP Cont Interlock NO				0	2801	See Par ID 190
P2.2.49 ②③	OP Cont Interlock NC				1	2802	See Par ID 190
P2.2.50 ③	Accel Pot Value				0	203	See Par ID 190
P2.2.51 ③	Decel Pot Value				0	204	See Par ID 190
P2.2.52 ③	Reset Pot Zero				0	216	See Par ID 190
P2.2.53 ③	CP Interlock NC				1	2894	See Par ID 190

Table 159. Preset Speed — P2.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.3.1	Preset Speed 1	0.00	See Par ID 102	Hz	5.00	105	
P2.3.2	Preset Speed 2	0.00	See Par ID 102	Hz	10.00	106	
P2.3.3	Preset Speed 3	0.00	See Par ID 102	Hz	15.00	118	
P2.3.4	Preset Speed 4	0.00	See Par ID 102	Hz	20.00	119	
P2.3.5	Preset Speed 5	0.00	See Par ID 102	Hz	25.00	120	
P2.3.6	Preset Speed 6	0.00	See Par ID 102	Hz	30.00	121	
P2.3.7	Preset Speed 7	0.00	See Par ID 102	Hz	35.00	122	
P2.3.8	Jog Reference	See Par ID 101	See Par ID 102	Hz	0.00	117	

Table 160. AI1 Settings — P2.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.4.1	AI1 Mode				1	222	0 = 0 - 20 mA 1 = 0 -10 V
P2.4.2	AI1 Signal Range				0	175	0 = 0-100%/0-20mA/0-10V 1 = 20-100%/4-20mA/2-10V 2 = Customized
P2.4.3	AI1 Custom Min	0.00	See Par ID 177	%	0.00	176	
P2.4.4	AI1 Custom Max	See Par ID 176	100.00	%	100.00	177	
P2.4.5	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.4.6	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.4.7	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	

Notes: ② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed.

Table 160. AI1 Settings — P2.4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.4.8	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.4.9	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.4.10	AI1 Joystick Offset	-50.00	50.00	%	0.00	133	

Table 161. AI2 Settings — P2.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.5.1	AI2 Mode				0	223	0 = 0 - 20 mA 1 = 0 -10 V 2 = -10 - +10 V
P2.5.2	AI2 Signal Range				1	183	0 = 0-100%/0-20mA/0-10V/ -10-10V 1 = 20-100%/4-20mA/2-10V/ -6-10V 2 = Customized
P2.5.3	AI2 Custom Min	0.00	See Par ID 185	%	0.00	184	
P2.5.4	AI2 Custom Max	See Par ID 184	100.00	%	100.00	185	
P2.5.5	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.5.6	AI2 Signal Invert				0	189	See Par ID 181
P2.5.7	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.5.8	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.5.9	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
P2.5.10	AI2 Joystick Offset	-50.00	50.00	%	0.00	134	

Outputs

Table 162. Digital Output — P3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1.1 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 = Ocurrent Fault 15 = Ovolt Fault 16 = Uvolt Fault 17 = 4mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Auto Control 29 = Jog Speed Select

Note: ② Parameter value will be set to be default when changing macros.

Table 162. Digital Output — P3.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1.1 ②	DO1 Function				1	151	30 = Motor Therm Protection 31 = FB Digital Input 1 32 = FB Digital Input 2 33 = FB Digital Input 3 34 = FB Digital Input 4 35 = Damper Control 36 = TC1 Status 37 = TC2 Status 38 = TC3 Status 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 43 = Motor 1 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 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output 60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = Fieldbus RTU Fault 65 = Fieldbus TCP Fault 66 = Fieldbus MSTP Fault 67 = Fieldbus EIP Fault 68 = Fieldbus SlotA Fault 69 = Fieldbus SlotB Fault 70 = Fieldbus SWD Fault 78 = CP Interlock Fault
P3.1.2 ②	RO1 Function				62	152	See Par ID 151
P3.1.3	RO1 On Delay	0.0	320.0	s	0.0	2112	
P3.1.4	RO1 Off Delay	0.0	320.0	s	0.0	2113	
P3.1.5 ②	RO2 Function				2	153	See Par ID 151
P3.1.6	RO2 On Delay	0.0	320.0	s	0.0	2114	
P3.1.7	RO2 Off Delay	0.0	320.0	s	0.0	2115	
P3.1.8 ②	RO3 Function				3	538	See Par ID 151
P3.1.9	RO3 On Delay	0.0	320.0	s	0.0	2116	
P3.1.10	RO3 Off Delay	0.0	320.0	s	0.0	2117	
P3.1.11	RO3 Reverse				0	2118	0 = No 1 = Yes
P3.1.12 ②	Virtual RO1 Function				0	2463	See Par ID 151
P3.1.13 ②	Virtual RO2 Function				0	2464	See Par ID 151
P3.1.14	Virtual RO1 On Delay	0.0	320.0	s	0.0	2848	
P3.1.15	Virtual RO1 Off Delay	0.0	320.0	s	0.0	2849	
P3.1.16	Virtual RO2 On Delay	0.0	320.0	s	0.0	2850	
P3.1.17	Virtua IRO2 Off Delay	0.0	320.0	s	0.0	2851	

Note: ② Parameter value will be set to be default when changing macros.

Table 163. Supervisions — P3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.2.1 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P3.2.2	Freq Limit 1 Supv Val	0.00	See Par ID 102	Hz	0.00	155	
P3.2.3	Freq Limit 1 Supv Hyst	0.10	1.00	Hz	0.10	2200	
P3.2.4 ②	Freq Limit 2 Supv				0	157	See Par ID 154
P3.2.5	Freq Limit 2 Supv Val	0.00	See Par ID 102	Hz	0.00	158	
P3.2.6	Freq Limit 2 Supv Hyst	0.10	1.00	Hz	0.10	2201	
P3.2.7 ②	Torque Limit Supv				0	159	See Par ID 154
P3.2.8 ②	Torque Limit Supv Val	-1000.0	1000.0	%	100.0	160	
P3.2.9	Torque Limit Supv Hyst	1.0	5.0	%	1.0	2202	
P3.2.10	Ref Limit Supv				0	161	See Par ID 154
P3.2.11	Ref Limit Supv Val	0.00	See Par ID 102	Hz	0.00	162	
P3.2.12	Ref Limit Supv Hyst	0.10	1.00	Hz	0.10	2203	
P3.2.13	Temp Limit Supv				0	165	See Par ID 154
P3.2.14	Temp Limit Supv Val	-10.0	75.0	Deg. C	40.0	166	
P3.2.15	Temp Limit Supv Hyst	1.0	10.0	Deg. C	1.0	2204	
P3.2.16	Power Limit Supv				0	167	See Par ID 154
P3.2.17	Power Limit Supv Val	-200.0	200.0	%	0.0	168	
P3.2.18	Power Limit Supv Hyst	0.1	10.0	%	0.1	2205	
P3.2.19	AI Supv Select				0	170	0 = AI1 1 = AI2
P3.2.20	AI Limit Supv				0	171	See Par ID 154
P3.2.21	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P3.2.22	AI Supv Hyst	0.00	10.00	%	1.00	2198	
P3.2.23 ②	Motor Current 1 Supv				0	2189	See Par ID 154
P3.2.24	Motor Current 1 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190	
P3.2.25	Motor Current 1 Supv Hyst	0.1	1.0	A	0.1	2196	
P3.2.26 ②	Motor Current 2 Supv				0	2191	See Par ID 154
P3.2.27	Motor Current 2 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192	
P3.2.28	Motor Current 2 Supv Hyst	0.1	1.0	A	0.1	2197	
P3.2.29	Second AI Supv Select				0	2193	See Par ID 170
P3.2.30	Second AI Limit Supv				0	2194	See Par ID 154
P3.2.31	Second AI Limit Supv Val	0.00	100.00	%	0.00	2195	
P3.2.32	Second AI Supv Hyst	0.00	10.00	%	1.00	2199	
P3.2.33	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P3.2.34	PID1 Superv Upper Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1347	
P3.2.35	PID1 Superv Lower Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1349	
P3.2.36	PID1 Superv Delay	0	3000	s	0	1351	
P3.2.37	PID2 Superv Enable				0	1408	See Par ID 1346
P3.2.38	PID2 Superv Upper Limit	See Par ID 1360	See Par ID 1362	Varies	0.00	1409	
P3.2.39	PID2 Superv Lower Limit	See Par ID 1360	See Par ID 1362	Varies	0.00	1411	
P3.2.40	PID2 Superv Delay	0	3000	s	0	1413	

Note: ② Parameter value will be set to be default when changing macros.

Table 164. Analog Output 1 — P3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.3.1	AO1 Mode				0	227	See Par ID 222
P3.3.2 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
P3.3.2	AO1 Function				1	146	10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 14 = PID2 Setpoint 15 = PID2 Feedback 1 16 = PID2 Feedback 2 17 = PID2 Control Error Value 18 = PID2 Control Output 19 = AI1 20 = AI2 21 = Output Freq (-2-+2N) 22 = Motor Torque (-2-+2N) 23 = Motor Power (-2-+2N) 24 = PT100 Temperature 25 = FB Process Data Input 1 26 = FB Process Data Input 2 27 = FB Process Data Input 3 28 = FB Process Data Input 4 29 = FB Process Data Input 5 30 = FB Process Data Input 6 31 = FB Process Data Input 7 32 = FB Process Data Input 8 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2 35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current (-2-+2N)
P3.3.3	AO1 Minimum				1	149	0 = 0V / 0 mA 1 = 2V / 4 mA
P3.3.4	AO1 Filter Time	0.00	0.00	s	1.00	147	
P3.3.5	AO1 Scale	10	10	%	100	150	
P3.3.6	AO1 Inversion				0	148	See Par ID 181
P3.3.7	AO1 Offset	-100.00	-100.00	%	0.00	173	

Table 165. Analog Output 2 — P3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.4.1	AO2 Mode				0	228	See Par ID 222
P3.4.2 ②	AO2 Function				4	229	See Par ID 146
P3.4.3	AO2 Minimum				1	232	See Par ID 149
P3.4.4	AO2 Filter Time	0.00	10.00	s	1.00	230	
P3.4.5	AO2 Scale	10	1000	%	100	233	
P3.4.6	AO2 Inversion				0	231	See Par ID 181
P3.4.7	AO2 Offset	-100.00	100.00	%	0.00	234	

Note: ② Parameter value will be set to be default when changing macros.

Table 166. Logic Function — P3.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.5.1	Logic Function Select				0	751	0 = AND 1 = OR 2 = XOR
P3.5.2 ②	Logic Operation Input A				0	752	0 = Not Used 1 = Ready 2 = Run 3 = Fault 6 = Reversed 7 = Warning 8 = Zero Frequency 9 = Control from I/O 14 = Run Bypass/Drive 16 = In Bypass Mode 17 = At Speed 18 = Auto Control 19 = Freq Limit 1 Superv 20 = Freq Limit 2 Superv 22 = PID1 Superv 23 = PID2 Superv 24 = OverHeat Fault 28 = 4mA Ref Fault/Warning 29 = OverCurrent Regular 30 = OverVoltage Regular 31 = UnderVoltage Regular 32 = Torq Limit Superv 33 = Ref Limit Superv 34 = Un-Requested Rotation Direction 35 = Thermal Fault/Warning 36 = Bypass Enable 37 = Jog Speed Select 38 = Motor Therm Protection 39 = FB Digital Input 1 40 = FB Digital Input 2 41 = FB Digital Input 3 42 = FB Digital Input 4 43 = Damper Control 44 = TC1 Status 45 = TC2 Status 46 = TC3 Status 48 = Power Limit Superv 49 = Temp Limit Superv 50 = Analog Input Superv 56 = Logic Fulfilled
P3.5.2 ②	Logic Operation Input A				0	752	
P3.5.3 ②	Logic Operation Input B				0	753	See Par ID 752

Note: ② Parameter value will be set to be default when changing macros.

Drive Control

Table 167. Basic Setting — P4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1.1	Keypad Reference	See Par ID 101	See Par ID 102	Hz	20.00	141	
P4.1.2	Keypad Direction				0	116	0 = Forward 1 = Reverse
P4.1.3	Keypad Stop				1	114	0 = Enabled-Keypad Operation 1 = Always Enabled
P4.1.4	Hand Key Enable				0	1724	0 = Enabled 1 = Disabled
P4.1.5 ①	Reverse Enable				0	1679	See Par ID 1346
P4.1.6	Change PhaseSequence Motor				0	2515	0 = Change Disable 1 = Change Enable
P4.1.7	Power Up HOA Select				0	1685	0 = Hold Last 1 = Hand Control 2 = Auto control 3 = Off
P4.1.8	Bumpless Enable				0	2462	See Par ID 1346
P4.1.9	Run Delay Time	0	32500	s	0	2423	
P4.1.10	Start Mode				0	252	0 = Ramp 1 = Flying Start From Stop Frequency 2 = Flying Start From Max Frequency
P4.1.11	Stop Mode				0	253	0 = Coasting 1 = Ramp
P4.1.12	Ramp 1 Shape	0.0	10.0	s	0.0	247	
P4.1.13	Ramp 2 Shape	0.0	10.0	s	0.0	248	
P4.1.14	Accel Time 2	0.1	3000.0	s	10.0	249	
P4.1.15	Decel Time 2	0.1	3000.0	s	10.0	250	
P4.1.16	Power Loss Function				0	267	0 = Disabled
P4.1.17	Power Loss Time	0.3	5.0	s	2.0	268	
P4.1.18 ①	2nd Stage Ramp Frequency	See Par ID 101	See Par ID 102	Hz	30.00	2444	
P4.1.19	Run Remove Stop Mode				0	2667	See Par ID 253

Table 168. Brake — P4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.2.1 ①	DC-Brake Current	DriveNomCurrCT *15/100	DriveNomCurrCT *15/10	A	DriveNom CurrCT*1/2	254	
P4.2.2 ①	Start DC-Brake Time	0.00	600.00	s	0.00	263	
P4.2.3 ①	Stop DC-Brake Frequency	0.10	10.00	Hz	1.50	262	
P4.2.4 ①	Stop DC-Brake Time	0.00	600.00	s	0.00	255	
P4.2.5 ①	Brake Chopper Define				0	251	0 = Disabled 1 = B(Run) T(Rdy) 2 = External 3 = B(Rdy) T(Rdy) 4 = B(Run) T(No)
P4.2.6 ①	Flux Brake					266	0 = Off 1 = On
P4.2.7 ①	Flux Brake Current	ActiveMotor NomCurr*1/10	See Par ID 107	A	ActiveMotor NomCurr*1/2	265	

Note: ① Parameter value can only be changed after the drive has stopped.

Table 169. Skip Frequency — P4.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.3.1	Skip Range Ramp Factor	0.1	10.0		1.0	264	
P4.3.2	Skip F1 Low Limit	0.00	See Par ID 257	Hz	0.00	256	
P4.3.3	Skip F1 High Limit	See Par ID 256	400.00	Hz	0.00	257	
P4.3.4	Skip F2 Low Limit	0.00	See Par ID 259	Hz	0.00	258	
P4.3.5	Skip F2 High Limit	See Par ID 258	400.00	Hz	0.00	259	
P4.3.6	Skip F3 Low Limit	0.00	See Par ID 261	Hz	0.00	260	
P4.3.7	Skip F3 High Limit	See Par ID 260	400.00	Hz	0.00	261	

Table 170. Energy Savings Calc — P4.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.4.1	Currency				0	2122	0 = $ 1 = £ 2 = € 3 = ¥ 4 = Rs 5 = R$ 6 = Fr 7 = kr
P4.4.2	Energy Cost			Varies	0	2123	
P4.4.3	Data Type				0	2124	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P4.4.4	Energy Savings Reset					2125	0 = Not Reset 1 = Reset

Table 171. Motor Pot — P4.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.5.1	Motor Pot Ramp Time	0.1	2000.0	Hz/s	10.0	156	
P4.5.2	Motor Pot Ref Reset				0	169	0 = No Reset 1 = Reset: Stop + Power Down 2 = Reset: Power Down

Table 172. Foldback — P4.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.6.1	IGBT Temperature			Deg. C		776	
P4.6.2	Foldback status					1771	0 = Inactive 1 = Active 2 = On hold
P4.6.3	Foldback output frequency			Hz		1772	
P4.6.4	Foldback output speed			rpm		1773	
P4.6.5	Foldback enable				0	1774	See Par ID 1346
P4.6.6	Foldback temperature	0	120	Deg. C	80	1775	
P4.6.7	Recovering temperature	0	120	Deg. C	70	1776	
P4.6.8	Foldback speed reduce rate	0	200	rpm/s	20	1777	
P4.6.9	Foldback minimum speed	0	10000	rpm	2000	1778	
P4.6.10	Foldback fault timeout	0	200	s	30	1779	

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.

Motor Control

Table 173. Basic Setting — P5.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1.1 ①②	Motor Control Mode				0	287	0 = Freq Control 1 = Speed Control 5 = Open Loop Speed Control 6 = Open Loop Torque Control
P5.1.2 ②	Current Limit	DriveNom CurrCT*1/10	DriveNom CurrCT*2	A	DriveNom CurrCT*2	107	
P5.1.3 ①	V/Hz Optimization				0	109	See Par ID 1346
P5.1.4 ①	V/Hz Ratio				0	108	0 = Linear 1 = Squared 2 = Programmable 3 = Linear + Flux Optimization
P5.1.5 ①	Field Weakening Point	8.00	400.00	Hz	Varies	289	
P5.1.6 ①	Voltage at FWP	10.00	200.00	%	100.00	290	
P5.1.7 ①	V/Hz Mid Frequency	0.00	See Par ID 289	Hz	Varies	291	
P5.1.8 ①	V/Hz Mid Voltage	0.00	100.00	%	100.00	292	
P5.1.9 ①	Zero Frequency Voltage	0.00	40.00	%	0.00	293	
P5.1.10	Switching Frequency	MinSwitchFreq	MaxSwitchFreq	kHz	DefaultSwitch FreqCT	288	
P5.1.11	Sine Filter Enable				0	1665	See Par ID 1346
P5.1.12 ①	OverVoltage Control				1	294	See Par ID 1346
P5.1.13	Load Drooping	0.00	100.00	%	0.00	298	
P5.1.14	Droop Control Filter Time Constant	0	3000	ms	0	1630	
P5.1.15	Overmodulation Enable					2835	
P5.1.16	Speed Control Kp0	0.0	1000.0	%	0.0	1593	
P5.1.17	Speed Control Ti0	0.0	3200.0	ms	0.0	1594	
P5.1.18	Speed Control F0	0.00	See Par ID 1598	Hz	5.00	1597	
P5.1.19	Speed Control F1	See Par ID 1597	See Par ID 289	Hz	10.00	1598	
P5.1.20	Speed Control Kp1	0.0	1000.0	%	0.0	1599	
P5.1.21	Speed Control Ti1	0.0	3200.0	ms	0.0	1600	
P5.1.22	Motoring Torque Limit	0.0	300.0	%	300.0	1602	
P5.1.23	Generator Torque Limit	0.0	300.0	%	300.0	1603	
P5.1.24	Torque Limit Forward	0.0	300.0	%	300.0	1604	
P5.1.25	Torque Limit Reverse	0.0	300.0	%	300.0	1605	
P5.1.26	Motoring Power Limit	0.0	300.0	%	300.0	1607	
P5.1.27	Generator Power Limit	0.0	300.0	%	300.0	1608	
P5.1.28	Flux Reference	0.0	500.0	%	100.0	1620	
P5.1.29	Droop Control Filter Time Constant	0	3000	ms	0	1630	
P5.1.30	Startup Torque Selection				0	1631	0 = Not Used 1 = TorqueMemory 2 = Reserve 3 = StartupTorqueFWD/REV
P5.1.31	Torque Memory Start	-300.0	300.0	%	0.0	1632	
P5.1.32 ①	Stator Resistor	0.001	65.535	ohm	0.001	771	
P5.1.33 ①	Leak Inductance	0.01	655.35	mh	0.12	773	
P5.1.34	V/F Stable Kd	0	3000	%	100	1656	
P5.1.35	V/F Stable Kq	0	3000	%	100	1657	
P5.1.36 ①	Motor Inertia	0.001	65.535		0.038	2837	
P5.1.37 ①	PM BEMF Voltage	0.0	6553.5	V	0.1	1882	

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. Basic Setting — P5.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.1.38 ①	PM q-axis stator inductance	0.00	655.35	mh	0.01	1883	
P5.1.39 ①	PM d-axis stator inductance	0.00	655.35	mh	0.01	1884	
P5.1.40 ①	PM Initial Selection				1	1890	0 = Align 1 = Six Pluse 2 = HFI
P5.1.41 ①	PM Initial Time	0.0	60.0	s	0.7	1891	
P5.1.42 ①	PM excited Current	0	200	%	20	1892	
P5.1.43 ①	PM excited Current off frequency	10.00	See Par ID 488	%	20.00	1893	
P5.1.44	Observer Kp	1	3000	%	100	2901	
P5.1.45 ②	Identification				0	299	0 = No Action 1 = Identification Only Stator Resistor 2 = Identification with Run 3 = Identification No Run 4 = Identification Only Inertia
P5.1.46	Slip Compensation Coefficient	0	500	%	100	1664	
P5.1.47 ①	Pulse Off Frequency	10	35	%	30	1768	

Table 174. Second Motor Parameter — P5.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.2.1 ①	Motor Nom Current 2	DriveNom CurrCT*1/10	DriveNom CurrCT*2	A	DriveNomCurrVT	577	
P5.2.2 ①	Motor Nom Speed 2	300	20000	rpm	Varies	578	
P5.2.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P5.2.4 ①	Motor Nom Volt 2	180	690	V	Varies	580	
P5.2.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	Varies	581	
P5.2.6	V/F Stable Kd	0	3000	%	100	1656	
P5.2.7	V/F Stable Kq	0	3000	%	100	1657	
P5.2.8 ①	Stator Resistor 2	0.001	65.535	ohm	0.033	1419	
P5.2.9 ①	Leak Inductance 2	0.01	655.35	mh	0.12	1421	
P5.2.10 ①	Motor Inertia 2	0.001	65.535		0.100	2838	
P5.2.11 ①	Second PM BEMF Voltage	0.0	6553.5	V	0.1	2842	
P5.2.12 ①	Second PM q-axis stator inductance	0.00	655.35	mh	0.01	2843	
P5.2.13 ①	Second PM d-axis stator inductance	0.00	655.35	mh	0.01	2844	

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.

Protections

Table 175. Motor — P6.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.1.1 ①	Output Phase Fault				2	308	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P6.1.2 ①	Ground Fault				2	309	See Par ID 308
P6.1.3	Ground Fault Limit	0	30	%	15	2158	
P6.1.4 ①	Motor Thermal Protection				2	310	See Par ID 308
P6.1.5	Motor Thermal F0 Current	0.0	150.0	%	40.00	311	
P6.1.7 ①	Stall Protection				0	313	See Par ID 308
P6.1.8	Stall Current Limit	0.1	ActiveMotor NomCurr*2	A	ActiveMotor NomCurr	314	
P6.1.9	Stall Time Limit	1.0	120.0	s	15.0	315	
P6.1.10	Stall Frequency Limit	1.00	See Par ID 102	Hz	15.00	316	
P6.1.11 ①	Underload Protection				0	317	See Par ID 308
P6.1.12	Underload Fnom Torque	10.0	150.0	%	50.0	318	
P6.1.13	Underload F0 Torque	5.0	150.0	%	10.0	319	
P6.1.14	Underload Time Limit	2.00	600.00	s	20.00	320	
P6.1.15 ①	Thermistor Fault Response				2	333	See Par ID 308
P6.1.16 ①	PT100 Fault Response				2	337	See Par ID 308
P6.1.17	Preheat Mode				0	2159	See Par ID 1346
P6.1.18 ②	Preheat Control Source				31	2160	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = SlotA PT100 Temp Channel 1 33 = SlotA PT100 Temp Channel 2 34 = SlotA PT100 Temp Channel 3

Note: ① Parameter value can only be changed after the drive has stopped.

Table 175. Motor — P6.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.1.18 ②	Preheat Control Source				31	2160	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
P6.1.19	Preheat Enter Temp	-20.0	20.0	Deg. C	10.0	2161	
P6.1.20	Preheat Quit Temp	-10.0	40.0	Deg. C	20.0	2162	
P6.1.21	Preheat Output Volt	0.0	20.0	%	2.0	2163	
P6.2.22 ①	CP Interlock Run Protection				2	2895	See Par ID 308
P6.2.23 ①	CP Interlock Stop Protection				1	2896	0 = No Action 1 = Warning, No Store

Table 176. Drive — P6.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.2.1	Line Start Lockout				2	750	0 = Disabled, No Change 1 = Enable, No Change 2 = Disabled, Changed 3 = Enable, Changed
P6.2.2	Fault Reset Start				0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset
P6.2.3 ①	4mA Input Fault				0	306	0 = No Action 1 = Warning 2 = Warning: Previous Freq 3 = Warning: Preset Freq 4 = Fault 5 = Fault, Coast
P6.2.4 ①	4mA Fault Frequency	0.00	See Par ID 102	Hz	0.00	331	
P6.2.5 ①	External Fault				2	307	See Par ID 308
P6.2.6 ①	Input Phase Fault				2	332	See Par ID 308
P6.2.7 ①	Uvolt Fault Response				2	330	See Par ID 308
P6.2.8 ①	Unit Under Temp Prot				2	1564	See Par ID 308
P6.2.9 ①	RTC Fault				1	955	See Par ID 308
P6.2.10 ①	Replace Battery Fault Response				1	1256	See Par ID 308
P6.2.11 ①	Replace Fan Fault Response				1	1257	See Par ID 308
P6.2.12	Cold Weather Mode				0	2126	See Par ID 1346
P6.2.13	Cold Weather Volt. Level	0.0	20.0	%	2.0	2127	
P6.2.14	Cold Weather Time Out	0	10	min	3	2128	
P6.2.15	Cold Weather Password					2129	
P6.2.16	Under Temp Fault Override					2130	See Par ID 2118
P6.2.17	STO Fault Response				2	2427	0 = No Action 1 = Warning 2 = Fault
P6.2.18	Warning Operation Mode					2657	0 = No Action 1 = Warning, Do not Store data 2 = Warning, Store data
P6.2.19	Fan Protection					2664	
P6.2.20	Under Voltage Trip Level					2666	
P6.2.21 ②	OP Cont Interlock Protection					2831	

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 177. Communication — P6.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.3.1 ①	Fieldbus Fault Response				2	334	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast 4 = Warning, Coast
P6.3.2 ①	OPTCard Fault Response				2	335	See Par ID 308
P6.3.3 ①	IP Address Confliction Resp				1	1678	See Par ID 308
P6.3.4 ①	Keypad Comm Fault Response				2	2157	See Par ID 308

Table 178. Auto Restart — P6.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.4.1	AR Wait Time	1.00	300.00	s	1.00	321	
P6.4.2	AR Trail Time	0.00	600.00	s	30.00	322	
P6.4.3	AR Start Function				0	323	0 = Flying Start 1 = Ramp
P6.4.4	Undervoltage Attempts	0	10		1	324	
P6.4.5	OverVoltage Attempts	0	10		1	325	
P6.4.6	OverCurrent Attempts	0	3		0	326	
P6.4.7	4mA Fault Attempts	0	10		0	327	
P6.4.8	Motor Temp Fault Attempts	0	10		0	329	
P6.4.9	External Fault Attempts	0	10		0	328	
P6.4.10	Underload Attempts	0	10		0	336	
P6.4.11	OP Cont Interlock Attempts				0	2803	
P6.4.12	CP Interlock Attempts	0	10		1	2897	

PID Controller 1

Table 179. Basic Setting — P7.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1.1	PID1 Control Gain	0.00	200.00	%	100.00	1294	
P7.1.2	PID1 Control ITime	0.00	600.00	s	1.00	1295	
P7.1.3	PID1 Control DTime	0.00	100.00	s	0.00	1296	
P7.1.4 ①	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

Note: ① Parameter value can only be changed after the drive has stopped.

Table 179. Basic Setting — P7.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1.4 ①	PID1 Process Unit				0	1297	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
P7.1.5	PID1 Process Unit Min	-99999.99	See Par ID 1300	Varies	0.00	1298	
P7.1.6	PID1 Process Unit Max	See Par ID 1298	99999.99	Varies	100.00	1300	
P7.1.7	PID1 Process Unit Decimal	0	4		2	1302	
P7.1.8 ①	PID1 Error Inversion				0	1303	See Par ID 181
P7.1.9	PID1 Dead Band	0.00	99999.99	Varies	0.00	1304	
P7.1.10	PID1 Dead Band Delay	0.00	320.00	s	0.00	1306	
P7.1.11	PID1 Ramp Time	0.00	300.00	s	0.00	1311	

Table 180. Monitor — P7.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.2.1	FB PID1 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2542	
P7.2.2	FB PID1 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2544	
P7.2.3	FB PID1 Feedback 1			%		2550	
P7.2.4	FB PID1 Feedback 2			%		2551	
P7.2.5	FB PID1 Feedforward 1			%		2554	
P7.2.6	FB PID1 Feedforward 2			%		2555	

Setpoint

Table 181. Basic — P7.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.3.1.1	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307	
P7.3.1.2	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309	
P7.3.1.3	PID1 Wake Up Action				0	2466	0 = Below Wake Up Level 1 = Above Wake Up Level 2 = Below Wake Up Level(PID ref.) 3 = Above Wake Up Level(PID ref.)
P7.3.1.4	PID1 Sleep Boost Level					2660	
P7.3.1.5	PID1 Sleep Boost Max Time					2661	

Note: ① Parameter value can only be changed after the drive has stopped.

Table 182. Setpoint 1 — P7.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.3.2.1 ①	PID1 Set Point 1 Source				1	1312	0 = Not Used 1 = PID1 Keypad Set Point 1 2 = PID1 Keypad Set Point 2 3 = AI1 4 = AI2 5 = Slot A: AI1 6 = Slot B: AI1 7 = FB Process Data Input 1 8 = FB Process Data Input 2 9 = FB Process Data Input 3 10 = FB Process Data Input 4 11 = FB Process Data Input 5 12 = FB Process Data Input 6 13 = FB Process Data Input 7 14 = FB Process Data Input 8 15 = PID2 Output 16 = FB PID1 Set Point 1 17 = FB PID1 Set Point 2
P7.3.2.2	PID1 Set Point 1 Min	-200.00	200.00	%	0.00	1313	
P7.3.2.3	PID1 Set Point 1 Max	-200.00	200.00	%	100.00	1314	
P7.3.2.4 ①	PID1 Set Point 1 Sleep Enable				0	1315	See Par ID 1346
P7.3.2.5 ①	PID1 Set Point 1 Sleep Unit Sel				0	2396	0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback
P7.3.2.6	PID1 Set Point 1 Sleep Level			Varies	0.00	2450	
P7.3.2.7	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P7.3.2.8	PID1 Set Point 1 Wake Up Level	-99999.99	99999.99	Varies	0.00	1318	
P7.3.2.9	PID1 Set Point 1 Boost	-2.0	2.0		1.0	1320	
P7.3.2.10	PID1 Set Point 1 Comp Enable				0	1352	See Par ID 1346
P7.3.2.11	PID1 Set Point 1 Comp Max	-200.00	200.00	%	0.00	1353	

Table 183. Setpoint 2 — P7.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.3.3.1 ①②	PID1 Set Point 2 Source				2	1321	0 = Not Used
P7.3.3.2	PID1 Set Point 2 Min	-200.00	200.00	%	0.00	1322	
P7.3.3.3	PID1 Set Point 2 Max	-200.00	200.00	%	100.00	1323	
P7.3.3.4 ①	PID1 Set Point 2 Sleep Enable				0	1324	See Par ID 1346
P7.3.3.5 ①	PID1 Set Point 2 Sleep Unit Sel				0	2397	See Par ID 2396
P7.3.3.6	PID1 Set Point 2 Sleep Level			Varies	0.00	2452	
P7.3.3.7	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P7.3.3.8	PID1 Set Point 2 Wake Up Level	-99999.99	99999.99	Varies	0.00	1327	
P7.3.3.9	PID1 Set Point 2 Boost	-2.0	2.0		1.0	1329	
P7.3.3.10	PID1 Set Point 2 Comp Enable				0	1354	See Par ID 1346
P7.3.3.11	PID1 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1355	

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

Feedback

Table 184. Basic — P7.4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.4.1.1 ①	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)
P7.4.1.2	PID1 Feedback Gain	-1000.0	1000.0	%	100.0	1331	

Table 185. Feedback 1 — P7.4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.4.2.1 ①②	PID1 Feedback 1 Source				2	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperature 14 = PID2 Output
P7.4.2.1 ①②	PID1 Feedback 1 Source				2	1332	15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID1 Feedback 1 22 = FB PID1 Feedback 2
P7.4.2.2	PID1 Feedback 1 Min	-200.00	200.00	%	0.00	1333	
P7.4.2.3	PID1 Feedback 1 Max	-200.00	200.00	%	100.00	1334	

Table 186. Feedback 2 — P7.4.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.4.3.1①②	PID1 Feedback 2 Source				0	1335	See Par ID 1332
P7.4.3.2	PID1 Feedback 2 Min	-200.00	200.00	%	0.00	1336	
P7.4.3.3	PID1 Feedback 2 Max	-200.00	200.00	%	100.00	1337	

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.

Feedforward

Table 187. Basic — P7.5.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.5.1.1 ①	PID1 Feedforward Func				0	1338	See Par ID 1330
P7.5.1.2	PID1 Feedforward Gain	-1000.0	1000.0	%	100.0	1339	

Table 188. Feedforward 1 — P7.5.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.5.2.1 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperature 14 = PID2 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID1 Feedforward 1 22 = FB PID1 Feedforward 2
P7.5.2.2	PID1 Feedforward 1 Min	-200.00	200.00	%	0.00	1341	
P7.5.2.3	PID1 Feedforward 1 Max	-200.00	200.00	%	100.00	1342	

Table 189. Feedforward 2 — P7.5.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.5.3.1 ①②	PID1 Feedforward 2 Source				0	1343	See Par ID 1340
P7.5.3.2	PID1 Feedforward 2 Min	-200.00	200.00	%	0.00	1344	
P7.5.3.3	PID1 Feedforward 2 Max	-200.00	200.00	%	100.00	1345	

PID Controller 2

Table 190. Basic Setting — P8.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.1.1	PID2 Control Gain	0.00	200.00	%	100.00	1356	
P8.1.2	PID2 Control I Time	0.00	600.00	s	1.00	1357	
P8.1.3	PID2 Control D Time	0.00	100.00	s	0.00	1358	
P8.1.4 ①	PID2 Process Unit				0	1359	See Par ID 1297
P8.1.5	PID2 Process Unit Min	-99999.99	See Par ID 1362	Varies	0.00	1360	
P8.1.6	PID2 Process Unit Max	See Par ID 1360	99999.99	Varies	100.00	1362	
P8.1.7	PID2 Process Unit Decimal	0	4		2	1364	

Note: ① Parameter value can only be changed after the drive has stopped.

Table 190. Basic Setting — P8.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.1.8 ①	PID2 Error Inversion				0	1365	See Par ID 181
P8.1.9	PID2 Dead Band	0.00	99999.99	Varies	0.00	1366	
P8.1.10	PID2 Dead Band Delay	0.00	320.00	s	0.00	1368	
P8.1.11	PID2 Ramp Time	0.00	300.00	s	0.00	1373	

Table 191. Monitor — P8.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.2.1	FB PID2 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2546	
P8.2.2	FB PID2 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2548	
P8.2.3	FB PID2 Feedback 1			%		2552	
P8.2.4	FB PID2 Feedback 2			%		2553	
P8.2.5	FB PID2 Feedforward 1			%		2556	
P8.2.6	FB PID2 Feedforward 2			%		2557	

Setpoint

Table 192. Basic — P8.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.3.1.1	PID2 Keypad Set Point 1	See Par ID 1360	See Par ID 1362	Varies	0.00	1369	
P8.3.1.2	PID2 Keypad Set Point 2	See Par ID 1360	See Par ID 1362	Varies	0.00	1371	
P8.3.1.3	PID2 Wake Up Action				0	2467	See Par ID 2466
P8.3.1.4	PID2 Sleep Boost level					2662	
P8.3.1.5	PID2 Sleep Boost Max Time					2663	

Table 193. Setpoint 1 — P8.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.3.2.1 ①	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
P8.3.2.2	PID2 Set Point 1 Min	-200.00	200.00	%	0.00	1375	
P8.3.2.3	PID2 Set Point 1 Max	-200.00	200.00	%	100.00	1376	
P8.3.2.4 ①	PID2 Set Point 1 Sleep Enable				0	1377	See Par ID 1346
P8.3.2.5 ①	PID2 Set Point 1 Sleep Unit Sel				0	2398	0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID2 Feedback

Note: ① Parameter value can only be changed after the drive has stopped.

Table 193. Setpoint 1 — P8.3.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.3.2.6	PID2 Set Point 1 Sleep Level			Varies	0.00	2454	
P8.3.2.7	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379	
P8.3.2.8	PID2 Set Point 1 WakeUp Level	-99999.99	99999.99	Varies	0.00	1380	
P8.3.2.9	PID2 Set Point 1 Boost	-2.0	2.0		1.0	1382	
P8.3.2.10	PID2 Set Point1 Comp Enable				0	1414	See Par ID 1346
P8.3.2.11	PID2 Set Point1 Comp Max	-200.00	200.00	%	0.00	1415	

Table 194. Setpoint 2 — P8.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.3.3.1 ①	PID2 Set Point 2 Source				2	1383	See Par ID 1374
P8.3.3.2	PID2 Set Point 2 Min	-200.00	200.00	%	0.00	1384	
P8.3.3.3	PID2 Set Point 2 Max	-200.00	200.00	%	100.00	1385	
P8.3.3.4 ①	PID2 Set Point 2 Sleep Enable				0	1386	See Par ID 1346
P8.3.3.5 ①	PID2 Set Point 2 Sleep Unit Sel				0	2399	See Par ID 2398
P8.3.3.6	PID2 Set Point 2 Sleep Level			Varies	0.00	2456	
P8.3.3.7	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388	
P8.3.3.8	PID2 Set Point 2 WakeUp Level	-99999.99	99999.99	Varies	0.00	1389	
P8.3.3.9	PID2 Set Point 2 Boost	-2.0	2.0		1.0	1391	
P8.3.3.10	PID2 Set Point 2 Comp Enable				0	1416	See Par ID 1346
P8.3.3.11	PID2 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1417	

Feedback

Table 195. Basic — P8.4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.4.1.1 ①	PID2 Feedback Func				0	1392	See Par ID 1330
P8.4.1.2	PID2 Feedback Gain	-1000.0	1000.0	%	100.0	1393	

Table 196. Feedback 1 — P8.4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.4.2.1①	PID2 Feedback 1 Source				2	1394	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperature 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

Note: ① Parameter value can only be changed after the drive has stopped.

Table 196. Feedback 1 — P8.4.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.4.2.2	PID2 Feedback 1 Min	-200.00	200.00	%	0.00	1395	
P8.4.2.3	PID2 Feedback 1 Max	-200.00	200.00	%	100.00	1396	

Table 197. Feedback 2 — P8.4.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.4.3.1 ①	PID2 Feedback 2 Source				0	1397	See Par ID 1394
P8.4.3.2	PID2 Feedback 2 Min	-200.00	200.00	%	0.00	1398	
P8.4.3.3	PID2 Feedback 2 Max	-200.00	200.00	%	100.00	1399	

Feedforward

Table 198. Basic — P8.5.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.5.1.1 ①	PID2 Feedforward Func				0	1400	See Par ID 1330
P8.5.1.2	PID2 Feedforward Gain	-1000.0	1000.0	%	100.0	1401	

Table 199. Feedforward 1 — P8.5.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.5.2.1 ①	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 Temperature 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
P8.5.2.2	PID2 Feedforward 1 Min	-200.00	200.00	%	0.00	1403	
P8.5.2.3	PID2 Feedforward 1 Max	-200.00	200.00	%	100.00	1404	

Table 200. Feedforward 2 – P8.5.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.5.3.1 ①	PID2 Feedforward 2 Source				0	1405	See Par ID 1402
P8.5.3.2	PID2 Feedforward 2 Min	-200.00	200.00	%	0.00	1406	
P8.5.3.3	PID2 Feedforward 2 Max	-200.00	200.00	%	100.00	1407	

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 201. Fire Mode – P9

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P9.1 ①	Fire Mode Function				0	535	0 = Closing Contact 1 = Opening Contact
P9.2 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
P9.3	Fire Mode Min Frequency	See Par ID 101	See Par ID 102	Hz	MotorNomFreqMFG	537	
P9.4	Fire Mode Freq Ref 1	0.0	100.0	%	75.0	565	
P9.5	Fire Mode Freq Ref 2	0.0	100.0	%	100.0	564	
P9.6	Fire Mode Test Enable					2443	See Par ID 1346
P9.7 ①	Smoke Purge Frequency	0.0	100.0	%	50.0	554	

Bypass

Table 202. Basic Setting — P10.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.1.1 ①	Bypass Enable				1	1418	See Par ID 1346
P10.1.2 ①	Bypass Start Delay	1	32765	s	1	544	
P10.1.3 ①	Auto Bypass				1	542	See Par ID 1346
P10.1.4 ①	Auto Bypass Delay	0	32765	s	10	543	
P10.1.5 ①	OverCurrent Bypass Enable				1	547	See Par ID 1346
P10.1.6 ①	IGBT Fault Bypas Enable				1	546	See Par ID 1346
P10.1.7 ①	4mA Fault Bypass Enable				1	548	See Par ID 1346
P10.1.8 ①	UnderVoltage Bypass Enable				1	545	See Par ID 1346
P10.1.9 ①	OverVoltage Bypass Enable				1	549	See Par ID 1346
P10.1.10 ①	Motor OverTemp Bypass Enable				1	1698	See Par ID 1346
P10.1.11 ①	UnderLoad Bypass Enable				1	1699	See Par ID 1346
P10.1.12 ①	External Bypass Enable				1	1700	See Par ID 1346
P10.1.13 ①	Charge Switch Fault Bypass Enable				1	1701	See Par ID 1346
P10.1.14 ①	Saturation Trip Fault Bypass Enable				1	1702	See Par ID 1346
P10.1.15 ①	Under Temp Fault Bypass Enable				1	1703	See Par ID 1346
P10.1.16 ①	EEPROM Fault Bypass Enable				1	1704	See Par ID 1346
P10.1.17 ①	Control board EEPROM Fault Bypass Enable				1	1705	See Par ID 1346
P10.1.18 ①	Watchdog Fault Bypass Enable				1	1706	See Par ID 1346
P10.1.19 ①	Fan Cooling Fault Bypass Enable				1	1707	See Par ID 1346
P10.1.20 ①	Keypad Com Fault Bypass Enable				1	1708	See Par ID 1346
P10.1.21 ①	Option Card Fault Bypass Enable				1	1709	See Par ID 1346
P10.1.22 ①	RTC Clock Fault Bypass Enable				1	1710	See Par ID 1346
P10.1.23 ①	Ctrl Board OverTemp Fault Bypass Enable				1	1711	See Par ID 1346
P10.1.24 ①	Fieldbus Fault				1	1713	See Par ID 1346
P10.1.25 ①	Op Cont Interlock Fault Bypass Enable				1	2832	See Par ID 1346

Note: ① Parameter value can only be changed after the drive has stopped.

Table 203. Redundant Drive — P10.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.2.1 ①	Redundant Drive Enable				0	2476	See Par ID 1346
P10.2.2 ①	Drive ID	0	5		0	2278	
P10.2.3	Redundant Run Time Enable				0	2477	See Par ID 1346
P10.2.4	Redundant Run Time Reset					2478	See Par ID 2125
P10.2.5	Redundant RunTime Limit	0.0	300000.0	h	0.0	2479	

Real Time Clock

Table 204. Interval 1 — P11.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.1.1	Interval 1 Setting				0	2487	0 = Weekly 1 = Daily
P11.1.2	Interval 1 On Time				0	491	
P11.1.3	Interval 1 Off Time				0	493	
P11.1.4	Interval 1 From Day				0	517	0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday
P11.1.5	Interval 1 To Day				0	518	See Par ID 517
P11.1.6	Interval 1 Channel				0	519	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3

Table 205. Interval 2 — P11.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.2.1	Interval 2 Setting				0	2488	See Par ID 2487
P11.2.2	Interval 2 On Time				0	495	
P11.2.3	Interval 2 Off Time				0	497	
P11.2.4	Interval 2 From Day				0	520	See Par ID 517
P11.2.5	Interval 2 To Day				0	521	See Par ID 517
P11.2.6	Interval 2 Channel				0	522	See Par ID 519

Table 206. Interval 3 — P11.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.3.1	Interval 3 Setting				0	2489	See Par ID 2487
P11.3.2	Interval 3 On Time				0	499	
P11.3.3	Interval 3 Off Time				0	501	
P11.3.4	Interval 3 From Day				0	523	See Par ID 517
P11.3.5	Interval 3 To Day				0	524	See Par ID 517
P11.3.6	Interval 3 Channel				0	525	See Par ID 519

Table 207. Interval 4 — P11.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.4.1	Interval 4 Setting				0	2490	See Par ID 2487
P11.4.2	Interval 4 On Time				0	503	
P11.4.3	Interval 4 Off Time				0	505	
P11.4.4	Interval 4 From Day				0	526	See Par ID 517
P11.4.5	Interval 4 To Day				0	527	See Par ID 517
P11.4.6	Interval 4 Channel				0	528	See Par ID 519

Table 208. Interval 5 — P11.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.5.1	Interval 5 Setting				0	2491	See Par ID 2487
P11.5.2	Interval 5 On Time				0	507	
P11.5.3	Interval 5 Off Time				0	509	
P11.5.4	Interval 5 From Day				0	529	See Par ID 517
P11.5.5	Interval 5 To Day				0	530	See Par ID 517
P11.5.6	Interval 5 Channel				0	531	See Par ID 519

Table 209. Timer — P11.6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.6.1	Timer 1 Duration	0	72000	s	0	511	
P11.6.2	Timer 1 Channel				0	532	See Par ID 519
P11.6.3	Timer 2 Duration	0	72000	s	0	513	
P11.6.4	Timer 2 Channel				0	533	See Par ID 519
P11.6.5	Timer 3 Duration	0	72000	s	0	515	
P11.6.6	Timer 3 Channel				0	534	See Par ID 519

Communication

Table 210. FB Process Data Input Sel — P12.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1.1	FB Process Data Input 1 Sel	0	3000		0	2533	
P12.1.2	FB Process Data Input 2 Sel	0	2560		2542	2534	
P12.1.3	FB Process Data Input 3 Sel	0	2560		2550	2535	
P12.1.4	FB Process Data Input 4 Sel	0	2560		103	2536	
P12.1.5	FB Process Data Input 5 Sel	0	2560		104	2537	
P12.1.6	FB Process Data Input 6 Sel	0	2560		107	2538	
P12.1.7	FB Process Data Input 7 Sel	0	2560		0	2539	
P12.1.8	FB Process Data Input 8 Sel	0	2560		0	2540	

Note: ② Parameter value will be set to be default when changing macros.

Table 211. FB Process Data Output Sel — P12.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.2.1	FB Process Data Output 1 Sel				1	1556	
P12.2.2	FB Process Data Output 2 Sel				2	1557	
P12.2.3	FB Process Data Output 3 Sel				3	1558	
P12.2.4	FB Process Data Output 4 Sel				4	1559	
P12.2.5	FB Process Data Output 5 Sel				5	1560	
P12.2.6	FB Process Data Output 6 Sel				6	1561	
P12.2.7	FB Process Data Output 7 Sel				7	1562	
P12.2.8	FB Process Data Output 8 Sel				28	1563	
P12.2.9 ②	Standard Status Word Bit0 Function Select				1	2415	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 11 = PID1 Superv 12 = PID2 Superv 13 = OverHeat Fault 14 = Ocurrent Fault 15 = Ovolt Fault 16 = Uvolt Fault 17 = 4mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Auto 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 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 43 = Motor 1 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 58 = 2th Stage Ramp Frequency Active 59 = STO Fault Output

Note: ② Parameter value will be set to be default when changing macros.

Table 211. FB Process Data Output Sel — P12.2, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.2.9 ②	Standard Status Word Bit0 Function Select (cont.)				1	2415	60 = Run Bypass/Drive 61 = Bypass Overload 62 = Bypass Run 63 = Auto Local On COM Fault 64 = Fieldbus RTU Fault 65 = Fieldbus TCP Fault 66 = Fieldbus MSTP Fault 67 = Fieldbus EIP Fault 68 = Fieldbus SlotA Fault 69 = Fieldbus SlotB Fault 70 = Fieldbus SWD Fault 78 = CP Interlock Fault
P12.2.10 ②	Standard Status Word Bit1 Function Select				2	2416	See Par ID 2415
P12.2.11 ②	Standard Status Word Bit2 Function Select				3	2417	See Par ID 2415
P12.2.12 ②	Standard Status Word Bit3 Function Select				4	2418	See Par ID 2415
P12.2.13 ②	Standard Status Word Bit4 Function Select				5	2419	See Par ID 2415
P12.2.14 ②	Standard Status Word Bit5 Function Select				6	2420	See Par ID 2415
P12.2.15 ②	Standard Status Word Bit6 Function Select				7	2421	See Par ID 2415
P12.2.16 ②	Standard Status Word Bit7 Function Select				8	2422	See Par ID 2415

RS-485 Bus

Table 212. Basic Setting — P12.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.1.1 ①⑥	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP

Table 213. Modbus RTU — P12.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.2.1 ①⑥	Slave Address	1	247		1	587	
P12.3.2.2 ①⑥	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P12.3.2.3 ①⑥	Parity Type And Stop Bit				2	585	0 = None and 2 stop bits 1 = Odd and 1 stop bit 2 = Even and 1 stop bit 3 = None and 1 stop bit
P12.3.2.4	Modbus RTU Protocol Status					588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P12.3.2.5	Comm Timeout Modbus RTU	0	60000	ms	10000	593	
P12.3.2.6	Modbus RTU Fault Response				0	2516	0 = in Fieldbus Control 1 = in all Control

Notes: ① Parameter value can only be changed after the drive has stopped.
⑥ Reset after modification.

Table 214. BACnet MS/TP — P12.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.3.1 ①⑥	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P12.3.3.2 ①⑥	MSTP Device Address	0	127		1	595	
P12.3.3.3 ①⑥	MSTP Instance Number	0	4194302		Varies	596	
P12.3.3.4	MSTP Comm Timeout	0	60000	ms	10000	598	
P12.3.3.5	MSTP Protocol Status					599	0 = Stopped 1 = Operational 2 = Faulted
P12.3.3.6	MSTP Fault Code					600	0 = None 1 = Sole Master
P12.3.3.7	MSTP Fault Response				0	2526	See Par ID 2516
P12.3.3.8 ①	MSTP Max Master				127	1537	

Table 215. SA Bus — P12.3.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.3.4.3 ①	SA Bus Instance Number	0	4194302		0	1728	
P12.3.4.4	SA Bus Comm Timeout	0	60000		10000	1730	
P12.3.4.5	SA Bus Protocol Status					1731	See Par ID 599
P12.3.4.6	SA Bus Fault Response				0	1732	See Par ID 2516

Ethernet Bus

Table 216. Basic Setting — P12.4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.1.1 ①⑥	IP Address Mode				1	1500	0 = Static IP 1 = DHCP with AutoIP
P12.4.1.2	Active IP Address					1507	
P12.4.1.3	Active Subnet Mask					1509	
P12.4.1.4	Active Default Gateway					1511	
P12.4.1.5	MAC Address					1513	
P12.4.1.6 ①⑥	Static IP Address				192.168.1.254	1501	
P12.4.1.7 ①⑥	Static Subnet Mask				255.255.255.0	1503	
P12.4.1.8 ①⑥	Static Default Gateway				192.168.1.1	1505	
P12.4.1.9 ①⑥	Enable BACnetIP				0	1725	See Par ID 1346
P12.4.1.10 ①⑥	Modbus TCP enable				0	1942	0 = Disable 1 = Enable

Table 217. Modbus TCP — P12.4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.2.1	Connection Limit				5	609	
P12.4.2.2	Modbus TCP Unit ID				1	610	
P12.4.2.3	Comm Timeout Modbus TCP	0	60000	ms	10000	611	
P12.4.2.4	Modbus TCP Protocol Status					612	See Par ID 599
P12.4.2.5	Modbus TCP Fault Response				0	2517	See Par ID 2516
P12.4.2.6	Modbus TCP Trusted IP Enable				1	74	
P12.4.2.7	Trusted IP White List				0xC0.0xA8.0x01.0x FF.0x00.0x00.0x00.0x 00.0x00.0x00.0x00.0x00	68	

Notes: ① Parameter value can only be changed after the drive has stopped.
⑥ Reset after modification.

Table 218. BACnet IP — P12.4.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.3.1 ① ⑥	BACnet IP UDP port number				47808	1733	47808 = BAC0 47809 = BAC1 47810 = BAC2 47811 = BAC3 47812 = BAC4 47813 = BAC5 47814 = BAC6 47815 = BAC7 47816 = BAC8 47817 = BAC9 47818 = BACA 47819 = BACB 47820 = BACC 47821 = BACD 47822 = BACE 47823 = BACF
P12.4.3.2 ①⑥	BACnet IP Foreign Device				0	1734	See Par ID 1346
P12.4.3.3 ①⑥	BACnet IP BBMD IP				0.0.0.0	1735	
P12.4.3.4 ①⑥	BACnet IP BBMD Port				47808	1737	See Par ID 1733
P12.4.3.5 ①⑥	BACnet IP Registration Interval	0	65535		10	1738	
P12.4.3.6	BACnet IP Comm Timeout	0	60000		0	1739	
P12.4.3.7	BACnet IP Protocol Status					1740	See Par ID 599
P12.4.3.8	BACnet IP Fault Behavior				0	1741	See Par ID 2516
P12.4.3.9 ①⑥	BACnetIP Instance Number	0	4194302		Varies	1742	

Table 219. WebUI — P12.4.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.4.4.1	WebUI Protocol Status					2915	0 = Off 1 = Operational 2 = Faulted
P12.4.4.2	WebUI Fault Response				0	2916	See Par ID 2516
P12.4.4.3	WebUI Communication Timeout	30000	60000	ms	60000	2919	
P12.4.4.4 ①⑥	WebUI Enable				1	2921	See Par ID 1346

System

Table 220. Basic Setting — P13.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.1.1	Language				0	340	0 = English 1 = Block 0—selected language at firmware update 2 = Block 1—selected language at firmware update
P13.1.2 ①	Application					142	0 = Basic 1 = PID 2 = Advanced
P13.1.3 ①	Parameter Sets					619	0 = No 1 = Reload Defaults 2 = Reload Set 1 3 = Reload Set 2 4 = Store Set 1 5 = Store Set 2 6 = Reset 7 = Reload Defaults VM
P13.1.4	Up To Keypad					620	See Par ID 2118

Notes: ① Parameter value can only be changed after the drive has stopped.
⑥ Reset after modification.

Table 220. Basic Setting — P13.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.1.5 ①	Down From Keypad					621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters
P13.1.6	Parameter Comparison					623	0 = No 1 = Compare with Keypad 2 = Compare with Default 3 = Compare with Set 1 4 = Compare with Set 2
P13.1.7	Password	0	9999		0	624	
P13.1.8	Parameter Lock				0	625	0 = Change Enable 1 = Change Disable
P13.1.9	Multimonitor Set				0	627	See Par ID 625
P13.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu 4 = Keypad Reference
P13.1.11	Timeout Time	0	65535	s	30	629	
P13.1.12	Contrast Adjust	5	18		12	630	
P13.1.13	Backlight Time	1	65535	min	10	631	
P13.1.14	Fan Control				2	632	0 = Continuous 1 = Temperature 2 = Run Follow 3 = Calculate IGBT Temp
P13.1.15	Keypad ACK Timeout	200	5000	ms	200	633	
P13.1.16	Keypad Retry Number	1	10		5	634	
P13.1.17	Startup Wizard				0	626	0 = Yes 1 = No
P13.1.18	Jog Softkey Hidden				0	2412	See Par ID 1346
P13.1.19	Reverse Softkey Hidden				1	2413	See Par ID 1346
P13.1.20	Output Display Unit				45	2424	0 = % 1 = 1/min 2 = rpm 3 = ppm 4 = pps 5 = l/s 6 = l/min 7 = l/h 8 = kg/s 9 = kg/min 10 = kg/h 11 = m3/s 12 = m3/min 13 = m3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVS 20 = kW 21 = 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

Table 220. Basic Setting — P13.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.1.20	Output Display Unit				45	2424	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
P13.1.21	Output Display Unit Min	-60000.00	See Par ID 2425	Varies	0.00	2460	
P13.1.22	Output Display Unit Max	See Par ID 2460	60000.00	Varies	Varies	2425	
P13.1.23	Keypad Lock Password					75	

Table 221. Version Info — P13.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.2.1	Keypad Software Version					640	
P13.2.2	Motor Control Software Version					642	
P13.2.3	Application Software Version					644	
P13.2.4	Software Bundle Version					1714	

Table 222. Application Info — P13.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.3.1	Brake Chopper					646	See Par ID 2118
P13.3.2	Brake Resistor Status					647	See Par ID 2118
P13.3.3	Serial Number					648	
P13.3.4	Power Unit Serial Number					1270	
P13.3.5	Control Unit Serial Number					1276	
P13.3.6	Serial Number					1758	

Table 223. User Info — P13.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.4.1	Real Time Clock				0.0.0.1:1:13	566	
P13.4.2	Daylight Saving				0	582	0 = Off 1 = EU 2 = US
P13.4.3	Total MWh Count			Mwh		601	
P13.4.4	Total Power Day Count					603	
P13.4.5	Total Power Hr Count					606	
P13.4.6	Trip MWh Count			Mwh		604	
P13.4.7	Clear Trip MWh Count					635	See Par ID 2125
P13.4.8	Trip Power Day Count					636	
P13.4.9	Trip Power Hr Count					637	
P13.4.10	Clear Trip Power Count					639	See Par ID 2125

Table 224. Operate Mode — O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz		1	
O2	Freq Reference			Hz		24	
O3	Motor Speed			rpm		2	
O4	Motor Current			A		3	
O5	Motor Torque			%		4	
O6	Motor Power			%		5	
O7	Motor Voltage			V		6	
O8	DC-link Voltage			V		7	
O9	Unit Temperature			Deg. C		8	
O10	Motor Temperature			%		9	
R11	Keypad Reference	See Par ID 101	See Par ID 102	Hz	20.00	141	
R12	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307	
R13	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309	

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.

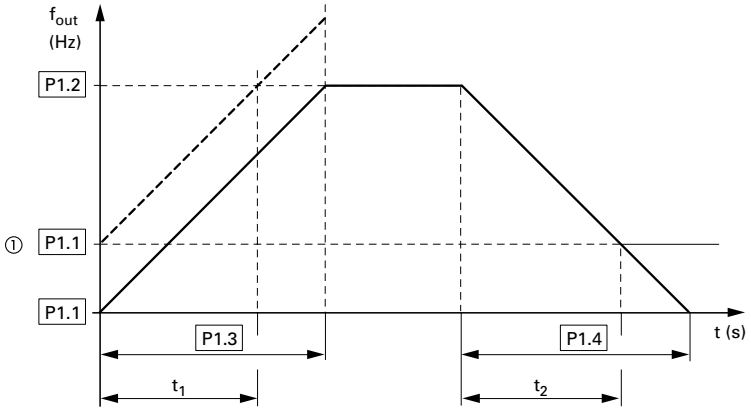
Application level

1 Basic
2 PID
3 Advanced

Code	Modbus ID	Parameter	Application	RO/RW
P1.1	**101**	**Min Frequency**	**1,2,3**	RW
		Defines the lowest frequency the drive will operate at; this setting will limit other frequency parameter settings: 1 = fire mode min frequency 2 = Derag 3 = MPFC staging frequency 4 = MPFC master fixed frequency 5 = Prime pump frequency 6 = Prime pump frequency2		
P1.2	**102**	**Max Frequency**	**1,2,3**	RW
		Defines the highest frequency the drive will operate at, this will limit other frequency parameters: 1 = Keypad reference 3 = Motor potentiome 3 = Jog speed 4 = 2nd stage ramp frequency 5 = Fire mode min frequency 6 = Derag 7 = MPFC staging frequency 8 = MPFC master fixed frequency 9 = Prime pump frequency 10 = Prime pump frequency2 11 = Preset speed frequency 12 = Frequency limit value 13 = Reference limit value 14 = SpeedControl_fs2 15 = Stall frequency limit 16 = 4mA fault frequency 17 = MPFC De-Staging Frequency 18 = Pipe Fill Loss Frequency Low 19 = Pipe Fill Loss Frequency high 20 = Broken Pipe frequency limit		
P1.3	**103**	**Accel Time 1**	**1,2,3**	RW
		Defines the time required for the output frequency to accelerate from zero frequency to maximum frequency.		

Code	Modbus ID	Parameter	Application	RO/RW
P1.4	**104**	**Decel Time 1**	**1,2,3**	RW
		Defines the time required for the output frequency to decelerate from maximum frequency to zero frequency.		

Figure 27. Acceleration and deceleration time



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

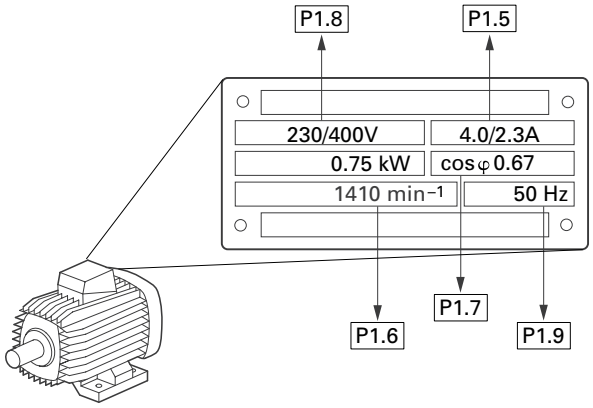
$$t_1 = \frac{(P1.2–P1.1) \times P1.3}{P1.2} \qquad t_2 = \frac{(P1.2–P1.1) \times P1.4}{P1.2}$$

The defined acceleration (ID103) and deceleration times ID104 apply for all changes to the frequency setpoint value.
If the start-release (FWD, REV) is switched off, the output frequency (f_{0ut}) is immediately set to zero. The motor runs down uncontrolled.
If a controlled run-down is requested (with value from ID104), stop mode should be set to ramp.

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

P1.5	**486**	**Motor Nom Current**	**1,2,3**	RW
		Motor nameplate rated full load current; this value is found on the rating plate of the motor.		

Figure 28. Motor parameters from ratings plate

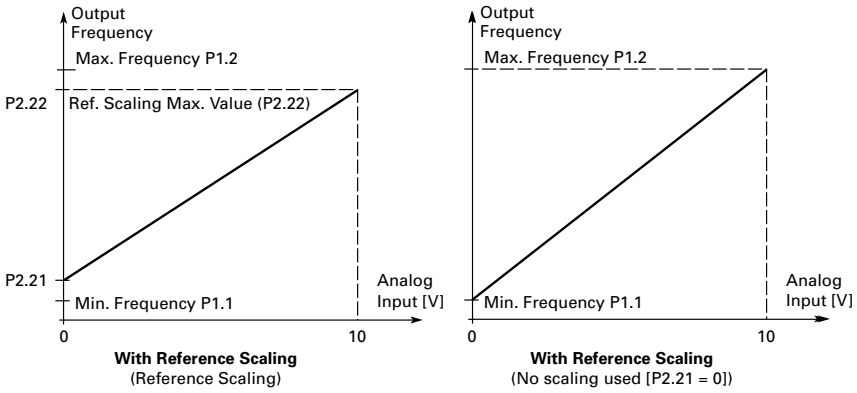


P1.6	**489**	**Motor Nom Speed**	**1,2,3**	RW
		Motor nameplate rated speed; this value is found on the rating plate of the motor.		
P1.7	**490**	**Motor PF**	**1,2,3**	RW
		Motor nameplate rated power factor; this value is found on the rating plate of the motor.		
P1.8	**487**	**Motor Nom Voltage**	**1,2,3**	RW
		Motor nameplate rated voltage; this value is found on the rating plate of the motor.		
P1.9	**488**	**Motor Nom Frequency**	**1,2,3**	RW
		Motor nameplate rated frequency; this value is found on the rating plate of the motor.		

Code	Modbus ID	Parameter	Application	RO/RW
P1.10	**2465**	**HOA Source** Enables the HOA control function. If enabled it selects 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**	RW
P1.11	**1695**	**Hand Control Place** Defines the signal location for the start command in local mode, I/O terminals would be from the Digital hardwired inputs or keypad for Start/Stop buttons on the drive. Keypad display will indicate what mode is selected.	**1,2,3**	RW
P1.12	**136**	**Hand Reference** Defines the signal location for the speed reference in local mode.	**1,2,3**	RW
P1.13	**135**	**Auto 1 Control Place** Defines the signal location for the start command in remote mode, I/O terminals would be from the Digital hardwired inputs or keypad for Start/Stop buttons on the drive. Keypad display will indicate what mode is selected.	**1,2,3**	RW
P1.14	**137**	**Auto 1 Reference** Defines the signal location for the speed reference in remote mode.	**1,2,3**	RW
P1.15	**138**	**Auto 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**	RW
P1.16	**139**	**Auto 2 Reference** Selects what frequency reference source to look at when in the Remote 2 control mode.	**1,2,3**	RW
P1.17	**2840**	**Frequency reference upper limit** The max value of Frequency reference, it is used to limit the value of Frequency reference.	**1,2,3**	RW
P1.18	**2841**	**Frequency reference upper limit source** Frequency reference upper limit source select 0 = Not Used 1 = Freq Ref upper 2 = AI1 3 = AI2	**1,2,3**	RW
P1.19	**1820**	**Motor Type Selection** Defines the type of Motor connected to the drive, Standard Induction motor, Internally mounted permanent magnet (IPM), or Surface mount permanent magnet (SPM) 0 = Inverter Duty 1 = IPM 2 = SPM	**3**	RW
P1.20	**1769**	**Compressor table version** Compressor table version. It is a number to indicate the version of compressor table.	**1,2,3**	RW
P1.21	**1770**	**Compressor type selection** Compressor type selection. It is a number, indicates compressor type. It is more than 0, and less than 255.	**1,2,3**	RW
P2.1.1	**483**	**Damper Start** This parameter determines the function of damper. 0 = Start—standard start 1 = Interlocked Start—To use this, a relay output, RO1/RO2, needs to be programmed for selections 29 "Damper Control," and a digital input function must be programmed for selection "RunEnable". 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**	RW
P2.1.2	**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.	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.1.3	**485**	**Damper Delay** The delay time following a Delay Start, after which the frequency converter will be started.	**2,3**	RW
P2.1.4	**144**	**AI Ref Scale Min Value** Defines the minimum frequency associated with 0% input from the analog input, setting AI ref scale min value and AI ref scale max value both to zero will cause the analog input to scale to the minimum and maximum frequencies.	**1,2,3**	RW
P2.1.5	**145**	**AI Ref Scale Max Value** Defines the maximum frequency associated with 100% input from the analog input, setting AI ref scale min value and I ref scale max value both to zero will cause the analog input to scale to the minimum and maximum frequencies.	**1,2,3**	RW

Figure 29. With and without reference scaling



Code	Modbus ID	Parameter	Application	RO/RW
P2.2.1	**143**	**IO Terminal 1 Start Stop Logic**	**1,2,3**	RW

For the DI function, we use Terminal programming method to function (TTF), you have a fixed input or output that you define a certain function for.

0 = DI closed contact = start forward : 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.

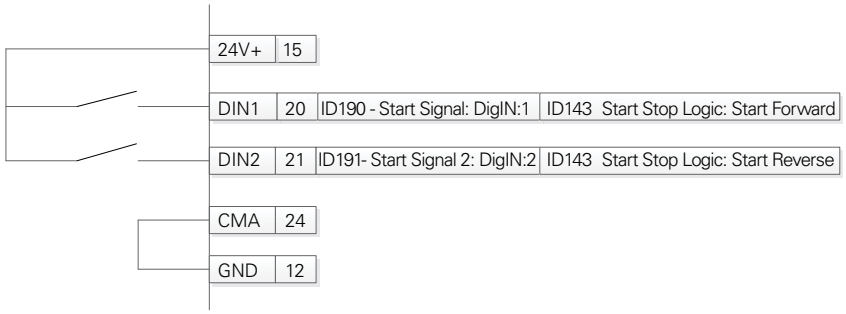
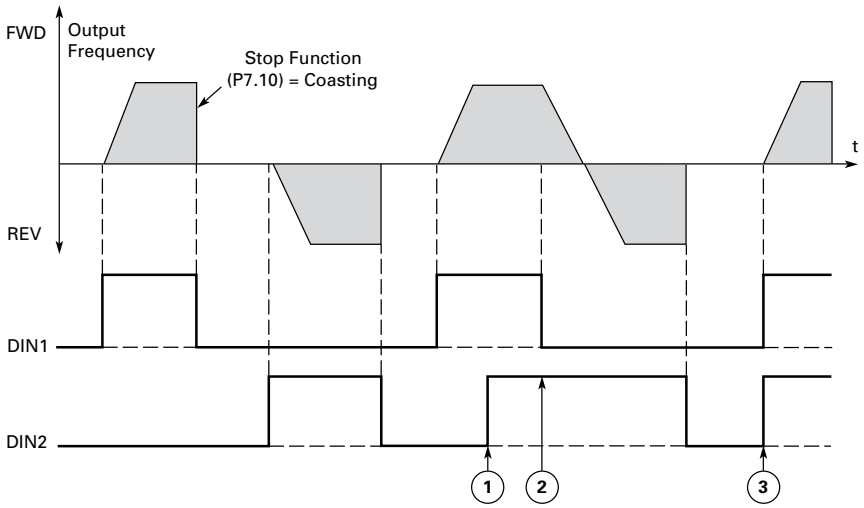


Figure 30. Start forward/start reverse



Code	Modbus ID	Parameter	Application	RO/RW
P2.2.1	**143**	1 = DI closed contact = start /open contact = stop: 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**	RW

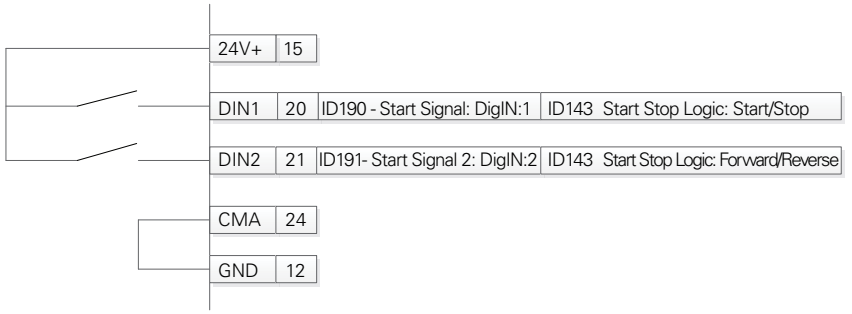
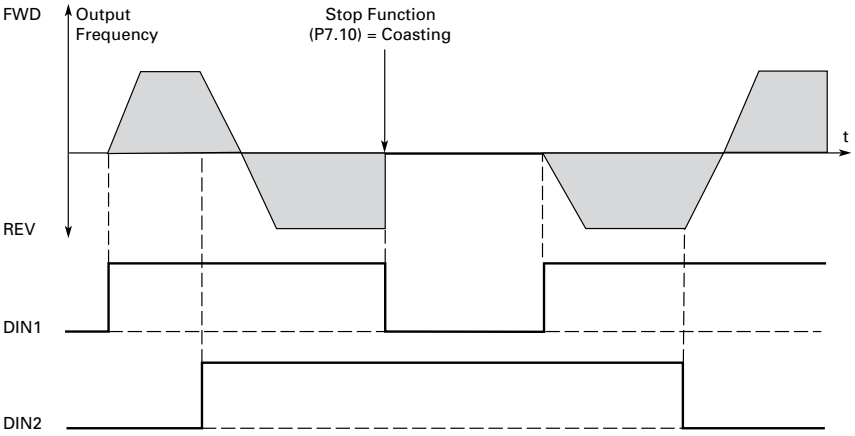
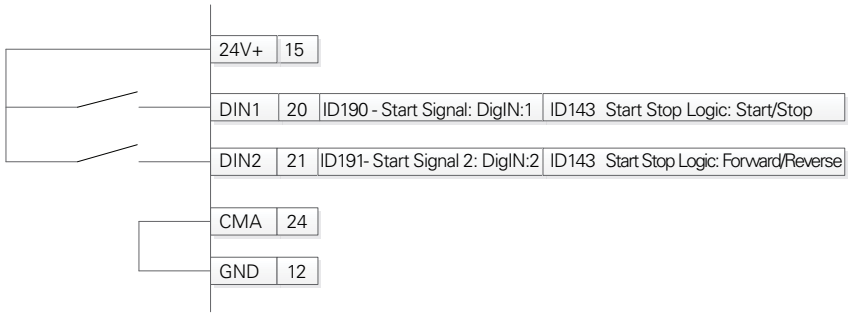


Figure 31. Start, stop and reverse



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 = DI closed contact = start / open contact = stop : 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.



Code	Modbus ID	Parameter	Application	RO/RW
P2.2.1	**143**	3 = Three-wire connection (pulse control): DI changes from open to closed = start pulse : DI changes from closed to open = stop pulse DI closed contact = reverse/ open contact = forward. This would be considered 3 wire control with Start Signal 1 being the Start Pulse and Start Signal 2 being the NC Stop.	**1,2,3**	RW

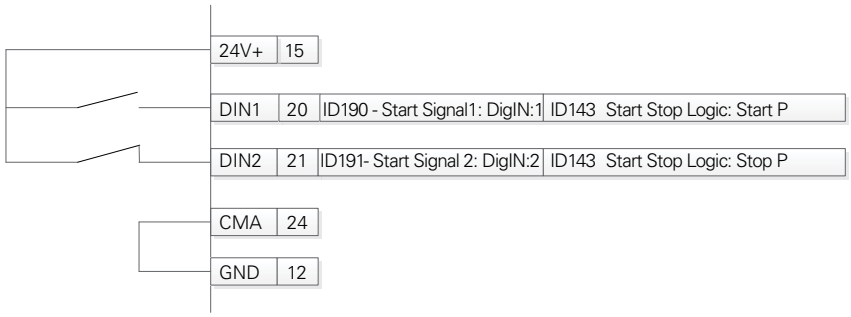
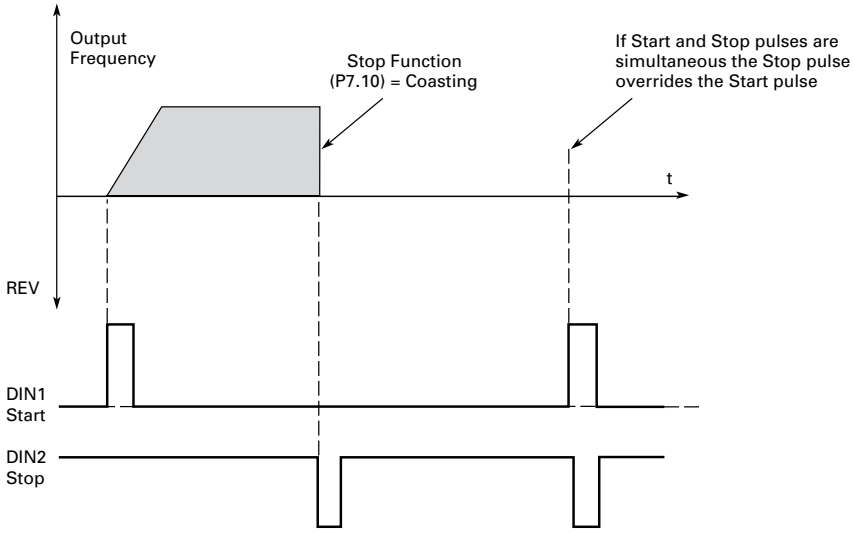


Figure 32. Start pulse/stop pulse



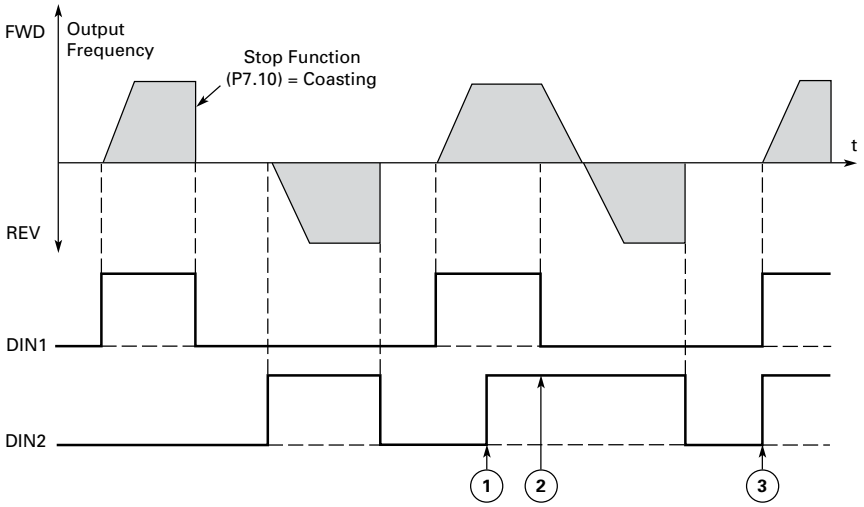
P2.2.2	**190**	**IO Terminal 1 Start Signal 1** Signal selection 1 for the start/stop logic. This parameter would correspond to the function listed for DIN1. When the parameter is set to DigIN: 1 it references DIN1 on the control board, selecting different DIGIN values will assign it to a different input on the control board or option card. When set to Normally Open this function would be always tied low or 0 when using I/O terminal 1 as the control place. When value is set to Normally Closed this will cause the function to be always on and activate the output if I/O Terminal 1 is the current control place. Can be set to DigIN:X indicates on board terminal inputs, DigIN:A:IOX:X indicates optional board inputs in A slot, DigIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X.	**1,2,3**	RW
P2.2.3	**191**	**IO Terminal 1 Start Signal 2** Signal selection 2 for the start/stop logic listed. This parameter would correspond to the function listed for DIN2. When the parameter is set to DigIN: 2 it references DIN2 on the control board, selecting different DIGIN values will assign it to a different input on the control board or option card. When set to Normally Open this function would be always tied low or 0 when using I/O terminal 1 as the control place. When value is set to Normally Closed this will cause the function to be always on and activate the output if I/O Terminal 1 is the current control place. Can be set to DigIN:X indicates on board terminal inputs, DigIN:A:IOX:X indicates optional board inputs in A slot, DigIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.2.4	**2206**	**IO Terminal 2 Start Stop Logic**	**1,2,3**	RW

For the DI function, we use Terminal programming method to function (TTF), you have a fixed input or output that you define a certain function for.

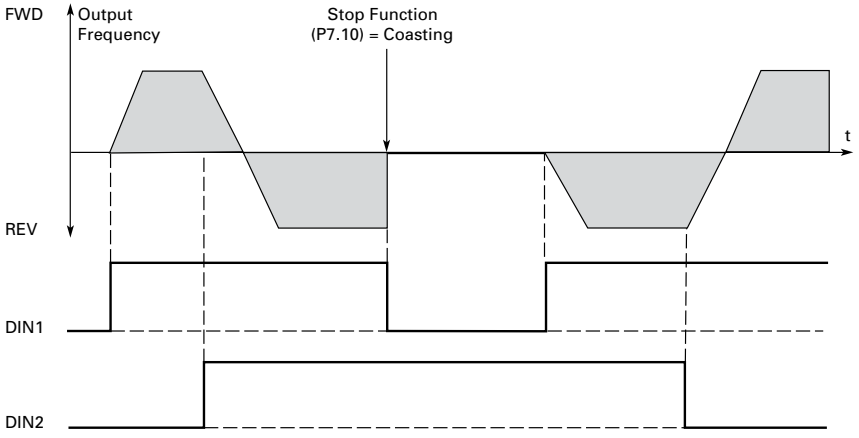
0 = DI closed contact = start forward : DI closed contact = start reverse. This would be considered 2 wire control with either a contact used on the Start FWD or Start REV commands. Contacts Open the motor stops.

Figure 33. Start forward/start reverse



1 = DI closed contact = start /open contact = stop : 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.

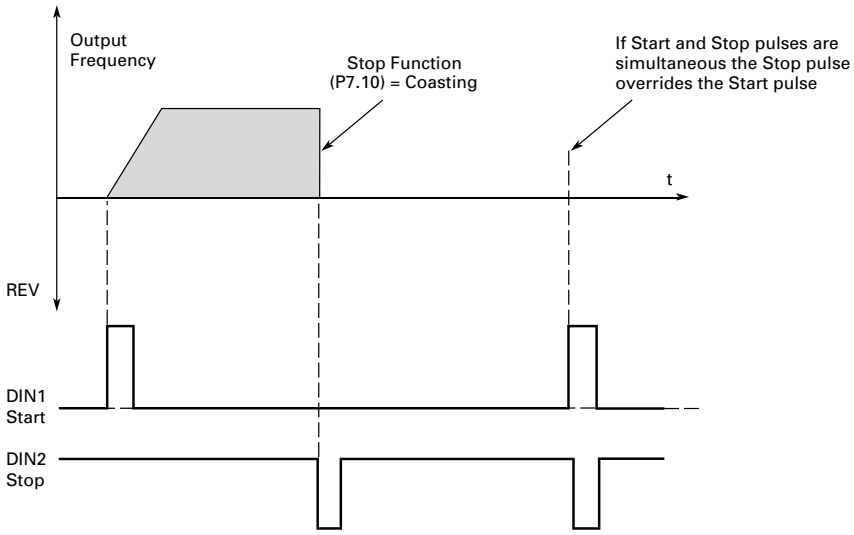
Figure 34. Start, stop and reverse



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
P2.2.4	**2206**	2 = DI closed contact = start / open contact = stop : 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): DI changes from open to closed = start pulse: DI changes from closed to open = stop pulse: DI closed contact = reverse/ open contact = forward. This would be considered 3 wire control with Start Signal 1 being the Start Pulse and Start Signal 2 being the NC Stop.	**1,2,3**	RW

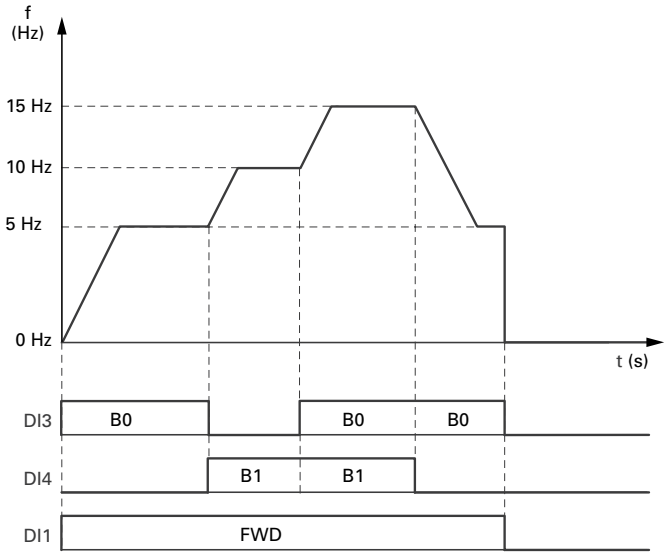
Figure 35. Start pulse/stop pulse



P2.2.5	**2207**	**IO Terminal 2 Start Signal 1** The 2nd Signal selection 1 for the start/stop logic listed. 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**	RW
P2.2.6	**2208**	**IO Terminal 2 Start Signal 2** The 2nd Signal selection 2 for the start/stop logic listed. 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**	RW
P2.2.7	**881**	**Thermistor Input Select** This parameter defines DIN7, and DIN8 is digital input or thermistor input. When this parameter is enabled it switches DIN7 and DIN8 to a thermistor input that triggers at 4.7k ohm.	**1,2,3**	RW
P2.2.8	**198**	**Reverse** Allows for switching the direction of the motor when using 3 wire start/stop logic. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X Contact Open = Forward direction. Contact Close = Reverse direction.	**1,2,3**	RW
P2.2.9	**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 on the fault can be changed. 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**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.2.10	**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 on the fault can be changed. 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**	RW
P2.2.11	**2297**	**Ext. Fault 1 Text** Defines the text to be displayed when external Fault 1 NO or NC is triggered. This text will be viewable using a remote keypad, PC Software, or the built in webserver.	**1,2,3**	RW
P2.2.12	**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. 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. Closed contact = external fault. Open contact = no external fault.	**1,2,3**	RW
P2.2.13	**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. Closed contact = no external fault. Open contact = external fault.	**1,2,3**	RW
P2.2.14	**2298**	**Ext. Fault 2 Text** Defines the text to be displayed when external Fault 2 NO or NC is triggered. This text will be viewable using a remote keypad, PC Software, or the built in webserver.	**1,2,3**	RW
P2.2.15	**2295**	**Ext. Fault 3 NO** Allows for external input causing drive to fault. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open—the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. The description on the fault can be changed. Closed contact = external fault. Open contact = no external fault.	**1,2,3**	RW
P2.2.16	**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. Closed contact = no external fault. Open contact = external fault.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.2.17	**2299**	**Ext. Fault 3 Text** This parameter allows for the text to be changed when using external Fault 1 NO or NC. 0 = External Fault 1 = Vibration Cut Out 2 = High Motor Temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage Defines the text to be displayed when external Fault 3 NO or NC is triggered. This text will be viewable using a remote keypad, PC Software, or the built in webserver.	**1,2,3**	RW
P2.2.18	**200**	**Fault Reset** Use this parameter for setting external fault reset input. This function is looking for a rising edge to reset a fault. If this function is set for Normally Open, the drive will not do a reset via the control terminals. When set for Normally Closed, the fault condition will always be trying to reset on the rising edge. When it is tied to an input on the control board or option card the function would be set to DIGIN: and the input desired. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. DI change from open contact to closed contact: reset fault.	**1,2,3**	RW
P2.2.19	**194**	**Run Enable** Use this parameter for setting external safety start input that is required along with start command for frequency converter to turn on output. When using this command if the function is set for Normally Open, the drive will see this as a open input and not allow the drive to run due to no Ready. The default state being Normally Closed indicates that the drive is in a Ready condition and will accept the start command. When assigned to one of the DIGIN or Time channels it requires the input to be high to activate output. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = Start of motor enabled Open contact = Start of motor disabled	**1,2,3**	RW
P2.2.20	**205**	**Preset Speed B0** Use this parameter selecting the of the digital input for an external speed setpoint desired. Validating 3 digital inputs will allow for 7 preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. When all the inputs are set to Normally Open none of the preset speeds will be enabled and the output will follow the control place reference command. If the function is set for Normally Closed the drive will follow the preset speed assigned to the inputs enabled. When assigned to one of the DIGIN on the control board or an installed option card it is looking for a high input to enable that preset. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1,2,3**	RW
P2.2.21	**206**	**Preset Speed B1** Use this parameter selecting the of the digital input for an external speed setpoint desired. Validating 3 digital inputs will allow for 7 preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. When all the inputs are set to Normally Open none of the preset speeds will be enabled and the output will follow the control place reference command. If the function is set for Normally Closed the drive will follow the preset speed assigned to the inputs enabled. When assigned to one of the DIGIN on the control board or an installed option card it is looking for a high input to enable that preset. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.2.22	**207**	**Preset Speed B2**	**1,2,3**	RW
		Use this parameter selecting the of the digital input for an external speed setpoint desired. Validating 3 digital inputs will allow for 7 preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. When all the inputs are set to Normally Open none of the preset speeds will be enabled and the output will follow the control place reference command. If the function is set for Normally Closed the drive will follow the preset speed assigned to the inputs enabled. When assigned to one of the DIGIN on the control board or an installed option card it is looking for a high input to enable that preset. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.		
		Figure 36. Activation of fixed frequencies		
				
P2.2.23	**199**	**Jog Enable**	**1,2,3**	RW
		Use this parameter for selecting an external input for enabling the jog frequency reference and starts the drive to slowly advance the system. When this function is set for Normally Open the drive will not follow the jog enable speed. If the function is set for Normally Close then the output will be activated and run at the Jog Frequency. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive is under jog mode.		
P2.2.24	**195**	**Accel/Decel Time Set**	**1,2,3**	RW
		Use this parameter for selecting the external digital input used to select between accel/decel time 1 and accel/decel time 2. When this function is set for Normally Open the Accel/Decel time set will follow time 1 always, when set for Normally Closed it will follow the 2nd Accel/Decel time always. Assigning it to an input will allow for the input to control this. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = 2nd set of acc/dec time applied. Open contact = 1st set of acc/dec time applied.		
P2.2.25	**201**	**Accel/Decel Prohibit**	**1,2,3**	RW
		Use this parameter for selecting an external input used to 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 function is set for Normally Open the Accel/Decel will be allowed via the desired control source, when is set for Normally Closed the drive will prohibit changing of speed from any control source. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive output frequency cannot rise or fall, it keeps on current output.		

Code	Modbus ID	Parameter	Application	RO/RW
P2.2.26	**215**	**No Access To Param**	**1,2,3**	RW
		Use this parameter selecting an external input for locking out the ability to change parameters when this input is enabled, this can be used with the password protection. When this function is set for Normally Open it will allow for changing of parameters, if it is set for Normally Closed it prevents any changes to parameters. If a input is desired to control this DIGIN X can be used. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: all writable parameters cannot be edited.		
P2.2.27	**196**	**Auto Control**	**1,2,3**	RW
		Use this parameter selecting an external input for use when desiring to use the remote control location. When this function is set for Normally Open the drive will not go into the remote control unless the keypad input is pressed. When set for Normally Closed the drive will always be in the remote location no matter the keypad loc/rem is pressed. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed Contact: force to remote control.		
P2.2.28	**197**	**Hand Control**	**1,2,3**	RW
		Use this parameter selecting an external input for use when desiring to use the local control location. When this function is set for Normally Open the drive will not go into the local control place unless the keypad Loc/Rem button is used. When it is set for Normally Closed it will always be in the local control location no matter if the keypad loc/rem button is pressed. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: force to local control.		
P2.2.29	**209**	**Auto 1/2 Select**	**1,2,3**	RW
		Selection allows for switching between Remote control 1 and control 2, this switches control and reference locations. When this function is set for Normally Open the drive will not go into the Remote 2 control place and will stay in Remote 1. When it is set for Normally Closed the drive will always be in the Remote 2 Control Place. When a DIGIN is used it will allow cycling between the 2 based off high/low state. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: remote2 is selected as control source. Open contact: remote1 is selected as control.		
P2.2.30	**2395**	**HOA On/Off**	**1,2,3**	RW
		Use this parameter for setting external input for disabling any control signal when the input is the off/open position, when closed drive will follow the desired control signal. If the function is set for Normally Open this will cause the drive to operate, if the function is set for Normally Closed then the drive will e in the off location and not allow operation. Can be set to DigiIN: X indicates on board terminal inputs, DigiIN:A:IOX:X indicates option boards in A slot, DigiIN:B:IOX:X indicates optional board in B slot, or Timer Channel X. RO X function allows for having an input turn on without having to hard wire it to the physical relay output.		
P2.2.31	**217**	**Second Motor Para Select**	**2,3**	RW
		Use this parameter selecting an external input for use of 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 use the Second Motor Parameter set. If an input is used the function will follow the logic of the input being high/low. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: the 2nd motor parameters is applied.		
P2.2.32	**2312**	**Parameter Set1/2 Sel**	**1,2,3**	RW
		Allows for the drive to select between the stored parameter set1 or set2, this requires saving parameters to the stored sets parameter set. 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.		

Code	Modbus ID	Parameter	Application	RO/RW
P2.2.33	**208**	**AI Ref Source Select** Use this parameter for selecting an external input for switching between AI1 and AI2 reference signals that are located on the control board. When this function is set for Normally Open the drive will follow the AI1 input. If the function is set for Normally Close the AI2 input would then be active. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: AI2 is selected for reference source. Open contact: AI1 is selected for reference source.	**1,2,3**	RW
P2.2.34	**218**	**Bypass Start** Use this parameter for selecting an external input for switching between bypass and drive modes. When this input is enabled the Bypass output contactor is enabled, when disabled this relay opens and puts drive in normal mode. When the input is enabled on the rising edge the bypass output contactor function is enabled in the output functions on the drive. When this fault is set for Normally Open/Normally Closed the drive will not activate the bypass relay output function due to the drive looking for a rising edge trigger. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: switch to bypass. Open contact: switch to drive.	**1,2,3**	RW
P2.2.35	**1246**	**Bypass Overload** Use this parameter for selecting an external input for faulting frequency converter when using an external overload block, the relay would be fed into this input to fault the drive. When the function is set for Normally Open the drive will not go into the fault state, if it is set for Normally Closed the drive will go into this fault state and stay even if reset is applied. Input needs to be low to allow operation. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor is over load in bypass. Use TTF method to realize the above functions.	**1,2,3**	RW
P2.2.36	**550**	**PID1 Control Enable** Allows for activating PID1 control mode when it is set as a reference place in local reference or remote reference. If the input is not enabled when starting the drive with PID1 Controller set as the reference the drive outout will not start. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Contact Close: Enables PID 1 control mode.	**2,3**	RW
P2.2.37	**553**	**PID2 Control Enable** Use this parameter for selecting the digital input for turn on or off the PID2 controller. If the input is not enabled when starting the drive with PID1 Controller set as the reference the drive output will not start. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Contact Close: Enables PID 2 control mode.	**2,3**	RW
P2.2.38	**351**	**PID1 Set Point Select** Use this parameter for selecting an external input for selecting between Set point 1 and Set point 2 when in the PID control mode, depending on the PID Controller you are using this will all for multiple set points. When this function is set for Normally Open and the drive is in PID mode, it will use the first PID Set Point Reference. When the function is set for Normally Close the 1st PID Set Point will be active. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: setpoint2 is selected for PID1. Open contact: setpoint1 is selected for PID1.	**2,3**	RW
P2.2.39	**352**	**PID2 Set Point Select** Use this parameter for selecting an external input for selecting between Set point 1 and Set point 2 when in the PID control mode, depending on the PID Controller you are using this will all for multiple set points. 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 PID2. Open contact: setpoint1 is selected for PID2.	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.2.40	**202**	**DC Brake Active** Selection enables DC brake on a closed contact. When enabled this will cause the drive inject DC voltage into the motor to assist in bring it to a stop. When this function is set for Normally Open the drive will not activate the DC brake function. When Normally Closed is used the drive will always have the DC brake function activated. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: DC brake function is enabled.	**1,2,3**	RW
P2.2.41	**219**	**Smoke Mode** Use this parameter for selecting an external input for enabling the smoke purge preset speed to be enabled. When this function is set for Normally Open the drive will not activate the Smoke Mode frequency. When Normally Closed is used the drive will always run at the Smoke Purge Frequency. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive is in smoke purge mode.	**2,3**	RW
P2.2.42	**220**	**Fire Mode** Use this parameter for selecting an external input for enabling the drive fire mode feature where faults will be ignored and preset speeds are given for reference commands to the drive, the reference are selectable in the P15 Group. When this function is set for Normally Open or Normally Closed it will depend on the setting in the Fire Mode parameter group, if the function activates on an open contact and this is set for Normally Open it will always be in the Fire Mode, if Normally Closed is used then the function will always be off. Vise versa will occur if Fire Mode is active on an Closed contact. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive is in fire mode. Ignores all the faults. Note: when Fire mode is enabled, this causes the drive to ignore all faults except hardware overcurrent, STO, saturation fault. Warranty will be non valid in the case this is enabled and the drive causes issues to the system.	**1,2,3**	RW
P2.2.43	**221**	**Fire Mode Ref 1/2 Select** Selection allows for switching between fire mode speed reference 1 and refence 2. When this function is set for Normally Open and the drive is in Fire Mode it will follow Fire Mode Ref 1, if the function is set for Normally Closed it will fallow Fire Mode Ref 2. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: drive output reference frequency selection 2.	**1,2,3**	RW
P2.2.44	**2119**	**Fire Mode Reverse** Use this parameter for selecting an external input for enabling the motor to run in reverse when in fire mode input is enabled. When the function is set for Normally Open and not in Fire mode the drive will run as normal, when the function is set for Normally Closed and the Fire Mode input is enabled the motor will spin in the counterclockwise direction. DigiIN:X indicates on-board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot and DigiIN:B:IOX:X indicates optional board inputs in B slot or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1,2,3**	RW
P2.2.45	**224**	**Start Timer 1** Use this parameter for selecting an external input for enabling the timer functions to begin counting. When this function is set for Normally Open the drive will not start the Timer sequence. If the function is set for Normally Close the Timer function will start. When assigned to an input the input active will start the timer. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Timer1, Timer2 or Timer3 will be started.	**2,3**	RW
P2.2.46	**225**	**Start Timer 2** Use this parameter for selecting an external input for enabling the timer functions to begin counting. When this function is set for Normally Open the drive will not start the Timer sequence. If the function is set for Normally Close the Timer function will start. When assigned to an input the input active will start the timer. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Timer1, Timer2 or Timer3 will be started.	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.2.47	**226**	**Start Timer 3** Use this parameter for selecting an external input for enabling the timer functions to begin counting. When this function is set for Normally Open the drive will not start the Timer sequence. If the function is set for Normally Close the Timer function will start. When assigned to an input the input active will start the timer. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Timer1, Timer2 or Timer3 will be started.	**2,3**	RW
P2.2.48	**2801**	**OP Cont Interlock NO** Allows for Output Contactor Interlock input causing drive to fault if drive in run mode and have a time delay of 250ms. 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 if run drive. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1,2,3**	RW
P2.2.49	**2802**	**OP Cont Interlock NC** Allows for Output Contactor Interlock input causing drive to fault if drive in run mode and have a time delay of 250ms. 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 off so the drive will not fault, when set to Normally Open the function will be active and fault all the time if run drive. 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. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	**1,2,3**	RW
P2.2.50	**203**	**Accel Pot Value** Motor Potentiometer is set for a reference, when this input is enabled it will increase reference value till contact opens. When this function is set for Normally Open it will not cause the Motor Pot reference to increase, when this is set for Normally Closed it will cause the Motor pot reference to increase till it reaches max frequency. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Potentiometer value keeps on rising.	**3**	RW
P2.2.51	**204**	**Decel Pot Value** Motor Potentiometer is set for a reference, when this input is enabled it decrease reference value till contact opens. When this function is set for Normally Open it will not cause the Motor Pot reference to decrease, when this is set for Normally Closed it will cause the Motor pot reference to decrease till the min frequency is reached. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Potentiometer value keeps on falling.	**3**	RW
P2.2.52	**216**	**Reset Pot Zero** Sets Motor Potentiometer reference value to zero when using the Motor Potentiometer as a Reference signal when contact closes. When this is set for Normally Open it will not cause the Motor Pot reference to not reset to 0 speed, when this is set for Normally Closed it will cause the Motor pot reference to reset to 0 speed and stay there till the opens. Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Potentiometer value reset to zero.	**3**	RW
P2.2.53	**2894**	**CP Interlock NC** CleanPower interlock DI NC select.	**1,2,3**	RW
P2.3.1	**105**	**Preset Speed 1** Preset speed is selected with digital inputs using a Binary input.	**1,2,3**	RW
P2.3.2	**106**	**Preset Speed 2** Preset speed is selected with digital inputs using a Binary input.	**1,2,3**	RW
P2.3.3	**118**	**Preset Speed 3** Preset speed is selected with digital inputs using a Binary input.	**1,2,3**	RW
P2.3.4	**119**	**Preset Speed 4** Preset speed is selected with digital inputs using a Binary input.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.3.5	**120**	**Preset Speed 5**	**1,2,3**	RW
		Preset speed is selected with digital inputs using a Binary input.		
P2.3.6	**121**	**Preset Speed 6**	**1,2,3**	RW
		Preset speed is selected with digital inputs using a Binary input.		
P2.3.7	**122**	**Preset Speed 7**	**1,2,3**	RW
		Preset speed is selected with digital inputs using a Binary input.		
P2.3.8	**117**	**Jog Reference**	**1,2,3**	RW
		Defines the jogging speed set point, this speed is selected with the digital input programmed for Jogging speed. When enabled the drive starts and ramps to this speed, input removed drive stops.		
P2.4.1		**AI1 Mode**	**1,2,3**	
		Defines the analog input mode to current or voltage the DIP switches on control board will need to be set to the same mode as this parameter. Drive CN5 terminals 8 and 9 for current or voltage, also need to set DIP switches SW2 2 and 3 on control board, near the RJ45 port. DIP switches SW2 2 and 3 off for voltage. Current mode, if using the +10 V supply on CN5 terminals 13 of the drive, it will require DIP switches SW2 2 and 3 on to complete the current loop. When doing a current loop with an external supply, the DIP switches SW2 2 off and 3 on.		

Figure 37. AI1 2wire-current

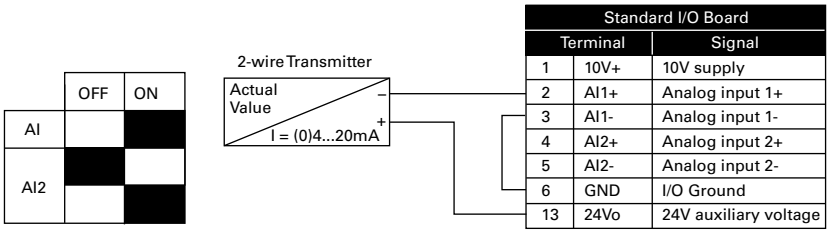


Figure 38. AI1 3wire-current

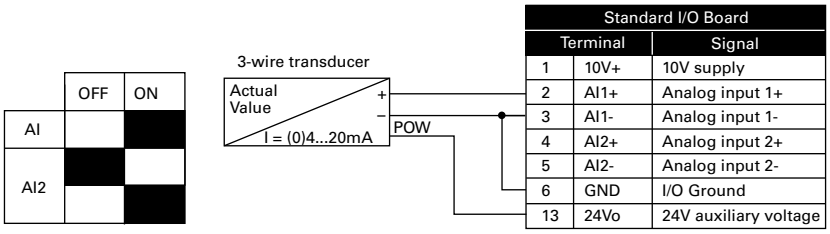
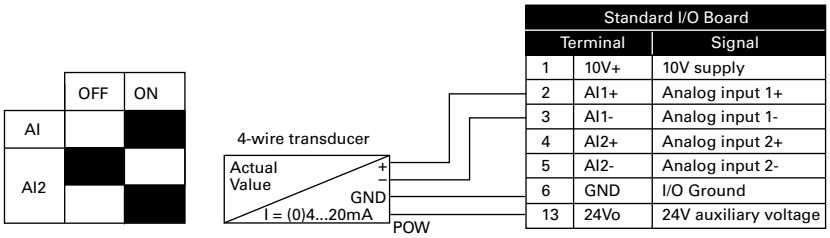
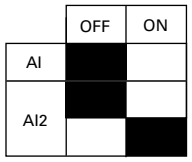


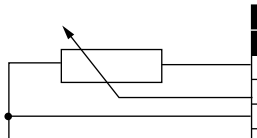
Figure 39. AI1 4wire-current



Code	Modbus ID	Parameter	Application	RO/RW
P2.4.1	**222**	**AI1 Mode**	**1,2,3**	RW

Figure 40. AI1 reference potentiometer 10 V



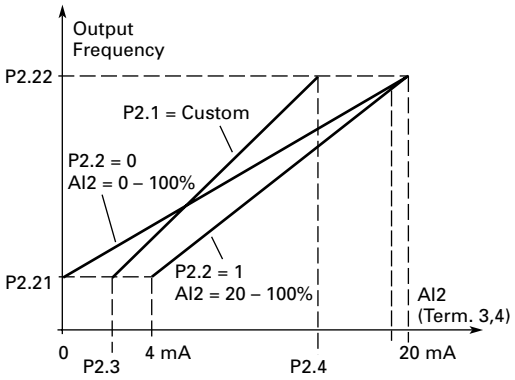


Standard I/O Board		
Terminal		Signal
1	10V+	10V supply
2	AI1+	Analog input 1+
3	AI1-	Analog input 1-
4	AI2+	Analog input 2+
5	AI2-	Analog input 2-
6	GND	I/O Ground
13	24Vo	24V auxiliary voltage

P2.4.2	**175**	**AI1 Signal Range**	**1,2,3**	RW

With this parameter you can select the analog input 1 signal range.
0–100% is equal to 0 to 10 V/ 0-20 mA
20–100% is equal to 2 to 10 V, 4-20 mA.
For selection "Customized," see "AI Custom Min" and "AI Custom Max", this enables a customized signal range.

Figure 41. Analog input AI scaling



P2.4.3	**176**	**AI1 Custom Min**	**1,2,3**	RW

Defines the minimum percentage for the input range to be associated with AI Ref Min Scale.

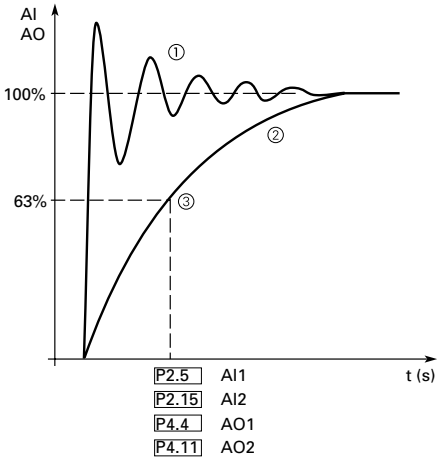
P2.4.4	**177**	**AI1 Custom Max**	**1,2,3**	RW

Defines the maximum percentage for the input range to be associated with AI Ref Max Scale.

Code	Modbus ID	Parameter	Application	RO/RW
P2.4.5	**174**	**AI1 Filter Time**	**1,2,3**	RW

Defines the filter time applied to the analog input signal, zero equals no filtering.

Figure 42. AI1 signal filtering



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

P2.4.6	**181**	**AI1 Signal Invert**	**1,2,3**	RW

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

Figure 43. AI1 No signal inversion

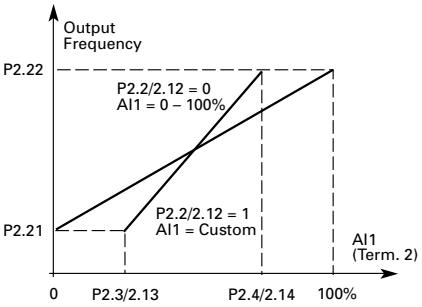
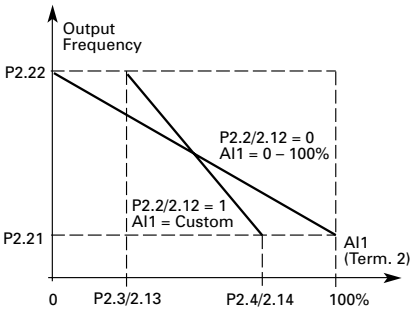


Figure 44. AI1 Signal Inversion

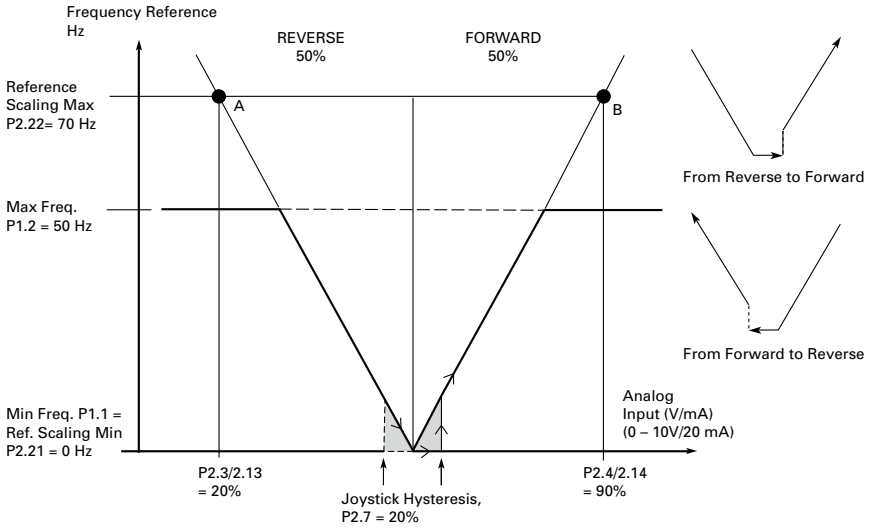


Maximum AI1 signal = minimum set speed.
Minimum AI1 signal = maximum set speed.

Code	Modbus ID	Parameter	Application	RO/RW
P2.4.7	**178**	**AI1 Joystick Hyst**	**3**	RW

Defines the joystick hysteresis, when the analog input is within this range the drive will interpret this as a zero speed reference.

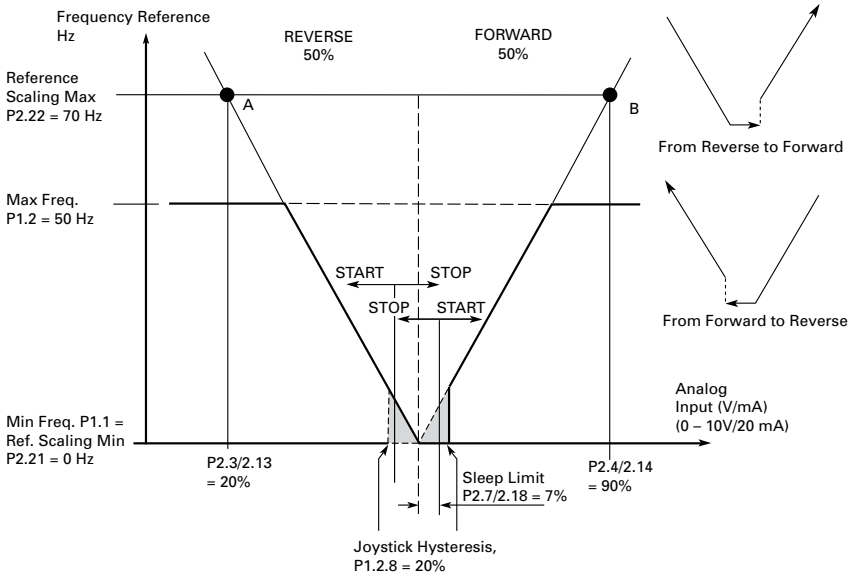
Figure 45. Example of joystick hysteresis



P2.4.8	**179**	**AI1 Sleep Limit**	**3**	RW

Defines the sleep level of the analog input, if the analog input signal is below this level for a time greater than the Analog Sleep Delay the drive will transition to a sleep state and restart when the analog input increases above this level.

Figure 46. Example of sleep limit function



P2.4.9	**180**	**AI1 Sleep Delay**	**3**	RW

Defines the delay for the analog input sleep level.

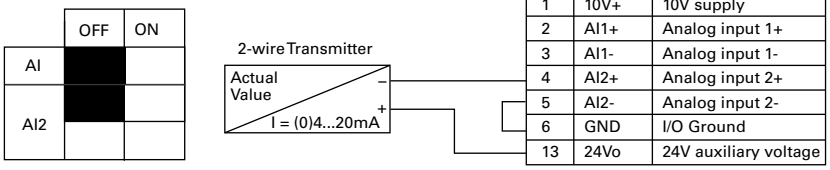
P2.4.10	**133**	**AI1 Joystick Offset**	**3**	RW

Joysticks zero point by default is the middle of AI range, Joystick offset defines how much the zero point is moved in the forward or reverse from this Analog input centerpoint.

Code	Modbus ID	Parameter	Application	RO/RW
P2.5.1	**223**	**AI2 Mode**	**1,2,3**	RW

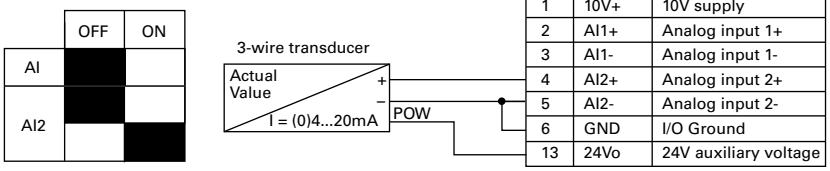
Selects the analog input mode for AI2 terminal 4 and 5 for current or voltage, also need to set DIP switches on control board. If using the 10 V supply on Terminal 1 of the drive, it will require a ground jumper from Terminal 6 to the AI- input terminal 5 to complete the loop. When doing a current loop with an external supply the ground jumper is not required.

Figure 47. AI2 2wire-current



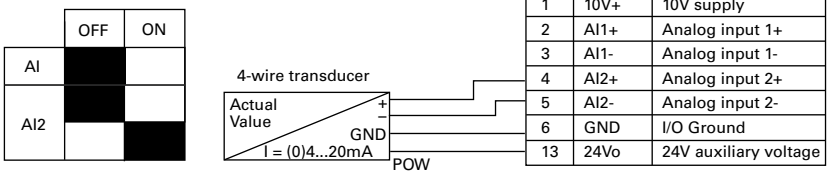
Standard I/O Board		
Terminal		Signal
1	10V+	10V supply
2	AI1+	Analog input 1+
3	AI1-	Analog input 1-
4	AI2+	Analog input 2+
5	AI2-	Analog input 2-
6	GND	I/O Ground
13	24Vo	24V auxiliary voltage

Figure 48. AI2 3wire-current



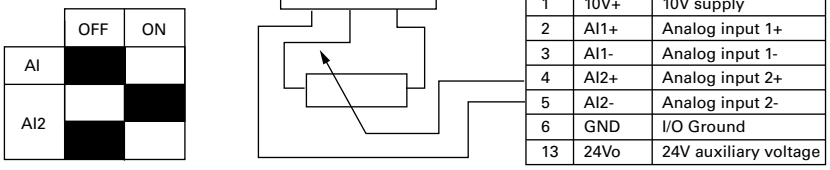
Standard I/O Board		
Terminal		Signal
1	10V+	10V supply
2	AI1+	Analog input 1+
3	AI1-	Analog input 1-
4	AI2+	Analog input 2+
5	AI2-	Analog input 2-
6	GND	I/O Ground
13	24Vo	24V auxiliary voltage

Figure 49. AI2 4wire-current



Standard I/O Board		
Terminal		Signal
1	10V+	10V supply
2	AI1+	Analog input 1+
3	AI1-	Analog input 1-
4	AI2+	Analog input 2+
5	AI2-	Analog input 2-
6	GND	I/O Ground
13	24Vo	24V auxiliary voltage

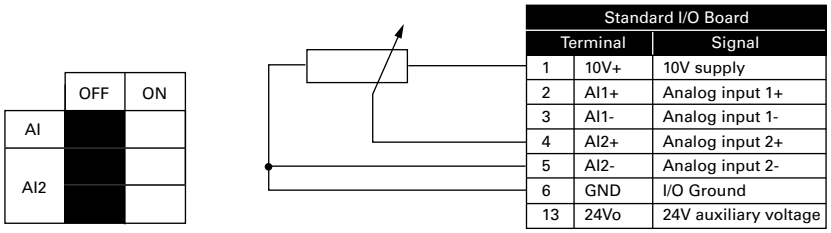
Figure 50. AI2 differential voltage



Standard I/O Board		
Terminal		Signal
1	10V+	10V supply
2	AI1+	Analog input 1+
3	AI1-	Analog input 1-
4	AI2+	Analog input 2+
5	AI2-	Analog input 2-
6	GND	I/O Ground
13	24Vo	24V auxiliary voltage

Code	Modbus ID	Parameter	Application	RO/RW

Figure 51. AI2 pot ref



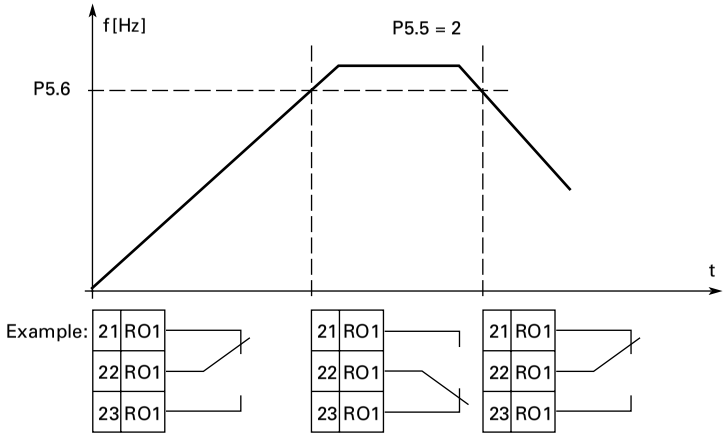
P2.5.2	**183**	**AI2 Signal Range** With this parameter you can select the analog input 2 signal range. 0–100% is equal to 0 to 10 V/ 0–20 mA 20–100% is equal to 2 to 10 V, 4–20 mA. For selection "Customized," see "AI Custom Min" and "AI Custom Max", this enables a customized signal range.	**1,2,3**	RW
P2.5.3	**184**	**AI2 Custom Min** Defines the minimum percentage for the input range to be associated with AI Ref Min Scale.	**1,2,3**	RW
P2.5.4	**185**	**AI2 Custom Max** Defines the maximum percentage for the input range to be associated with AI Ref Max Scale..	**1,2,3**	RW
P2.5.5	**182**	**AI2 Filter Time** Defines the filter time applied to the analog input signal, zero equals no filtering.	**1,2,3**	RW
P2.5.6	**189**	**AI2 Signal Invert** Inverts the reference signal, maximum reference becomes minimum frequency and minimum reference becomes maximum frequency.	**1,2,3**	RW
P2.5.7	**186**	**AI2 Joystick Hyst** Defines the joystick hysteresis, when the analog input is within this range the drive will interpret this as a zero speed reference.	**3**	RW
P2.5.8	**187**	**AI2 Sleep Limit** Defines the sleep level of the analog input, if the analog input signal is below this level for a time greater than the Analog Sleep Delay the drive will transition to a sleep state and restart when the analog input increases above this level.	**3**	RW
P2.5.9	**188**	**AI2 Sleep Delay** Defines the delay for the analog input sleep level.	**3**	RW
P2.5.10	**134**	**AI2 Joystick Offset** Joysticks zero point by default is the middle of AI range, Joystick offset defines how much the zero point is moved in the forward or reverse from this Analog input centerpoint.	**3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P3.1.1	**151**	**DO1 Function**	**1,2,3**	RW
		Setting Value Signal Content 0 = Not used - No Action 1 = Ready - Drive is ready for operation 2 = Run - Drive is running 3 = fault - Drive is faulted 4 = fault invert - Drive is not faulted 5 = warning - Drive has a warning message 6 = Reverse - The Drive is outputing reverse phase rotation 7 = At Speed - The output frequency has reached the set reference 8 = Zero Frequency - Drive output is at zero frequency 9 = Frequency limit supervision - Supervision for frequency limit 1 is activated 10 = Frequency limit2 supervision -Supervision for frequency limit2 is activated 11 = pid1 supervision - Supervision for pid1 controller is activated 12 = pid2 supervision - Supervision for pid2 controller is activated 13 = over heat fault - Drive over heat has occurred 14 = Ocurrent Fault - Over current fault has occurred 15 = Ovolt Fault - Over volt fault has occurred 16 = Uvolt Fault Resp - Under volt warning/fault has occurred 17 = 4 mA fault - 4 mA fault has occurred 20 = torque limit supervision - Supervision for torque limit 21 = reference limit supervision - Supervision for reference limit 22 = control from IO - I/O is the control place 23 = unrequired rotation direction - The active direction isn't the same with the reference direction 24 = thermal fault - Thermistor fault has occurred 25 = fire mode - Drive is in fire mode 26 = bypass running - Drive is in bypass mode 27 = external fault - External fault has occurred 28 = remote control - Remote is the control place 29 = jog speed - Drive is in jog mode 30 = motor thermal protection - Motor is thermal protected 31 = fieldbus input1 - Controled by FB control word, look at com manuals. 32 = fieldbus input2 - Controled by FB control word, look at com manuals. 33 = fieldbus input3 - Controled by FB control word, look at com manuals. 34 = fieldbus intpu4 - Controled by FB control word, look at com manuals. 35 = damper control - Drive is in damper control 36 = timer1 status - The status of timer1 37 = timer2 status - The status of timer2 38 = timer3 status - The status of timer3 40 = power limit supervision - Supervision for power limit 41 = temperature limit supervision - Supervision for temperature limit 42 = analog input supervision - Supervision for analog input 43 = motor1 control - Motor1 is controlled 48 = logic fulfilled - The status of logic function 49 = pid1 sleep - PID1 controller is in sleep mode 50 = pid2 sleep - PID2 controller is in sleep mode 51 = Motor Current 1 Supv - Motor current supervision value active 52 = Motor Current 2 Supv - Motor current supervision value active 53 = Second AI Limit Supv - Analog input supervision active 54 = DC Charge Switch Close - DC bus is charged (230 Vac - 230 Vdc, 480 Vac - 380 Vdc, 575 Vac - 520 Vdc) fault signal is not effectived by this output. 55 = Preheat Active - Preheat Control mode is activated 56 = Cold Weather Active - Cold Weather mode is activated 58 = 2nd Stage Ramp Frequency Active - 2nd stage ramp frequency limit reached 59 = STO Fault Output - STO fault has occurred 60 = Run Bypass/Drive - Run indication for drive and bypass. 61 = Bypass Overload; 62 = Bypass Run; 63 = Auto Local On COM Fault; 64 = Fieldbus RTU Fault; 65 = Fieldbus TCP Fault; 66 = Fieldbus MSTP Fault; 67 = Fieldbus EIP Fault; 68 = Fieldbus SlotA Fault; 69 = Fieldbus SlotB Fault; 70 = Fieldbus SWD Fault; 78 = CP Interlock Fault - CleanPower Interlock run fault has occurred		

Code	Modbus ID	Parameter	Application	RO/RW
P3.1.2	**152**	**RO1 Function**	**1,2,3**	RW
		See Par ID 151, DO1 function.		
P3.1.3	**2112**	**RO1 On Delay**	**1,2,3**	RW
		Use this parameter to set the delay time for RO1 relay to transition from logic 0 to 1 state.		
P3.1.4	**2113**	**RO1 Off Delay**	**1,2,3**	RW
		Use this parameter to set the delay time for RO1 relay to transition from logic 1 to 0 state.		
P3.1.5	**153**	**RO2 Function**	**1,2,3**	RW
		See Par ID 151, DO1 function.		
P3.1.6	**2114**	**RO2 On Delay**	**1,2,3**	RW
		Use this parameter to set the delay time for RO2 relay to transition from logic 0 to 1 state.		
P3.1.7	**2115**	**RO2 Off Delay**	**1,2,3**	RW
		Use this parameter to set the delay time for RO2 relay to transition from logic 1 to 0 state.		
P3.1.8	**538**	**RO3 Function**	**1,2,3**	RW
		See Par ID 151, DO1 function.		
P3.1.9	**2116**	**RO3 On Delay**	**1,2,3**	RW
		Use this parameter to set the delay time for RO3 relay to transition from logic 0 to 1 state.		
P3.1.10	**2117**	**RO3 Off Delay**	**1,2,3**	RW
		Use this parameter to set the delay time for RO3 relay to transition from logic 1 to 0 state.		
P3.1.11	**2118**	**RO3 Reverse**	**1,2,3**	RW
		Use this parameter to invert the output logic of RO3 to be normally closed. Instead of normally open. Power off state of relay will be Normally Open. 1 = Not Inverted 2 = Inverted		
P3.1.12	**2463**	**Virtual RO1 Function**	**1,2,3**	RW
		See Par ID 151, DO1 function.		
P3.1.13	**2464**	**Virtual RO2 Function**	**1,2,3**	RW
		See Par ID 151, DO1 function.		
P3.1.14	**2848**	**Virtual RO1 On Delay**	**1,2,3**	RW
		Delay time for virtual RO1 relay to turn on after signal received.		
P3.1.15	**2849**	**Virtual RO1 Off Delay**	**1,2,3**	RW
		Delay time for virtual RO1 relay to turn off after signal removed.		
P3.1.16	**2850**	**Virtual RO2 On Delay**	**1,2,3**	RW
		Delay time for virtual RO2 relay to turn on after signal received.		
P3.1.17	**2851**	**Virtual RO2 Off Delay**	**1,2,3**	RW
		Delay time for virtual RO2 relay to turn off after signal removed.		
P3.2.1	**154**	**Freq Limit 1 Supv**	**1,2,3**	RW
		Selects how the drives frequency limit supervision controller functions.		

Code	Modbus ID	Parameter	Application	RO/RW
P3.2.2	155	**Freq Limit 1 Supv Val** Selects the frequency value supervised by the frequency limit supervision function.	1,2,3	RW

Figure 52. Supervision function

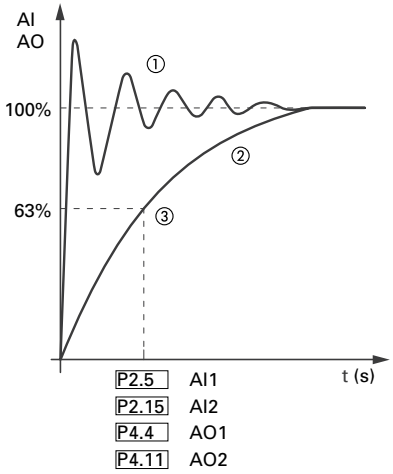


P3.2.3	2200	**Freq Limit 1 Supv Hyst** This value selects the bandwidth between when the output frequency supervision enables and disables.	1,2,3	RW
P3.2.4	157	**Freq Limit 2 Supv** Selects how the drives frequency limit supervision controller functions.	1,2,3	RW
P3.2.5	158	**Freq Limit 2 Supv Val** Selects the frequency value supervised by the frequency limit supervision function.	1,2,3	RW
P3.2.6	2201	**Freq Limit 2 Supv Hyst** This value selects the bandwidth between when the output frequency supervision enables and disables.	1,2,3	RW
P3.2.7	159	**Torque Limit Supv** Selects how the drives torque limit supervision controller functions.	1,2,3	RW
P3.2.8	160	**Torque Limit Supv Val** Selects the torque value supervised by the torque limit supervision function.	1,2,3	RW
P3.2.9	2202	**Torque Limit Supv Hyst** This value selects the bandwidth between when the Torque supervision enables and disables.	1,2,3	RW
P3.2.10	161	**Ref Limit Supv** Selects how the drives reference limit supervision controller function.	1,2,3	RW
P3.2.11	162	**Ref Limit Supv Val** Selects the reference frequency value supervised by the reference frequency limit supervision function.	1,2,3	RW
P3.2.12	2203	**Ref Limit Supv Hyst** This value selects the bandwidth between when the Reference limit supervision enables and disables.	1,2,3	RW
P3.2.13	165	**Temp Limit Supv** Selects how the drives temperature limit supervision controller function.	1,2,3	RW
P3.2.14	166	**Temp Limit Supv Val** Selects the drive temperature value supervised by the drive temperature limit supervision function.	1,2,3	RW
P3.2.15	2204	**Temp Limit Supv Hyst** This value selects the bandwidth between when the Temp limit supervision enables and disables.	1,2,3	RW
P3.2.16	167	**Power Limit Supv** Selects how the drives power limit supervision controller function.	1,2,3	RW
P3.2.17	168	**Power Limit Supv Val** Selects the output power value supervised by the power limit supervision function.	1,2,3	RW

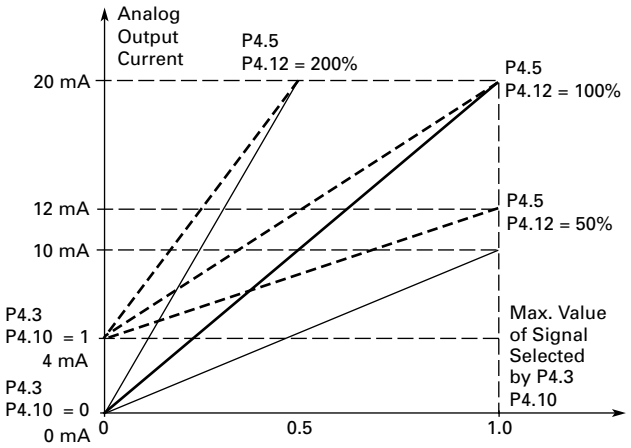
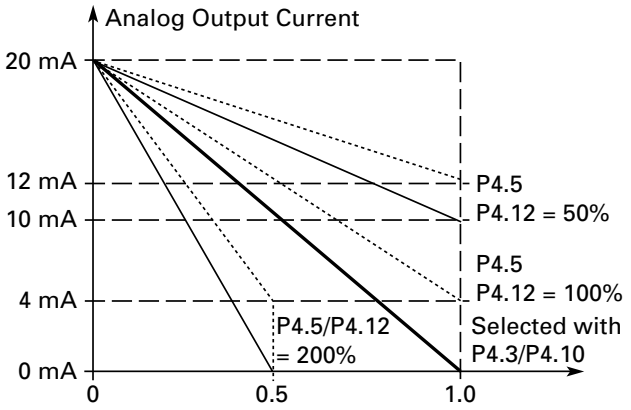
Code	Modbus ID	Parameter	Application	RO/RW
P3.2.18	2205	**Power Limit Supv Hyst** This value selects the bandwidth between when the Power limit supervision enables and disables.	1,2,3	RW
P3.2.19	170	**AI Supv Select** Selects analog signal to use for the analog input supervision 0 = Analog reference from AI 1 = Analog reference from keypad Potentiometer	1,2,3	RW
P3.2.20	171	**AI Limit Supv** Selects how the analog input limit supervision controller functions.	1,2,3	RW
P3.2.21	172	**AI Limit Supv Val** Selects the analog reference value supervised by the analog reference limit supervision function.	1,2,3	RW
P3.2.22	2198	**AI Supv Hyst** This value selects the bandwidth between when the AI supervision enables and disables.	1,2,3	RW
P3.2.23	2189	**Motor Current 1 Supv** Selects how the motor current limit supervision controller function.	1,2,3	RW
P3.2.24	2190	**Motor Current 1 Supv Value** Selects the motor current value supervised by the motor current limit supervision function.	1,2,3	RW
P3.2.25	2196	**Motor Current 1 Supv Hyst** This value selects the bandwidth between when the motor current supervision enables and disables.	1,2,3	RW
P3.2.26	2191	**Motor Current 2 Supv** Selects how the motor current limit supervision controller function.	1,2,3	RW
P3.2.27	2192	**Motor Current 2 Supv Value** Selects the motor current value supervised by the motor current limit supervision function.	1,2,3	RW
P3.2.28	2197	**Motor Current 2 Supv Hyst** This value selects the bandwidth between when the motor current supervision enables and disables.	1,2,3	RW
P3.2.29	2193	**Second AI Supv Select** Selects analog signal to use for the analog input supervision 0 = Analog reference from AI 1 = Analog reference from keypad Potentiometer	1,2,3	RW
P3.2.30	2194	**Second AI Limit Supv** Selects how the analog input limit supervision controller functions.	1,2,3	RW
P3.2.31	2195	**Second AI Limit Supv Val** Selects the analog reference value supervised by the analog reference limit supervision function.	1,2,3	RW
P3.2.32	2199	**Second AI Supv Hyst** This value selects the bandwidth between when the AI supervision enables and disables.	1,2,3	RW
P3.2.33	1346	**PID1 Superv Enable** Upper and lower limits around the reference are set. When the actual value goes above or below the upper limit and lower limit the delay timer will increment. When the actual value is within the allowed area the delay counter decrements. After the delay time expires the relay output for PID supervision will be activated. This function is used for process value out of range faults.	2,3	RW
P3.2.34	1347	**PID1 Superv Upper Limit** Upper limit for PID feedback value used with the PID supervision controller.	2,3	RW
P3.2.35	1349	**PID1 Superv Lower Limit** Upper limit for PID feedback value used with the PID supervision controller.	2,3	RW
P3.2.36	1351	**PID1 Superv Delay** Defines the delay time that the PID feedback value must be out of range before activating the PID supervision output.	2,3	RW
P3.2.37	1408	**PID2 Superv Enable** Use this parameter to select enabling of the 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.	2,3	RW

Code	Modbus ID	Parameter	Application	RO/RW
P3.2.38	**1409**	**PID2 Superv Upper Limit**	**2,3**	RW
		Use this parameter to set the upper PID feedback supervision limit level.		
P3.2.39	**1411**	**PID2 Superv Lower Limit**	**2,3**	RW
		Use this parameter to set the lower PID feedback supervision limit level.		
P3.2.40	**1413**	**PID2 Superv Delay**	**2,3**	RW
		Use this parameter to set the delay time after which the PID feedback goes above or below the limit settings to provide status to relay output function.		
P3.3.1	**227**	**AO1 Mode**	**1,2,3**	RW
		Defines the analog output mode to current or voltage.		
P3.3.2	**146**	**AO1 Function**	**1,2,3**	RW
		Select the function desired to the terminal AO1 1 = Output frequency (0 -mMax frequency) 2 = Frequency reference (0 - max frequency) 3 = Motor Speed RPM (0 - nameplate RPM) 4 = Motor Current (0 - nameplate current) 5 = Motor Torque (0 - calculated nominal) 6 = Motor Power (0 - calculated nominal) 7 = Motor Voltage (0 - nameplate voltage) 8 = DC bus Voltage (0 - 1000VDC) 9 = PID setpoint (Process unit min- process unit max) 10 = PID error value (Process unit min- process unit max) 11 = PID output (Process unit min- process unit max) 12 = Analog input (0% - 100%) 13 = Drive Reference Potentiometer (0% - 100%) 14 = Fieldbus process data input 1 (0% - 100%) 15 = Fieldbus process data input 2 (0% - 100%) 16 = Fieldbus process data input 3 (0% - 100%) 17 = Fieldbus process data input 4 (0% - 100%) 18 = Fieldbus process data input 5 (0% - 100%) 19 = Fieldbus process data input 6 (0% - 100%) 20 = Fieldbus process data input 7 (0% - 100%) 21 = Fieldbus process data input 8 (0% - 100%) 22 = User Defined Output (user defined min - user defined max) 23 = Motor Torque (0% - 200%) 24 = Motor Power Absolute Value (0% - 100%)		
P3.3.3	**149**	**AO1 Minimum**	**1,2,3**	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). 0 = Set minimum value to 0 V/0 mA. 1 = Set minimum value to 2 V/4 mA.		
P3.3.4	**147**	**AO1 Filter Time**	**1,2,3**	RW
		Defines the filter time applied to the analog output signal, zero equals no filtering.		

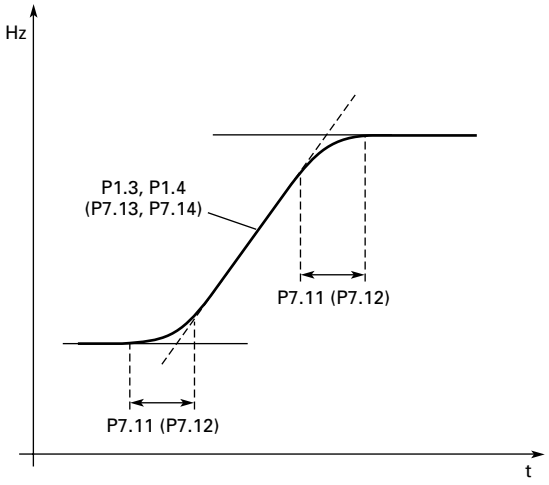
Figure 53. Analog output filtering



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

Code	Modbus ID	Parameter	Application	RO/RW
P3.3.5	**150**	**A01 Scale**	**1,2,3**	RW
		This parameter will scale the analog output function from 10% to 1000%, in adjusting this value it will either extend or shrink the scale on the analog signal from 0–10 V/0–20 mA or 2–10 V/4–20 mA.		
		Figure 54. Analog output scaling		
				
P3.3.6	**148**	**A01 Inversion**	**1,2,3**	RW
		Use this parameter to invert 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 55. Analog output invert		
				
P3.3.7	**173**	**A01 Offset**	**1,2,3**	RW
		This parameter is used to add an offset of –100.0 to 100.0% to the analog output minimum value to add in an additional offset scale factor.		
P3.4.1	**228**	**A02 Mode**	**1,2,3**	RW
		Use this parameter to select the analog output mode for AO2 as current or voltage. There are internal relays to perform the switching of the signal between mA or V.		
P3.4.2	**229**	**A02 Function**	**1,2,3**	RW
		Use this parameter to select the function or signal that is connected to the terminal AO2 terminal 24. Scaling will vary based on the signal selected. See ID 146 for options.		
P3.4.3	**232**	**A02 Minimum**	**1,2,3**	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). 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
P3.4.4	**230**	**AO2 Filter Time** Use this parameter to define the filtering time for the analog output signal, with a higher number the more filtering time is added on the output signal. Setting this parameter value to 0.00 will deactivate filtering.	**1,2,3**	RW
P3.4.5	**233**	**AO2 Scale** This parameter will scale the analog output function from 10% to 1000%, in adjusting this value it will either extend or shrink the scale on the analog signal from 0–0 V/0–20 mA or 2–10 V/4–20 mA.	**1,2,3**	RW
P3.4.6	**231**	**AO2 Inversion** Use this parameter to invert the analog output signal, normally 0 V/0 mA/2 V/4 mA = 0% and 10 V/20 mA = 100%, when inverted 0 V/0 mA/2 V/4 mA = 100% and 10 V/20 mA = 0%: Maximum output signal = Minimum set value. Minimum output signal = Maximum set value.	**1,2,3**	RW
P3.4.7	**234**	**AO2 Offset** This parameter is used to add a offset of –100.0 to 100.0% to the analog output minimum value to add in an additional offset scale factor.	**1,2,3**	RW
P3.5.1	**751**	**Logic Function Select** The logic function enables you to link both parameters logic function input(A) and logic function input (B) logically with each other. The value can be And - indicating both being active then enable the logic, OR - if one or both inputs are active then it will enabled the logic, XOR - if any one of the inputs are active the logic is enabled, if both logic's are the same state it disables the logic. The result (LOG) can then be assigned to the digital outputs DO, RO1, RO2 and RO3. The type of operation is defined in parameterlogic function selection: 0 = AND 1 = OR 2 = XOR	**3**	RW
P3.5.2	**752**	**Logic Operation Input A** Input A for Logic function calculation defined. See DO/RO Functions for settings.	**3**	RW
P3.5.3	**753**	**Logic Operation Input B** Input B for Logic function calculation defined. See DO/RO Functions for settings.	**3**	RW
P4.1.1	**141**	**Keypad Reference** Use this parameter to modify the frequency reference on the keypad.	**1,2,3**	RW
P4.1.2	**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**	RW
P4.1.3	**114**	**Keypad Stop** 0 = Enabled-Keypad operation—In this mode the keypad stop will only operate when the control source is set to keypad 1 = Always Enables—In this mode the stop button will always stop the drive regardless of control mode	**1,2,3**	RW
P4.1.4	**1724**	**Hand Key Enable** Enable/Disable handkey on keypad.	**1,2,3**	RW
P4.1.5	**1679**	**Reverse Enable** Use this parameter to enables or disables the reverse motor direction.	**1,2,3**	RW
P4.1.6	**2515**	**Change PhaseSequence Motor** Use this parameter allows for swapping the motor phase output from u, v, w to u, w, v. This does not affect the forward/reverse selection. Can be used in fan and pump applications where motor rotation was incorrect and not able to swap motor leads.	**1,2,3**	RW
P4.1.7	**1685**	**Power Up HOA Select** Selects what control place the drive will start at after power is applied. The default setting will hold the last state that the drive was in when powered down, selecting Local or Remote will cause the drive to start in that mode regardless of last state.	**1,2,3**	RW
P4.1.8	**2462**	**Bumpless Enable** Selects what control place the drive will start at after power is applied. the default setting will hold the last state that the drive was in when powered down, selecting Local or Remote will cause the drive to start in that mode regardless of last state.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P4.1.9	**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 signal is given it is ignored until the time has expired upon which it will then start, in keypad, I/O, or fieldbus Control Modes.	**1,2,3**	RW
P4.1.10	**252**	**Start Mode** 0 = Ramp—The drive starts from 0 Hz and ramps to the frequency reference value 1 = Flying Start From Stop Frequency—The drive will catch a spinning motor this setting searches for the current frequency using the last operating frequency as a starting point 2 = Flying Start From Max Frequency—The drive will catch a spinning motor this setting searches for the current frequency using the maximum operating frequency as a starting point	**1,2,3**	RW
P4.1.11	**253**	**Stop Mode** 0 = Coasting—After a stop command the motor coasts to a stop uncontrolled by the drive 1 = Ramp—After the stop command the speed of the motor is decelerated according to the set deceleration parameters	**1,2,3**	RW
P4.1.12	**247**	**Ramp 1 Shape** The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.0 gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.1 to 10 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope.	**1,2,3**	RW
P4.1.13	**248**	**Ramp 2 Shape** The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.0 gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.1 to 10 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope. **Figure 56. Acceleration/Deceleration (S-shaped)**  	**1,2,3**	RW
P4.1.14	**249**	**Accel Time 2** These values correspond to the time required for the output frequency to accelerate from the zero frequency to the set maximum frequency. 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**	RW
P4.1.15	**250**	**Decel Time 2** These values correspond to the time required for the output frequency to decelerate from the set maximum frequency to the zero frequency. 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**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P4.1.16	**267**	**Power Loss Function** This enables the drive to reduce output voltage to the motor to keep the drive powered up as long as it can before power is lost. The motor is used as a generator to feed the DC bus. This mode is engaged at the following levels—230 V–156.8 Vdc, 480 V–303 Vdc, and 575–426.65 Vdc. 1 = Enable power loss function 0 = Disable power loss function	**1,2,3**	RW
P4.1.17	**268**	**Power Loss Time** Use this parameter to set the allowable power loss max time before the drive will not auto restart when power is reestablished and run command active. If AC input voltage recovers before this time expires, drive shall continue to operate.	**1,2,3**	RW
P4.1.18	**2444**	**2nd Stage Ramp Frequency** When 2nd Stage Ramp Frequency is the frequency level at which the drive will enable the 2nd Stage Ramp Frequency output function. This then can be used for other inputs or devices to signal a frequency level.	**1,2,3**	RW
P4.1.19	**2667**	**Run Remove Stop Mode** Drive will use this stop mode setting if run enable(Par ID 594) signal removed. Default value should be coast stop.	**1,2,3**	RW
P4.2.1	**254**	**DC-Brake Current** Use this parameter to set the amount of DC current as an amp value that is injected into the motor during DC braking.	**1,2,3**	RW
P4.2.2	**263**	**Start DC-Brake Time** This parameter defines the time the drive injects DC braking current before starting to ramp. This can be used to stop motors that are potentially spinning before a run command is given. Before ramping to reference level. This is to stop motors that are potentially spinning before a run command is given.	**1,2,3**	RW
P4.2.3	**262**	**Stop DC-Brake Frequency** During a ramp to stop this parameter defines the output frequency to be below to begin DC-braking.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P4.2.4	**255**	**Stop DC-Brake Time**	**1,2,3**	RW
		Determines the length of DC braking while stopping. 0.00 = DC-brake is not used >0.0 = The amount of time DC-braking will occur after falling below the stop DC brake frequency		

Figure 57. DC-Braking time when stop mode = coasting

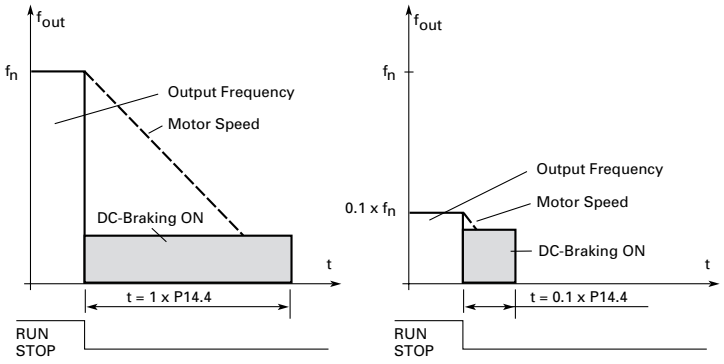
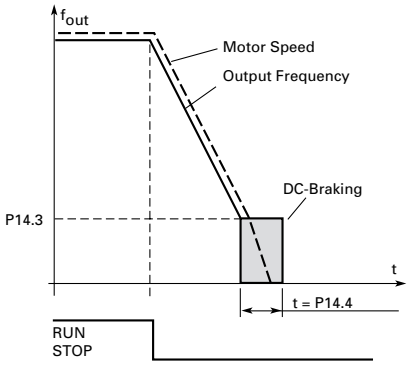


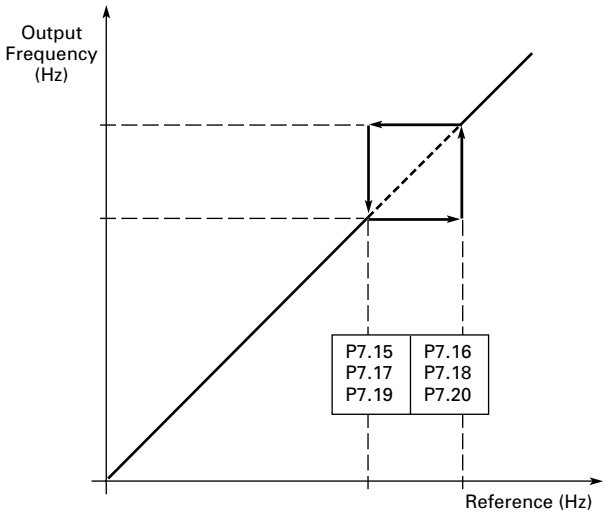
Figure 58. DC-Braking time when stop mode = ramp



P4.2.5	**251**	**Brake Chopper Define**	**1,2,3**	RW
		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)		
P4.2.6	**266**	**Flux Brake**	**1,2,3**	RW
		While stopping the output 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 carefully to avoid motor damage.		
P4.2.7	**265**	**Flux Brake Current**	**1,2,3**	RW
		Use this parameter to set the level of current In amps for the flux braking is enabled.		
P4.3.1	**264**	**Skip Range Ramp Factor**	**1,2,3**	RW
		Use this parameter to set the multiplier used for 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.		

Code	Modbus ID	Parameter	Application	RO/RW
P4.3.2	**256**	**Skip F1 Low Limit** Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor. e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.	**1,2,3**	RW
P4.3.3	**257**	**Skip F1 High Limit** Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor. e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.	**1,2,3**	RW
P4.3.4	**258**	**Skip F2 Low Limit** Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor. e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.	**1,2,3**	RW
P4.3.5	**259**	**Skip F2 High Limit** Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor. e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.	**1,2,3**	RW
P4.3.6	**260**	**Skip F3 Low Limit** Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor. e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.	**1,2,3**	RW
P4.3.7	**261**	**Skip F3 High Limit** Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor. e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.	**1,2,3**	RW

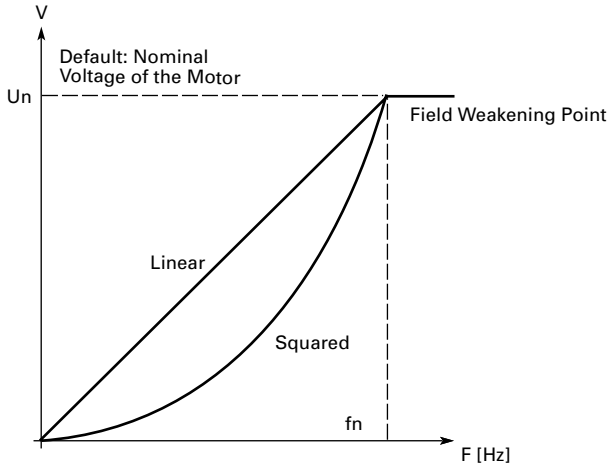
Figure 59. Example of skip frequency area setting

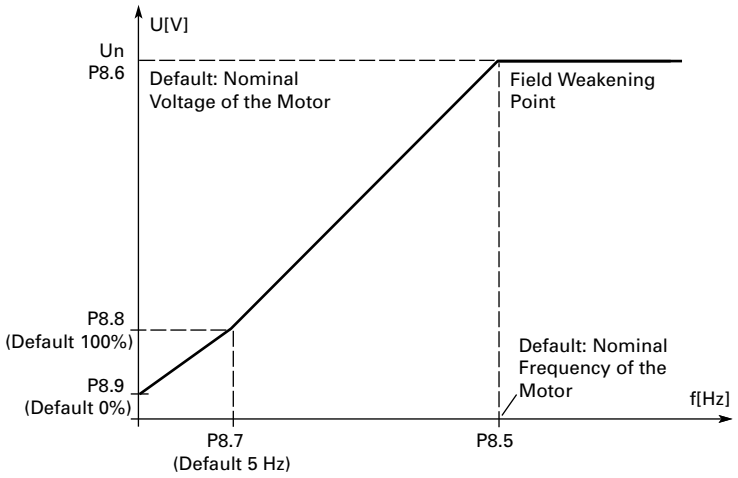


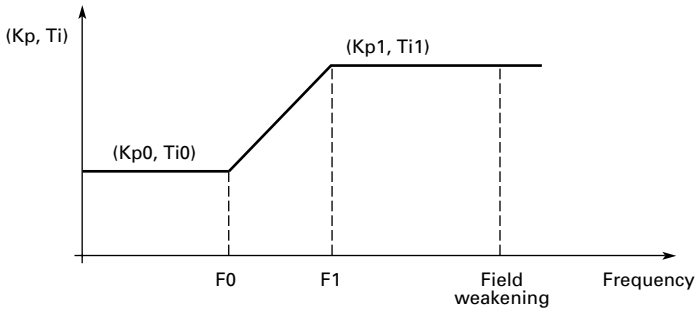
Code	Modbus ID	Parameter	Application	RO/RW
P4.4.1	**2122**	**Currency** Sets the local currency used for energy savings estimation.	**1,2,3**	RW
P4.4.2	**2123**	**Energy Cost** Sets the local energy cost per kW, used for energy savings estimation.	**1,2,3**	RW
P4.4.3	**2124**	**Data Type** Selects Data type to view energy savings. The drive takes four recordings in an hour and then calculates the average based off this parameter. The savings estimation is based on comparing the drives energy usage compared to a across the line starter. 0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg	**1,2,3**	RW
P4.4.4	**2125**	**Energy Savings Reset** Resets the energy savings value.	**1,2,3**	RW
P4.5.1	**156**	**Motor Pot Ramp Time** Defines the speed of change for the motor potentiometer reference value.	**3**	RW
P4.5.2	**169**	**Motor Pot Ref Reset** Defines how the motor pot reference signal is handled on shutting down frequency converter output or powering down the frequency converter. 0 = No reset—reference stays at last setting 1 = Memory reset in stop and power down—reference resets to 0 when drive is stopped or the power is cycled to the drive 2 = Memory reset in power down—reference resets to 0 when drive is powered down only	**3**	RW
P4.6.1	**776**	**IGBT Temperature** IGBT Temperature	**1,2,3**	RO
P4.6.2	**1771**	**Foldback status** Foldback status. It is a monitor parameter. There are three values: (a) active, when IGBT temperature is greater than Foldback temperature (b) on hold, when IGBT temperature is between Recovering temperature and Foldback temperature (c) inactive, when IGBT temperature is smaller than Recovering temperature	**1,2,3**	RW
P4.6.3	**1772**	**Foldback output frequency** Foldback output, it is the frequency. It is a monitor parameter, unit is Hz.	**1,2,3**	RW
P4.6.4	**1773**	**Foldback output speed** Foldback output, it is the speed. It is a monitor parameter, unit is rpm.	**1,2,3**	RW
P4.6.5	**1774**	**Foldback enable** Foldback enable	**1,2,3**	RW
P4.6.6	**1775**	**Foldback temperature** Foldback temperature. It is a user-setting parameter. Display unit is Deg. C. If IGBT temperature is greater than Foldback temperature, the speed shall be reduced at the rate “speed reduce rate”.	**1,2,3**	RW
P4.6.7	**1776**	**Recovering temperature** Recovering temperature. It is a user-setting parameter. Display unit Deg. C. If IGBT temperature is between Recovering temperature and Foldback temperature, the speed shall remain the current speed.	**1,2,3**	RW
P4.6.8	**1777**	**Foldback speed reduce rate** Foldback speed reduce rate. It is a user-setting parameter, unit is rpm/s. If IGBT temperature is greater than Foldback temperature, the speed shall be reduced at the rate “foldback speed reduce rate”.	**1,2,3**	RW
P4.6.9	**1778**	**Foldback minimum speed** Foldback fault trip speed. It is a user-setting parameter, unit is rpm. If the drive is “foldback active” and speed is less than “Foldback minimum speed”, this status lasts “Foldback fault timeout”, Foldback fault will happen.	**1,2,3**	RW
P4.6.10	**1779**	**Foldback fault timeout** Foldback fault timeout. It is a user-setting parameter, unit is seconds. If the drive is “foldback active” and speed is less than “Foldback minimum speed”, this status lasts “Foldback fault timeout”, Foldback fault will happen.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P5.1.1	**287**	**Motor Control Mode** 0 = Frequency control: Motor is controlled by giving a frequency reference to it. Voltage reference is calculated from scalar U/f ratio according to preprogrammed curve. (Output frequency resolution = 0.01 Hz). The frequency reference can be from I/O terminal, keypad or communication bus. 1 = Speed control: Motor is controlled by giving a frequency reference to it with slip compensation. Voltage reference is calculated from scalar U/f ratio according to preprogrammed curve. (Output frequency resolution = 0.01 Hz). The speed reference can be from I/O terminal, keypad or communication bus (accuracy ±0.5%). 2 = PM Control1 - PM motor control mode 1, used for SPM (surface mounted permanet magnet) and it also can be used for IPM. 3= PM Control2 - PM motor control mode 2, used for IPM (internally mounted permanet magnet) and it can not be used for SPM. 5 = Speed Control (Open Loop): Similar to the standard Speed Control mode, but it internally calculates for the amount of slip feedback from the motor. Requires running a motor Identification to perform the calculations. 6 = Torque control (Open loop): Motor is controlled based off a torque reference given to the drive and then based on the motor load the drive will maintain that torque level. Requires running a motor Identification to perform the calculations. Note: Option 0/1 is V/Hz mode, Options 2/3/5/6 are Vector control modes.	**1,2,3**	RW
P5.1.2	**107**	**Current Limit** This parameter determines the maximum output current allowed from the drive. The parameter value range differs from size to size. Once the motor current hits this level it goes into the current limiter controller and trys to limit the output current.	**1,2,3**	RW
P5.1.3	**109**	**V/Hz Optimization** Automatic torque boost The voltage to the motor increases automatically, which assists the motor to produce sufficient torque to start and run at low frequencies with high loads. 0 = Disable torque boost function 1 = Enable torque boost function	**1,2,3**	RW
P5.1.4	**108**	**V/Hz Ratio** 0 = Linear—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. A linear V/Hz ratio should be used in constant torque applications. 1 = Squared—The voltage of the motor changes following a squared curve with the frequency in the area from 0 Hz to the field weakening point where the nominal voltage is supplied. 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.	**1,2,3**	RW

Figure 60. Linear and squared change of motor voltage



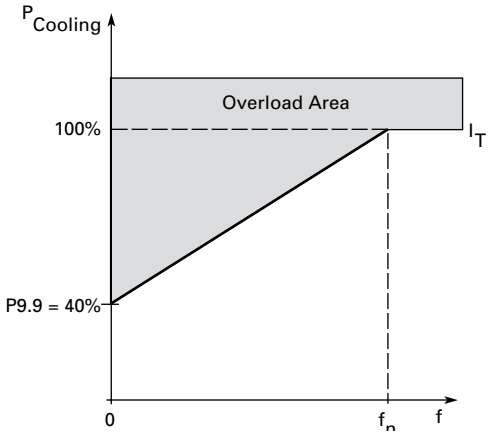
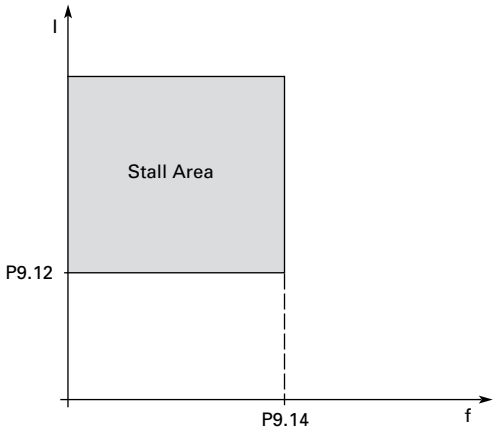
Code	Modbus ID	Parameter	Application	RO/RW
P5.1.4	**108**	2 = Programmable V/Hz curve. The V/Hz curve can be programmed with three different points. These points are the 0 frequency voltage, midpoint and weakening point. A programmable V/Hz curve can be used if the other settings do not satisfy the needs of the application. Linear with flux optimization **Figure 61. Programmable V/Hz curve**  **Linear with Flux Optimization** 3 = Linear with flux optimization. The drive starts to search for the minimum motor current in order to save energy. This mode is called Active Energy Control which will reduce the voltage and current but still maintain the desired speed.	**1,2,3**	RW
P5.1.5	**289**	**Field Weakening Point** The field weakening point is the frequency at which the output voltage reaches the set maximum value. This value is usually determined by the motor nameplate value.	**1,2,3**	RW
P5.1.6	**290**	**Voltage at FWP** Defines the voltage at the field weakening point, when the output frequency exceeds the field weakening point the voltage will remain constant.	**1,2,3**	RW
P5.1.7	**291**	**V/Hz Mid Frequency** Use this parameter if the programmable V/Hz curve has been selected, it defines the midpoint frequency of the curve. This value can be set anywhere between 0 and the FWP, to either have a different V/Hz ramp or if set to the FWP it will provide the max voltage all the way up the curve.	**1,2,3**	RW
P5.1.8	**292**	**V/Hz Mid Voltage** If the programmable V/Hz curve has been selected this parameter defines the midpoint frequency of the curve. This value can be set anywhere between 0 and the field weakening point, to either have a different V/Hz ramp or if set to the FWP it will provide the field weaken point voltage all the way up the curve.	**1,2,3**	RW
P5.1.9	**293**	**Zero Frequency Voltage** If the programmable V/Hz curve has been selected this parameter defines the zero frequency voltage of the curve.	**1,2,3**	RW
P5.1.10	**288**	**Switching Frequency** This prameter sets the frequency that the PWM wave rides on, higher switching frequency will be cleaner current sine wave, lower switching frequency will be a choppier current sine wave. Motor noise can be minimized using a high switching frequency but the amount of heat dissipation increases. Increasing the switching frequency reduces the capacity of the frequency converter unit. By default, Switching frequency may optimize automatically to get better performance and efficiency. If this auto adjustment is not expected, user can disable this feature via setting Sine Filter Enable as "enable". 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**	RW
P5.1.11	**1665**	**Sine Filter Enable** This parameter enables the drive to have a set switching frequency(Par ID 2522) which is required by sine filters. The drive no longer automatically adjusts the switching frequency based on the unit temperature.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P5.1.12	**294**	**OverVoltage Control** The overvoltage control is used to limit the DC link voltage below the preset limit value. If over voltage control is enabled the drive will control the DC link voltage below the preset limit value by increasing the output frequency to allow the motor to use the energy. 0 = Disable over voltage controller 1 = The max controller output frequency is the (Ramp frequency +8Hz) 2 = The max controller output frequency is the max frequency 3 = The max controller output frequency is the (max frequency+8Hz)	**1,2,3**	RW
P5.1.13	**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.	**3**	RW
P5.1.14	**1630**	**Droop Control Filter Time Constant** Filter time when using droop control	**3**	RW
P5.1.15	**2835**	**Overmodulation Enable** Voltage drop of rectifier circuit may impact the required maximum motor output voltage, Enabling the over modulation allows for compensating the rectifier drop and helps increase the output voltage (roughly 0~10%). The side effect of over modulation results in increase in harmonic, impacting the stability, so it should be used per application requirement. Over modulation control is only available for V/Hz control.	**1,2,3**	RW
P5.1.16	**1593**	**Speed Control Kp0** This parameter is the gain for the speed controller in open loop control mode given in % per Hz. Gain Value of 100% means that the nominal torque reference is produced at the speed controller output for a frequency error of 1Hz.	**3**	RW
P5.1.17	**1594**	**Speed Control Ti0** Sets the integral time constant for the speed controller.	**3**	RW
P5.1.18	**1597**	**Speed Control F0** Speed Level in Hz below the speed controller gain is equal to the Speed Control Gain Below F0.	**3**	RW
P5.1.19	**1598**	**Speed Control F1** The Speed level in Hz above the speed controller Gain is equal to the Speed Control Gain. From the speed defined by the F0 setting to the speed defined by the F1 setting, the speed controller gain changes linearly from the F0 gain to the Speed Gain Kp. See image below. **Figure 62. Speed Control F1**  	**3**	RW
P5.1.20	**1599**	**Speed Control Kp1** The relative gain of the speed controller as a percentage of the Speed Control Gain when torque reference or speed control output is less than the value of Speed Control T0. This parameter is normally used to stabilize the speed controller for a drive system with gear backlash.	**3**	RW
P5.1.21	**1600**	**Speed Control Ti1** The level of torque reference below which the speed controller gain is changed from the Speed Control Gain to Speed Control T0. This is a percentage of nominal Torque.	**3**	RW
P5.1.22	**1602**	**Motoring Torque Limit** Torque limit setting in the motoring side.	**3**	RW
P5.1.23	**1603**	**Generator Torque Limit** Torque limit setting for the generating side.	**3**	RW
P5.1.24	**1604**	**Torque Limit Forward** Torque limit setting in forward direction	**3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P5.1.25	**1605**	**Torque Limit Reverse** Torque limit setting in reverse direction	**3**	RW
P5.1.26	**1607**	**Motoring Power Limit** Motor Power limit setting.	**3**	RW
P5.1.27	**1608**	**Generator Power Limit** Generator Power limit setting.	**3**	RW
P5.1.28	**1620**	**Flux Reference** This parameter defines the amount of flux that is output to the motor, which is valid only in open loop vector control.	**3**	RW
P5.1.29	**1630**	**Droop Control Filter Time Constant** Filter time when using droop control.	**3**	RW
P5.1.30	**1631**	**Startup Torque Selection** Voltage across the q-axis stator inductance of the PM motor at the rated motor current and the rated motor frequency displayed in line-to-line rms value. Value is measured when performing Identification.	**3**	RW
P5.1.31	**1632**	**Torque Memory Start** This starting torque reference comes from the 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.	**3**	RW
P5.1.32	**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.	**1,2,3**	RW
P5.1.33	**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.	**3**	RW
P5.1.34	**1656**	**V/F Stable Kd** The compensation coefficient of the d-axis, which is used to suppress oscillation.	**1,2,3**	RW
P5.1.35	**1657**	**V/F Stable Kq** The compensation coefficient of the q-axis, which is used to suppress oscillation.	**1,2,3**	RW
P5.1.36	**2837**	**Motor Inertia** System rotation inertia real value for speed loop parameter tuning. Value is measured when performing Identification.	**3**	RW
P5.1.37	**1882**	**PM BEMF Voltage** Back electromotive force(EMF) voltage. Value is measured when performing Identification.	**3**	RW
P5.1.38	**1883**	**PM q-axis stator inductance** Voltage across the q-axis stator inductance of the PM motor at the rated motor current and the rated motor frequency displayed in line-to-line rms value. Value is measured when performing Identification.	**3**	RW
P5.1.39	**1884**	**PM d-axis stator inductance** Voltage across the d-axis stator inductance of the PM motor at the rated motor current and the rated motor frequency displayed in line-to-line rms value. Value is measured when performing Identification.	**3**	RW
P5.1.40	**1890**	**PM Initial Selection** PM initial angle detect method.	**3**	RW
P5.1.41	**1891**	**PM Initial Time** PM initial angle detect time.	**3**	RW
P5.1.42	**1892**	**PM excited Current** PM excited current during the low speed.	**3**	RW
P5.1.43	**1893**	**PM excited Current off frequency** PM excited current cut off frequency.	**3**	RW
P5.1.44	**2901**	**Observer Kp** Linear gain of the PM/IM observer.	**3**	RW

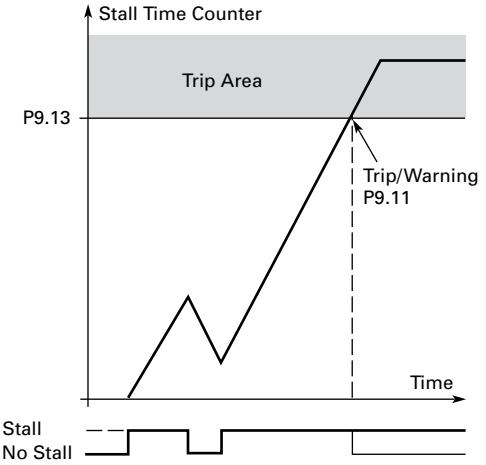
Code	Modbus ID	Parameter	Application	RO/RW
P5.1.45	**299**	**Identification** This Parameter enables the drive to make an motor identification cycle of the motor once complete the drive will adjust tuning parameters to improve starting torque and open loop vector control performance. once set and a run command is given the operation will be active then set back to 0 when completed. When a run command is issued the message on the keypad will indicate ""Auto tuning"" is being performed. If there is an issue with the Motor Identification a fault message will be displayed. 0 = Not Action 1 = Identification only stator resistor—does not spin the motor can be done with load attached 2 = Identification with run—Motor stator resistor is completed then the motor is run, must be completed with unloaded motor 3 = Identification no run—Motor is supplied with current and voltage but at zero frequency. 4 = Identification only inertia—Identification for the system inertia only.	**1,2,3**	RW
P5.1.46	**1664**	**Slip Compensation Coefficient** The linear coefficient of the slip compensation frequency, which is valid only in the speed control mode.	**1,2,3**	RW
P5.1.47	**1768**	**Pulse Off Frequency** High frequency injection cutoff frequency. It will be active if Motor Control Mode(Par ID 287) select value is "PM Control2".	**3**	RW
P5.2.1	**577**	**Motor Nom Current 2** Use this parameter to set the second motor set name plate Current. Selected based off of a digital input.	**2,3**	RW
P5.2.2	**578**	**Motor Nom Speed 2** Use this parameter to set the second motor set name plate RPM. Selected based off of a digital input.	**2,3**	RW
P5.2.3	**579**	**Motor PF 2** Use this parameter to set the second motor set name plate Power Factor. Selected based off of a digital input.	**2,3**	RW
P5.2.4	**580**	**Motor Nom Volt 2** Use this parameter to set the second motor set name plate Voltage. Selected based off of a digital input.	**2,3**	RW
P5.2.5	**581**	**Motor Nom Freq 2** Use this parameter to set the second motor set name plate Frequency. Selected based off of a digital input.	**2,3**	RW
P5.2.6	**1656**	**V/F Stable Kd** The compensation coefficient of the d-axis, which is used to suppress oscillation.	**1,2,3**	RW
P5.2.7	**1657**	**V/F Stable Kq** The compensation coefficient of the q-axis, which is used to suppress oscillation.	**1,2,3**	RW
P5.2.8	**1419**	**Stator Resistor 2** The second set of motor stator resistor real values for 2nd motor set.	**1,2,3**	RW
P5.2.9	**1421**	**Leak Inductance 2** The second set of motor leakage inductance real value for 2nd motor set.	**3**	RW
P5.2.10	**2838**	**Motor Inertia2** Motor Inertia2	**3**	RW
P5.2.11	**2842**	**Second PM BEMF Voltage** Second PM BEMF Voltage	**3**	RW
P5.2.12	**2843**	**Second PM q-axis stator inductance** Second PM q-axis stator inductance	**3**	RW
P5.2.13	**2844**	**Second PM d-axis stator inductance** Second PM d-axis stator inductance	**3**	RW
P6.1.1	**308**	**Output Phase Fault** Output phase supervision of the motor ensures that the motor phases have equal currents, if phases are 5% difference from one another, the frequency converter will respond corresponding to this setting. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode. 3 = Fault, stop mode after fault always by coasting	**1,2,3**	RW

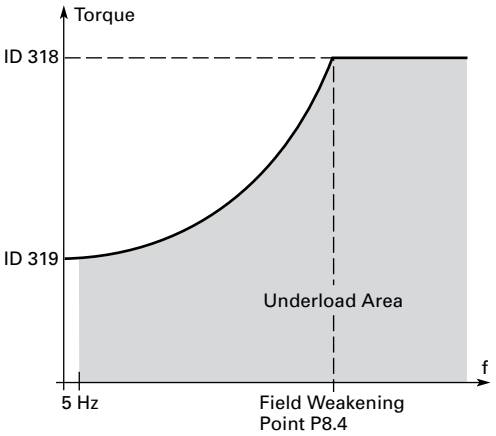
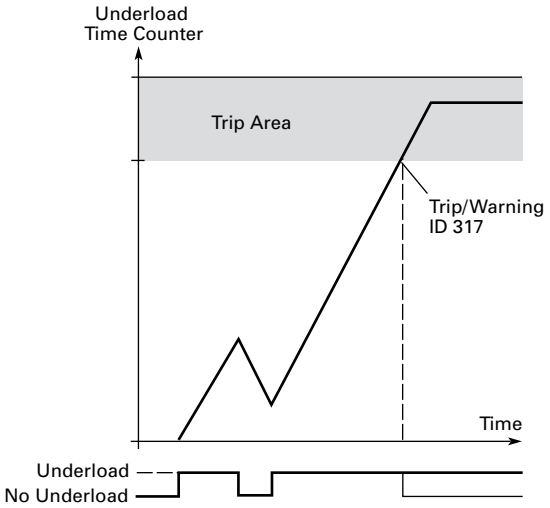
Code	Modbus ID	Parameter	Application	RO/RW
P6.1.2	**309**	**Ground Fault**	**1,2,3**	RW
		Earth fault protection ensures that the sum of the motor phase currents is zero. There is a current level setting parameter Ground fault limit that allows for setting the allowable ground current level based off the total drive current. The overcurrent protection is always working and protects the frequency converter from earth faults with high currents. Frequency Converter will correspond the setting below. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode 3 = Fault, stop mode after fault always by coasting		
P6.1.3	**2158**	**Ground Fault Limit**	**1,2,3**	RW
		This parameter 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.		
P6.1.4	**310**	**Motor Thermal Protection**	**1,2,3**	RW
		If a fault condition is selected, the drive will stop and activate the fault stage based off the % of calculated motor temperature. The calculated motor temp is based off the install power on values of the drive and monitoring values as the drive is running. Deactivating this protection, i.e., setting parameter to 0, will reset the thermal stage of the motor to 0%. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode 3 = Fault, stop mode after fault always by coasting		

Code	Modbus ID	Parameter	Application	RO/RW
P6.1.5	**311**	**Motor Thermal F0 Current**	**1,2,3**	RW
		The current can be set between 0–150.0% x InMotor. This parameter sets the value for thermal current at zero frequency. 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, parameter "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.		
		Figure 63. Motor thermal current I_T curve		
				
P6.1.7	**313**	**Stall Protection**	**1,2,3**	RW
		Stall protection is a user defined of overcurrent protection. It protects the motor from short time overload situations like a stalled shaft. This is customer selectable based off of current level, frequency level and time. 0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast		
P6.1.8	**314**	**Stall Current Limit**	**1,2,3**	RW
		The current can be set to 0.1–InMotor*2. For a stall stage to occur, the current must have exceeded this limit. The software does not allow entering a greater value than InMotor*2. If Parameter "nominal motor current" is changed, this parameter is automatically restored to the default value (IL).		
		Figure 64. Stall characteristics settings		
				

Code	Modbus ID	Parameter	Application	RO/RW
P6.1.9	**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.	**1,2,3**	RW
P6.1.10	**316**	**Stall Frequency Limit** The frequency can be set between 1–fmax. For a stall state to occur, the output frequency must have remained below this limit, above the current limit for the stall time to occur.	**1,2,3**	RW
P6.1.11	**317**	**Underload Protection** If fault is set as the function, the drive will stop and activate the fault stage based on the parameter conditions and the monitoring status of the motor. If the motor torque drops below the Fnom and F0 torque levels for the time limit the protection is enabled. Deactivating the protection by setting the parameter to 0 will reset the underload time counter to zero. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode 3 = Fault, stop mode after fault always by coasting	**1,2,3**	RW

Figure 65. Stall time count



Code	Modbus ID	Parameter	Application	RO/RW
P6.1.12	**318**	**Underload Fnom Torque**	**1,2,3**	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. If you change parameter "nominal motor current", this parameter is automatically restored to the default value.		
		Figure 66. Setting of minimum load		
				
P6.1.13	**319**	**Underload F0 Torque**	**1,2,3**	RW
		The torque limit can be set between 5.0–150.0 % x TnMotor. This parameter gives value for the minimum torque allowed at zero frequency. If you change the value of nominal motor current, this parameter is automatically restored to the default value.)		
P6.1.14	**320**	**Underload Time Limit**	**1,2,3**	RW
		This time can be set between 2.0 and 600.0s. This is the time allowed for an fault 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 protection parameter. If the drive is stopped, the counter is reset to zero.		
		Figure 67. Underload time counter function		
				

Code	Modbus ID	Parameter	Application	RO/RW
P6.1.15	**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, the thermistor is usually in the winding of the motor or an external sensor, Motor Thermal Protection can be deactivated. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode. 3 = Fault, stop mode after fault always by coasting	**1,2,3**	RW
P6.1.16	**337**	**PT100 Fault Response** PT100 Thermistor protection used with motor PT100 thermistors input option board are used to fault frequency conveter if motor has reached the set temperature fault level on the option card. If using PT100 thermistors, Motor Terminal Protection can be disabled. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to stop mode 3 = Fault, stop mode after fault always by coasting	**1,2,3**	RW
P6.1.17	**2159**	**Preheat Mode** This parameter enables/disables the preheat function where this is used in the case depending on where the temperature is being read from the drive will turn on the output to allow current to flow to the motor if the temperature of the drive drops, this is typically used when the motor is not running. 0 = Disable 1 = Enable)	**1,2,3**	RW
P6.1.18	**2160**	**Preheat Control Source** Selects the source of where the temperature is coming from, either digital input or the drive heat sink temperature which potentially could be at a different temperature. 0 = DI Function 1 = Drive Temperature	**1,2,3**	RW
P6.1.19	**2161**	**Preheat Enter Temp** This parameter is used to set the temperature level when the preheat is enabled if using one of the internal or external temperature mode settings in Para ID2160.	**1,2,3**	RW
P6.1.20	**2162**	**Preheat Quit Temp** This parameter is used to set the temperature level when the preheat is disabled if using one of the internal or external temperature mode settings in Para ID2160.	**1,2,3**	RW
P6.1.21	**2163**	**Preheat Output Volt** This parameter is used to set the voltage level output to the motor when the drive is in the Preheat operation mode. This is a percentage of the motor nameplate voltage.	**1,2,3**	RW
P6.2.1	**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 respond to I/O run command when power is applied. If in another control place and switched to I/O control do not respond (Run Command has to be cycled) 2 = Respond to I/O commands when power is applied. If in another control place and switched to I/O control the drive will respond to a maintained Run Command. 3 = Do Not respond to I/O commands when power is applied. If in another control place and switched to I/O control the drive will respond to a maintained Run Command.	**1,2,3**	RW
P6.2.2	**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 = Follow Run Command—Follow Start/Stop input after fault reset. 1 = Rising Edge After Fault Reset—Toggle of Run input required to start after fault reset.	**1,2,3**	RW
P6.2.3	**306**	**4mA 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 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 is set as reference 4 = Fault, stop mode after fault according to parameter stop mode. 5 = Fault, stop mode after fault always by coasting	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P6.2.4	**331**	**4mA Fault Frequency** When 4 mA fault happens, the output frequency of drive goes to this preset speed.	**1,2,3**	RW
P6.2.5	**307**	**External Fault** A warning or a fault action and message is generated from the external fault signal in the programmable (digital inputs function select external fault). The status information can also be programmed into digital output relay outputs RO1 and RO2. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode 3 = Fault, stop mode after fault always by coasting	**1,2,3**	RW
P6.2.6	**332**	**Input Phase Fault** The input phase supervision ensures that the input phases of the frequency converter have approximately equal current draw. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode 3 = Fault, stop mode after fault always by coasting 4 = Single-phase power limit, recommend to select this option when the drive is powered by single-phase, to limit output power	**1,2,3**	RW
P6.2.7	**330**	**Uvolt Fault Response** Frequency converter monitors DC Bus Voltage if drops below set level (via trouble shooting guide for more information on fault level) the drive will respond corresponding to this setting. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode 3 = Fault, stop mode after fault always by coasting	**1,2,3**	RW
P6.2.8	**1564**	**Unit Under Temp Prot** This protection sets the response to a low frequency converter temperature on the heat sink.	**1,2,3**	RW
P6.2.9	**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 stop mode 3 = Fault, stop mode after fault always by coasting	**1,2,3**	RW
P6.2.10	**1256**	**Replace Battery Fault Response** Sets how the frequency converter responds to a low voltage on the Real Time Clock battery. If the voltage on the battery drops below 2 V drive will display a warning by default. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to stop mode 3 = Fault, stop mode after fault always by coasting	**1,2,3**	RW
P6.2.11	**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 off the power on time of the drive. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to stop mode 3 = Fault, stop mode after fault always by coasting	**1,2,3**	RW
P6.2.12	**2126**	**Cold Weather Mode** With this parameter, you are able to enable the cold weather function of the causing the frequency converter's under temp limit to drop from –10 °C to –30 °C drive. This then enables a warmup feature when the frequency converter is between –30 °C and –20 °C. The motor, when given a run command, will turn on for the Cold Weather Timeout and output the Cold Weather Voltage at 0.5 Hz to allow the motor to warm up. If it does not warm up above –20 °C, after that the time frequency converter will fault on Under temp fault. If the frequency converter does go above –20 °C, output will begin to follow reference.	**1,2,3**	RW
P6.2.13	**2127**	**Cold Weather Volt. Level** This parameter allows for setting the % of the motor voltage that is output to the motor when in the cold weather warmup period.	**1,2,3**	RW
P6.2.14	**2128**	**Cold Weather Time Out** This parameter allows for selecting the time limit that the frequency converter will run in the warm up period.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P6.2.15	**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 62385, this value gets reset on cycle of power.	**1,2,3**	RW
P6.2.16	**2130**	**Under Temp Fault Override** With the password set to the correct value this parameter is enabled and will give the ability to override the under temp fault. This function gets reset when power is cycled.	**1,2,3**	RW
P6.2.17	**2427**	**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. 0 = No Action Drive will stop no indication shown, n reset required, have to cycle start command. 1 = Warning Drive indicate warning/if STO clears drive will run without Reset. 2 = Fault Drive will indicate fault/Require Reset to start again.	**1,2,3**	RW
P6.2.18	**2657**	**Warning Operation Mode** Warning store and set rule. User could select save warning log in memory, or even don't pop out by keypad or PC tool.	**1,2,3**	RW
P6.2.19	**2664**	**Fan Protection** Fan protection parameter.	**1,2,3**	RW
P6.2.20	**2666**	**Under Voltage Trip Level** Under Voltage Trip Level.	**1,2,3**	RW
P6.2.21	**2831**	**OP Cont Interlock Protection** OP Cont Interlock Protection.	**1,2,3**	RW
P6.2.22	**2895**	**CP Interlock Run Protection** CleanPower interlock fault protection parmeters only for drive running.	**1,2,3**	RW
P6.2.23	**2896**	**CP Interlock Stop Protection** CleanPower interlock fault protection parmeters only for drive stop.	**1,2,3**	RW
P6.3.1	**334**	**Fieldbus Fault Response** This sets the response mode for the fieldbus fault when a fieldbus mode is used and communication is lost between the PLC and communication port. Each protocol has another parameter to select in all control or only in fieldbus control to set fault or warning.	**1,2,3**	RW
P6.3.2	**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.	**1,2,3**	RW
P6.3.3	**1678**	**IP Address Confliction Resp** Indicates there is a conflict in the IP address assigned to the drive, typically meaning there are multiple devices with the same IP address assigned. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode 3 = Fault, stop mode after fault always by coasting	**1,2,3**	RW
P6.3.4	**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**	RW
P6.4.1	**321**	**AR Wait Time** Defines time before drive tries to automatically restart the motor after a specific fault condition has been cleared.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P6.4.2	**322**	**AR Trail Time** Amount of time after fault set that drive uses the restart attempts to reset the fault and restart the motor, after this time has run out without resetting the alarm, drive will fault. Attemps parameter determines the maximum number of automatic restarts during the trial time set. If the number of faults occurring during the trial time exceeds the attemps values, the fault state becomes active. Otherwise the fault is cleared after the trial time has elapsed.	**1,2,3**	RW

Figure 68. Auto restart fail (try number >2.)

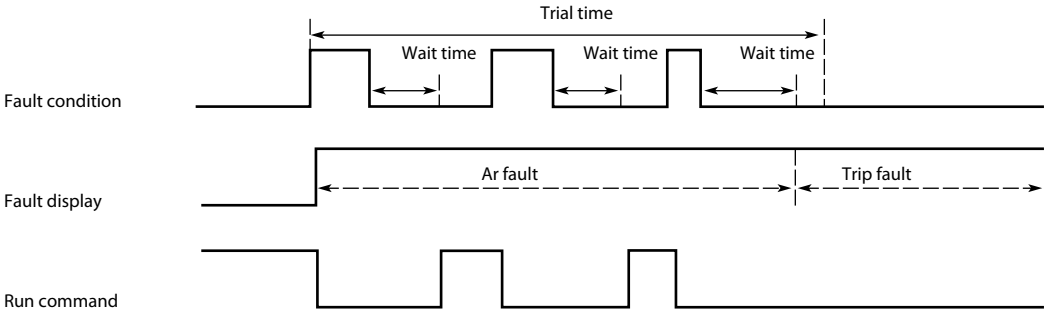


Fig5. Auto restart fail (try number >2.)

P6.4.3	**323**	**AR Start Function** The parameter defines the start mode upon a auto restart condition: 0 = Flying Start From Stop Frequency 1 = Start according to parameter start mode(Par ID 252) 2 = Flying Start From Max Frequency	**1,2,3**	RW
P6.4.4	**324**	**Undervoltage Attempts** This parameter determines how many automatic restarts can be made during the trial time after an undervoltage trip. 0 = No automatic restart >0 = Number of automatic restarts after undervoltage fault. The fault is reset and the drive is started automatically after the DC-link voltage has returned to the normal level.	**1,2,3**	RW
P6.4.5	**325**	**OverVoltage Attempts** This parameter determines how many automatic restarts can be made during the trial time 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**	RW
P6.4.6	**326**	**OverCurrent Attempts** This parameter determines how many automatic restarts can be made during the trial time. 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**	RW
P6.4.7	**327**	**4mA Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time. 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**	RW
P6.4.8	**329**	**Motor Temp Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time. 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**	RW
P6.4.9	**328**	**External Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time. 0 = No automatic restart after External fault trip >0 = Number of automatic restarts after External fault trip	**1,2,3**	RW
P6.4.10	**336**	**Underload Attempts** This parameter determines how many automatic restarts can be made during the trial time. 0 = No automatic restart after an Underload fault trip >0 = Number of automatic restarts after an Underload fault trip	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P6.4.11	**2803**	**OP Cont Interlock Attempts**	**1,2,3**	RW
		OP Cont Interlock Attempts		
P6.4.12	**2897**	**CP Interlock Attempts**	**1,2,3**	RW
		CleanPower interlock running fault auto reset try number.		
P7.1.1	**1294**	**PID1 Control Gain**	**2,3**	RW
		This parameter is used to defines the proportional gain of the PID Controller. It adjust the slope of the speed increase according to the initial of the load. If this value is set to 100% a change of 10% in the error value causes the controller output to change 10%.		
P7.1.2	**1295**	**PID1 Control ITime**	**2,3**	RW
		Defines the integration time of the PID Controller. Over the time the integral time contributes to the deviation between the reference and the feedback signal. If this value is set to 1.00 sec, a change of 10% in the error value causes the controller output to change by 10.00%/s.		
P7.1.3	**1296**	**PID1 Control DTime**	**2,3**	RW
		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 PID controller		
P7.1.4	**1297**	**PID1 Process Unit**	**2,3**	RW
		This parameter is used to defines the unit type for PID controller. This will change the Feedback and Setpoint variables to show the desired unit of measure.		
P7.1.5	**1298**	**PID1 Process Unit Min**	**2,3**	RW
		This parameter is used to defines the minimum process unit value for the PID controller.		
P7.1.6	**1300**	**PID1 Process Unit Max**	**2,3**	RW
		This parameter is used to defines the maximum process unit value for the PID controller.		
P7.1.7	**1302**	**PID1 Process Unit Decimal**	**2,3**	RW
		This parameter is used to defines the amount of decimal places used in the value for the PID Controller setpoint.		
P7.1.8	**1303**	**PID1 Error Inversion**	**2,3**	RW
		Defines the way the process value output reacts to the feedback signal. 0 = Normal, If feedback is less than set-point, PID controller output increases. 1 = Inverted, If feedback is less than set-point, PID controller output decreases.		
P7.1.9	**1304**	**PID1 Dead Band**	**2,3**	RW
		This parameter sets the PID Dead band around the set point in process units. This is a band where no actions occur to the output of the PID controller, to prevent oscillation or repeated activation/deactivation of controller.		
P7.1.10	**1306**	**PID1 Dead Band Delay**	**2,3**	RW
		This parameter sets the delay time, if the PID process value goes out of the Dead Band area for the desired time delay at that point the controller will re-initialize and try to level out again.		
P7.1.11	**1311**	**PID1 Ramp Time**	**2,3**	RW
		This parameter defines the rising and falling ramp times for changes in the process value setpoint. The ramp time corresponds to the time it takes to change the setpoint value from minimum to the maximum, if the value is 0 no ramps are used.		
P7.2.1	**2542**	**FB PID1 Set Point 1**	**2,3**	RW
		PID setpoint 1 value from fieldbus.		
P7.2.2	**2544**	**FB PID1 Set Point 2**	**2,3**	RW
		PID setpoint 2 value from fieldbus.		
P7.2.3	**2550**	**FB PID1 Feedback 1**	**2,3**	RW
		PID Feedback value from Network. Can be assigned to PID Feedback Source		
P7.2.4	**2551**	**FB PID1 Feedback 2**	**2,3**	RW
		PID Feedback value from Network. Can be assigned to PID Feedback Source		
P7.2.5	**2554**	**FB PID1 Feedforward 1**	**2,3**	RW
		PID Feedforward value from Network. Can be assigned to PID Feedforward Source		
P7.2.6	**2555**	**FB PID1 Feedforward 2**	**2,3**	RW
		PID Feedforward value from Network. Can be assigned to PID Feedforward Source		

Code	Modbus ID	Parameter	Application	RO/RW
P7.3.1.1	**1307**	**PID1 Keypad Set Point 1** This parameter sets the Keypad PID Reference value set point 1.	**2,3**	RW
P7.3.1.2	**1309**	**PID1 Keypad Set Point 2** This parameter sets the Keypad PID Reference value set point 2.	**2,3**	RW
P7.3.1.3	**2466**	**PID1 Wake Up Action** This parameter defines the wakeup function action. 0 = Wakeup when below wakeup level 1 = Wakeup when above wakeup level 2 = Wakeup when below wakeup level % from PID setpoint 3 = Wakeup when above wakeup level %from PID setpoint	**2,3**	RW
P7.3.1.4	**2660**	**PID1 Sleep Boost Level** Defines unit value of which automatic increase of PID regulation set point before entering sleep state.	**2,3**	RW
P7.3.1.5	**2661**	**PID1 Sleep Boost Max Time** Sleep boost max time define sleep set point boost active time if the actual value doesn't reach the incremented set point (normal set point + sleep boost level).	**2,3**	RW
P7.3.2.1	**1312**	**PID1 Set Point 1 Source** Use this parameter to define the source of the PID set point value. This can either be an internal preset value, keypad set point, analog signal or Fieldbus message.	**2,3**	RW
P7.3.2.2	**1313**	**PID1 Set Point 1 Min** Use this parameter to set the minimum value for the set point 1 source.	**2,3**	RW
P7.3.2.3	**1314**	**PID1 Set Point 1 Max** Use this parameter to set the maximum value for the set point 1 source.	**2,3**	RW
P7.3.2.4	**1315**	**PID1 Set Point 1 Sleep Enable** Use this parameter to enable PID Set Point Sleep mode function. When enabled this function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level. When the function is disabled the drive will run at the minimum or maximum defined speed.	**2,3**	RW
P7.3.2.5	**2396**	**PID1 Set Point 1 Sleep Unit Sel** Use this parameter to define the variable used when going into the sleep mode. 0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback	**2,3**	RW
P7.3.2.6	**2450**	**PID1 Set Point 1 Sleep Level** Use this parameter to set the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below or goes above this level for the sleep delay time it will put the drive into the sleep mode.	**2,3**	RW
P7.3.2.7	**1317**	**PID1 Set Point 1 Sleep Delay** Use this parameter sets the minimum time after the variable drops below the Sleep level for this amount of time that the output will shutoff.	**2,3**	RW
P7.3.2.8	**1318**	**PID1 Set Point 1 Wake Up Level** Defines the level for the PID feedback value to go above top enable the PID output to be re enabled. This value is based of the % of feedback which can be scaled based off the PID Unit Min/Max values.	**2,3**	RW
P7.3.2.9	**1320**	**PID1 Set Point 1 Boost** Use this parameter to set the value the set point can be boosted when going into sleep mode. This is an additive variable that will add to the setpoint before drive output goes to sleep to prevent premature cycling.	**2,3**	RW
P7.3.2.10	**1352**	**PID1 Set Point 1 Comp Enable** Use this parameter to enables pressure loss compensation for set point 1 signal value. This is used in pump systems to compensate the pressure loss that occurs at the end of the pipe line due to the liquid flow.	**2,3**	RW
P7.3.2.11	**1353**	**PID1 Set Point 1 Comp Max** Use this parameter to set the maximum compensation for the PID setpoint value that is applied to the output frequency of the drive is at its maximum frequency level. This value is added to the actual setpoint value as a function of the output frequency. Set Point Compensation = comp max * (output freq–min freq)/(max freq–min freq).	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P7.3.3.1	**1321**	**PID1 Set Point 2 Source** Use this parameter to define the source of the PID set point value. This can either be an internal preset value, keypad set point, analog signal or Fieldbus message.	**2,3**	RW
P7.3.3.2	**1322**	**PID1 Set Point 2 Min** Use this parameter to set the minimum value for the set point 2 source.	**2,3**	RW
P7.3.3.3	**1323**	**PID1 Set Point 2 Max** Use this parameter to set the maximum value for the set point 2 source.	**2,3**	RW
P7.3.3.4	**1324**	**PID1 Set Point 2 Sleep Enable** Use this parameter to enable PID Set Point Sleep mode function. When enabled this function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level. When the function is disabled the drive will run at the minimum or maximum defined speed.	**2,3**	RW
P7.3.3.5	**2397**	**PID1 Set Point 2 Sleep Unit Sel** Use this parameter to define the variable used when going into the sleep mode. 0 = Output parameter 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback	**2,3**	RW
P7.3.3.6	**2452**	**PID1 Set Point 2 Sleep Level** Use this parameter to set the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below or goes above this level for the sleep delay time it will put the drive into the sleep mode.	**2,3**	RW
P7.3.3.7	**1326**	**PID1 Set Point 2 Sleep Delay** Use this parameter sets the minimum time after the variable drops below the Sleep level for this amount of time that the output will shut off.	**2,3**	RW
P7.3.3.8	**1327**	**PID1 Set Point 2 Wake Up Level** Defines the level for the PID feedback value to go above top enable the PID output to be re enabled. This value is based on the % of feedback which can be scaled based off the PID Unit Min/Max values.	**2,3**	RW
P7.3.3.9	**1329**	**PID1 Set Point 2 Boost** Use this parameter to set the value the set point can be boosted when going into sleep mode. This is an additive variable that will add to the setpoint before drive output goes to sleep to prevent premature cycling.	**2,3**	RW
P7.3.3.10	**1354**	**PID1 Set Point 2 Comp Enable** Use this parameter to enables pressure loss compensation for set point 2 signal value. This is used in pump systems to compensate the pressure loss that occurs at the end of the pipe line due to the liquid flow.	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P7.3.3.11	1355	**PID1 Set Point 2 Comp Max**	2,3	RW

Value added proportionally to the frequency, setpoint compensation = comp max * (output freq−min freq)/ (max freq−min freq).

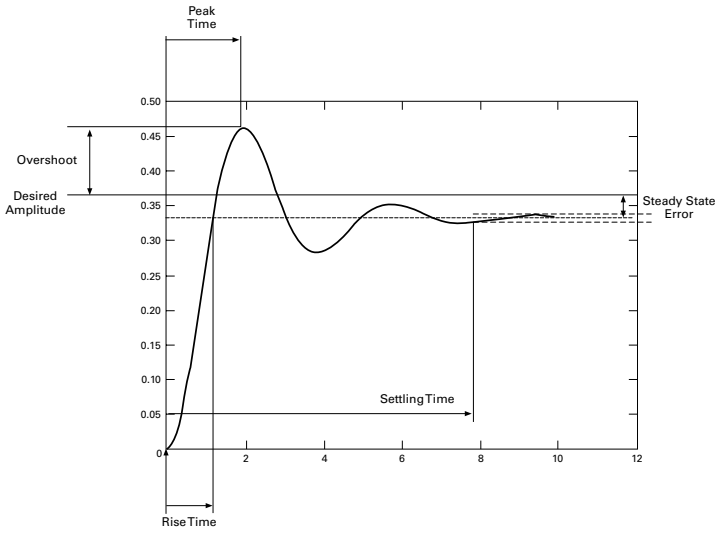
Procedure for setting up PID Application:

Initially set PID Gain to 0.0% and set the PID I Time 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 until the drive speed oscillates constantly. After this occurs reduce the PID Gain slightly to reduce the oscillation. From here take the value found for PID Gain to 0.5 times that value and reduce the PID I time until the feedback signal oscillates again. Increase the PID I time until the oscillation stops, with that value take it times 1.2 and use that value for the PID I time. 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 effected.

Figure 69. Setting up PID application

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

Rise Time—the time required for the output to rise 90% of the desired level for the first time.
Overshoot—the difference between the peak level and the steady state level. 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.



P7.4.1.1	1330	**PID1 Feedback Function**	2,3	RW

Use this parameter to select if the feedback value is taken form a single signal or a combination of two signals. The mathematical functions can be selected that is used when two feedback signals are combined.

P7.4.1.2	1331	**PID1 Feedback Gain**	2,3	RW

Use this parameter to set the gain associated with feedback signal from the measuring signals defined in the feedback function.

P7.4.2.1	1332	**PID1 Feedback 1 Source**	2,3	RW

Use this parameter is used to select where feedback signal is being fed into the drive. This signal could be defined as analog inputs or fieldbus data value.

P7.4.2.2	1333	**PID1 Feedback 1 Min**	2,3	RW

Use this parameter to set the minimum unit value for the feedback signal.

P7.4.2.3	1334	**PID1 Feedback 1 Max**	2,3	RW

Use this parameter to set the maximum unit value for the feedback signal.

Code	Modbus ID	Parameter	Application	RO/RW
P7.4.3.1	**1335**	**PID1 Feedback 2 Source** Use this parameter is used to select where feedback signal is being fed into the drive. This signal could be defined as analog inputs or fieldbus data value.	**2,3**	RW
P7.4.3.2	**1336**	**PID1 Feedback 2 Min** Use this parameter to set the minimum unit value for the feedback signal.	**2,3**	RW
P7.4.3.3	**1337**	**PID1 Feedback 2 Max** Use this parameter to set the maximum unit value for the feedback signal.	**2,3**	RW
P7.5.1.1	**1338**	**PID1 Feedforward Func** Use this parameter to select if the feedforward value is taken form a single signal or a combination of two signals. The mathematical functions can be selected that is used when two feedback signals are combined.	**2,3**	RW
P7.5.1.2	**1339**	**PID1 Feedforward Gain** Use this parameter to set the gain associated with feedforward signal from the measuring signals defined in the feedback function.	**2,3**	RW
P7.5.2.1	**1340**	**PID1 Feedforward 1 Source** Use this parameter is used to select where feedforward signal is being fed into the drive. This signal could be defined as analog inputs or fieldbus data value.	**2,3**	RW
P7.5.2.2	**1341**	**PID1 Feedforward 1 Min** Use this parameter to set the minimum unit value for the feedforward signal.	**2,3**	RW
P7.5.2.3	**1342**	**PID1 Feedforward 1 Max** Use this parameter to set the maximum unit value for the feedforward signal.	**2,3**	RW
P7.5.3.1	**1343**	**PID1 Feedforward 2 Source** Use this parameter is used to select where feedforward signal is being fed into the drive. This signal could be defined as analog inputs or fieldbus data value.	**2,3**	RW
P7.5.3.2	**1344**	**PID1 Feedforward 2 Min** Use this parameter to set the minimum unit value for the feedforward signal.	**2,3**	RW
P7.5.3.3	**1345**	**PID1 Feedforward 2 Max** Use this parameter to set the maximum unit value for the feedforward signal.	**2,3**	RW
P8.1.1	**1356**	**PID2 Control Gain** This parameter is used to defines the proportional 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**	RW
P8.1.2	**1357**	**PID2 Control I Time** This parameter is used to defines the integration time constant of the PID Controller. Over the time the integral time contributes to the deviation between the reference and the feedback signal. If this value is set to 1.00 sec, a change of 10% in the error value causes the controller output to change by 10.00%/s. With value set to 0.0, frequency converter operates as PD controller.	**2,3**	RW
P8.1.3	**1358**	**PID2 Control D Time** Defines the derivation time of the PID Controller. This value will adjust the rate of change on the feedback signal. If this value is set to 1.00 sec, a change of %10 in error value during 1.00 sec causes the control output to change by %10.00. If value is set to 0.0, frequency converter operates as PID controller.	**2,3**	RW
P8.1.4	**1359**	**PID2 Process Unit** This parameter is used to defines the unit type for PID controller. This will change the Feedback and Setpoint variables to show the desired unit of measure.	**2,3**	RW
P8.1.5	**1360**	**PID2 Process Unit Min** This parameter is used to defines the minimum process unit value for the PID controller.	**2,3**	RW
P8.1.6	**1362**	**PID2 Process Unit Max** This parameter is used to defines the maximum process unit value for the PID controller.	**2,3**	RW
P8.1.7	**1364**	**PID2 Process Unit Decimal** This parameter is used to defines the amount of decimal places used in the value for the PID Controller setpoint.	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P8.1.8	**1365**	**PID2 Error Inversion** Defines the way the process value output reacts to the feedback signal. 0 = Normal, If feedback is less than set point, PID controller output increases. 1 = Inverted, If feedback is less than set point, PID controller output decreases.	**2,3**	RW
P8.1.9	**1366**	**PID2 Dead Band** This parameter sets the PID Dead band around the set point in process units. This is a band where no actions occur to the output of the PID controller, to prevent oscillation or repeated activation/deactivation of controller.	**2,3**	RW
P8.1.10	**1368**	**PID2 Dead Band Delay** This parameter sets the delay time, if the PID process value goes out of the Dead Band area for the desired time delay at that point the controller will re-initialize and try to level out again.	**2,3**	RW
P8.1.11	**1373**	**PID2 Ramp Time** This parameter defines the rising and falling ramp times for changes in the process value setpoint. The ramp time corresponds to the time it takes to change the setpoint value from minimum to the maximum, if the value is 0 no ramps are used.	**2,3**	RW
P8.2.1	**2546**	**FB PID2 Set Point 1** PID setpoint 1 value from fieldbus.	**2,3**	RW
P8.2.2	**2548**	**FB PID2 Set Point 2** PID setpoint 2 value from fieldbus.	**2,3**	RW
P8.2.3	**2552**	**FB PID2 Feedback 1** PID Feedback value1 from Network. Can be assigned to PID2 Feedback Source.	**2,3**	RW
P8.2.4	**2553**	**FB PID2 Feedback 2** PID Feedback value2 from Network. Can be assigned to PID2 Feedback Source.	**2,3**	RW
P8.2.5	**2556**	**FB PID2 Feedforward 1** PID Feedforward value1 from Network. Can be assigned to PID2 Feedforward Source.	**2,3**	RW
P8.2.6	**2557**	**FB PID2 Feedforward 2** PID Feedforward value2 from Network. Can be assigned to PID2 Feedforward Source.	**2,3**	RW
P8.3.1.1	**1369**	**PID2 Keypad Set Point 1** This parameter sets the Keypad PID Reference value set point 1.	**2,3**	RW
P8.3.1.2	**1371**	**PID2 Keypad Set Point 2** This parameter sets the Keypad PID Reference value set point 2.	**2,3**	RW
P8.3.1.3	**2467**	**PID2 Wake Up Action** This parameter defines the wakeup function action. 0 = Wakeup when below wakeup level 1 = Wakeup when above wakup level 2 = Wakeup when below wakeup level % from PID set point 3 = Wakeup when above wakeup level %from PID set point	**2,3**	RW
P8.3.1.4	**2662**	**PID2 Sleep Boost level** Defines unit value of which automatic increase of PID regulation set point before entering sleep state.	**2,3**	RW
P8.3.1.5	**2663**	**PID2 Sleep Boost Max Time** Sleep boost max time define sleep set point boost active time if the actual value doesn't reach the incremented set point (normal set point + sleep boost level).	**2,3**	RW
P8.3.2.1	**1374**	**PID2 Set Point 1 Source** Use this parameter to define the source of the PID set point value. This can either be an internal preset value, keypad set point, analog signal or Fieldbus message.	**2,3**	RW
P8.3.2.2	**1375**	**PID2 Set Point 1 Min** Use this parameter to set the minimum value for the set point 1 source.	**2,3**	RW
P8.3.2.3	**1376**	**PID2 Set Point 1 Max** Use this parameter to set the maximum value for the set point 1 source.	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P8.3.2.4	1377	**PID2 Set Point 1 Sleep Enable** Use this parameter to enable PID Set Point Sleep mode function. When enabled this function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level. When the function is disabled the drive will run at the minimum or maximum defined speed.	2,3	RW
P8.3.2.5	2398	**PID2 Set Point 1 Sleep Unit Sel** Use this parameter to define the variable used when going into the sleep mode. 0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback	2,3	RW
P8.3.2.6	2454	**PID2 Set Point 1 Sleep Level** Use this parameter to set the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below or goes above this level for the sleep delay time it will put the drive into the sleep mode.	2,3	RW
P8.3.2.7	1379	**PID2 Set Point 1 Sleep Delay** Use this parameter sets the minimum time after the variable drops below the Sleep level for this amount of time that the output will shutoff.	2,3	RW
P8.3.2.8	1380	**PID2 Set Point 1 WakeUp Level** Defines the level for the PID feedback value to go above top enable the PID output to be re enabled. This value is based of the % of feedback which can be scaled based off the PID Unit Min/Max values.	2,3	RW
P8.3.2.9	1382	**PID2 Set Point 1 Boost** Use this parameter to set the value the set point can be boosted when going into sleep mode. This is an additive variable that will add to the setpoint before drive output goes to sleep to prevent premature cycling.	2,3	RW
P8.3.2.10	1414	**PID2 Set Point1 Comp Enable** Use this parameter to enables pressure loss compensation for set point 1 signal value. This is used in pump systems to compensate the pressure loss that occurs at the end of the pipe line due to the liquid flow.	2,3	RW
P8.3.2.11	1415	**PID2 Set Point1 Comp Max** Use this parameter to set the maximum compensation for the PID setpoint value that is applied to the output frequency of the drive is at its maximum frequency level. This value is added to the actual setpoint value as a function of the output frequency. Set Point Compensation = comp max * (output freq–min freq)/(max freq–min freq).	2,3	RW
P8.3.3.1	1383	**PID2 Set Point 2 Source** Use this parameter to define the source of the PID set point value. This can either be an internal preset value, keypad set point, analog signal or Fieldbus message.	2,3	RW
P8.3.3.2	1384	**PID2 Set Point 2 Min** Use this parameter to set the minimum value for the set point 2 source.	2,3	RW
P8.3.3.3	1385	**PID2 Set Point 2 Max** Use this parameter to set the maximum value for the set point 2 source.	2,3	RW
P8.3.3.4	1386	**PID2 Set Point 2 Sleep Enable** Use this parameter to enable PID Set Point Sleep mode function. When enabled this function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level. When the function is disabled the drive will run at the minimum or maximum defined speed.	2,3	RW
P8.3.3.5	2399	**PID2 Set Point 2 Sleep Unit Sel** Use this parameter to define the variable used when going into the sleep mode. 0 = Output Frequency 1 = Motor Speed 2 = Motor Current 3 = PID1 Feedback	2,3	RW
P8.3.3.6	2456	**PID2 Set Point 2 Sleep Level** Use this parameter to set the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below or goes above this level for the sleep delay time it will put the drive into the sleep mode.	2,3	RW
P8.3.3.7	1388	**PID2 Set Point 2 Sleep Delay** Use this parameter sets the minimum time after the variable drops below the Sleep level for this amount of time that the output will shutoff.	2,3	RW

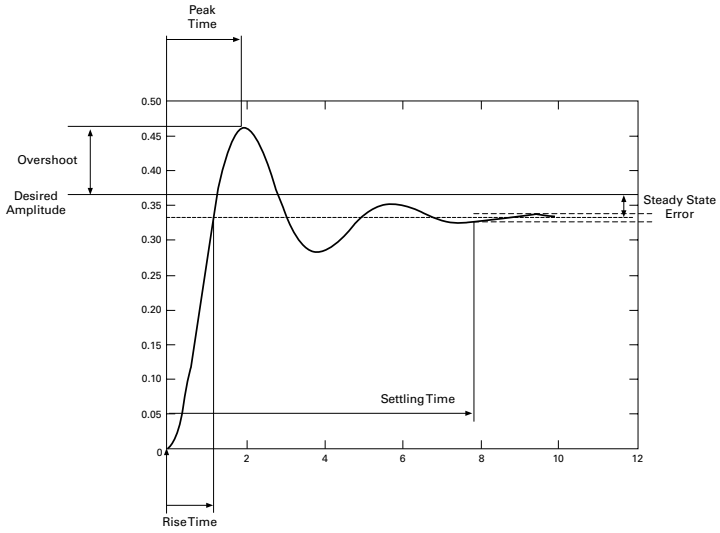
Code	Modbus ID	Parameter	Application	RO/RW
P8.3.3.8	**1389**	**PID2 Set Point 2 WakeUp Level** Defines the level for the PID feedback value to go above top enable the PID output to be re enabled. This value is based on the % of feedback which can be scaled based off the PID Unit Min/Max values.	**2,3**	RW
P8.3.3.9	**1391**	**PID2 Set Point 2 Boost** Use this parameter to set the value the set point can be boosted when going into sleep mode. This is an additive variable that will add to the setpoint before drive output goes to sleep to prevent premature cycling.	**2,3**	RW
P8.3.3.10	**1416**	**PID2 Set Point 2 Comp Enable** Use this parameter to enables pressure loss compensation for set point 2 signal value. This is used in pump systems to compensate the pressure loss that occurs at the end of the pipe line due to the liquid flow.	**2,3**	RW
P8.3.3.11	**1417**	**PID2 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**	RW

Procedure for setting up PID Application:
Initially set PID Gain) to 0.0% and set the PID I Time 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 until the drive speed oscillates constantly. After this occurs reduce the PID Gain slightly to reduce the oscillation. From here take the value found for PID Gain to 0.5 times that value and reduce the PID I time until the feedback signal oscillates again. Increase the PID I time until the oscillation stops, with that value take it times 1.2 and use that value for the PID I time. 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 70. 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.



P8.4.1.1	**1392**	**PID2 Feedback Func** Use this parameter to select if the feedback value is taken form a single signal or a combination of two signals. The mathematical functions can be selected that is used when two feedback signals are combined.	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P8.4.1.2	**1393**	**PID2 Feedback Gain** Use this parameter to set the gain associated with feedback signal from the measuring signals defined in the feedback function.	**2,3**	RW
P8.4.2.1	**1394**	**PID2 Feedback 1 Source** Use this parameter is used to select where feedback signal is being fed into the drive. This signal could be defined as analog inputs or fieldbus data value.	**2,3**	RW
P8.4.2.2	**1395**	**PID2 Feedback 1 Min** Use this parameter to set the minimum unit value for the feedback signal.	**2,3**	RW
P8.4.2.3	**1396**	**PID2 Feedback 1 Max** Use this parameter to set the maximum unit value for the feedback signal.	**2,3**	RW
P8.4.3.1	**1397**	**PID2 Feedback 2 Source** Use this parameter is used to select where feedback signal is being fed into the drive. This signal could be defined as analog inputs or fieldbus data value.	**2,3**	RW
P8.4.3.2	**1398**	**PID2 Feedback 2 Min** Use this parameter to set the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below or goes above this level for the sleep delay time it will put the drive into the sleep mode.	**2,3**	RW
P8.4.3.3	**1399**	**PID2 Feedback 2 Max** Use this parameter to set the maximum unit value for the feedback signal.	**2,3**	RW
P8.5.1.1	**1400**	**PID2 Feedforward Func** Use this parameter to select if the feedforward value is taken form a single signal or a combination of two signals. The mathematical functions can be selected that is used when two feedback signals are combined.	**2,3**	RW
P8.5.1.2	**1401**	**PID2 Feedforward Gain** Use this parameter to set the gain associated with feedforward signal from the measuring signals defined in the feedback function.	**2,3**	RW
P8.5.2.1	**1402**	**PID2 Feedforward 1 Source** Use this parameter is used to select where feedforward signal is being fed into the drive. This signal could be defined as analog inputs or fieldbus data value.	**2,3**	RW
P8.5.2.2	**1403**	**PID2 Feedforward 1 Min** Use this parameter to set the minimum unit value for the feedforward signal.	**2,3**	RW
P8.5.2.3	**1404**	**PID2 Feedforward 1 Max** Use this parameter to set the maximum unit value for the feedforward signal.	**2,3**	RW
P8.5.3.1	**1405**	**PID2 Feedforward 2 Source** Use this parameter is used to select where feedforward signal is being fed into the drive. This signal could be defined as analog inputs or fieldbus data value.	**2,3**	RW
P8.5.3.2	**1406**	**PID2 Feedforward 2 Min** Use this parameter to set the minimum unit value for the feedforward signal.	**2,3**	RW
P8.5.3.3	**1407**	**PID2 Feedforward 2 Max** Use this parameter to set the maximum unit value for the feedforward signal.	**2,3**	RW
P9.1	**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 function select fire mode. 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.	**1,2,3**	RW
P9.2	**536**	**Fire Mode Ref Select Function** This parameter allows for setting the reference location for when the fire mode is enabled. 0 = Fire Mode Min Frequency 1 = Fire Mode Ref 2 = Fieldbus Ref—Reference from fieldbus process in 3 = AI 4 = PI1 Control—follows the PID control algorithm settings	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P9.3	**537**	**Fire Mode Min Frequency** Use this parameter sets the minimum output frequency for fire mode, when reference selection is the min frequency.	**1,2,3**	RW
P9.4	**565**	**Fire Mode Freq Ref 1** This parameter sets the drive operating percentage based off the 0% being Min Frequency and 100% being Max Frequency for fire mode reference 1.	**1,2,3**	RW
P9.5	**564**	**Fire Mode Freq Ref 2** This parameter sets the drive operating percentage based off the 0% being Min Frequency and 100% being Max Frequency for fire mode reference 2.	**1,2,3**	RW
P9.6	**2443**	**Fire Mode Test Enable** Use this parameter to 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 still enabled.	**1,2,3**	RW
P9.7	**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 and 100% being Max Frequency	**2,3**	RW
P10.1.1	**1418**	**Bypass Enable** Use this parameter to enable the bypass functionality in the drive to have a soft key or input to force bypass.	**1,2,3**	RW
P10.1.2	**544**	**Bypass Start Delay** Use this parameter to set a time delay between when the Bypass Signal is applied via I/O, Fieldbus or keypad, to when the motor starts and once bypass is removed the time to switch back to drive.	**1,2,3**	RW
P10.1.3	**542**	**Auto Bypass** This parameter specifies whether an automatic switch to bypass will occur based on Overvoltage Fault condition, is enabled based off a specfic fault conditon of Auto Bypass through Undervoltage Fault Auto Bypass parameters below. 0 = Auto Bypass disabled 1 = Auto Bypass enabled	**1,2,3**	RW
P10.1.4	**543**	**Auto Bypass Delay** This parameter specifies the time delay before an automatic switch to bypass, as determined by Overvoltage Fault Auto Bypass through Undervoltage Fault Auto Bypass parameters, will occur.	**1,2,3**	RW
P10.1.5	**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.	**1,2,3**	RW
P10.1.6	**546**	**IGBT Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the IGBT fault auto-restart tries have been exceeded. 0 = Auto bypass on IGBT fault tries exceeded disabled 1 = Auto bypass on IGBT fault tries exceeded enabled	**1,2,3**	RW
P10.1.7	**548**	**4mA Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the loss of reference fault and auto-restart tries have been exceeded. 0 = Auto bypass on loss of reference fault tries exceeded disabled 1 = Auto bypass on loss of reference fault tries exceeded enabled Note: 4 mA (Reference) Fault Auto Bypass) must be set to 4 or 5 (Fault).	**1,2,3**	RW
P10.1.8	**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	**1,2,3**	RW
P10.1.9	**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	**1,2,3**	RW
P10.1.10	**1698**	**Motor OverTemp Bypass Enable** Motor OverTemp Bypass Enable.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P10.1.11	**1699**	**UnderLoad Bypass Enable** UnderLoad Bypass Enable.	**1,2,3**	RW
P10.1.12	**1700**	**External Bypass Enable** External Bypass Enable.	**1,2,3**	RW
P10.1.13	**1701**	**Charge Switch Fault Bypass Enable** Charge Switch Fault Bypass Enable.	**1,2,3**	RW
P10.1.14	**1702**	**Saturation Trip Fault Bypass Enable** Saturation Trip Fault Bypass Enable.	**1,2,3**	RW
P10.1.15	**1703**	**Under Temp Fault Bypass Enable** Under Temp Fault Bypass Enable.	**1,2,3**	RW
P10.1.16	**1704**	**EEPROM Fault Bypass Enable** EEPROM Fault Bypass Enable.	**1,2,3**	RW
P10.1.17	**1705**	**Control board EEPROM Fault Bypass Enable** Control board EEPROM Fault Bypass Enable.	**1,2,3**	RW
P10.1.18	**1706**	**Watchdog Fault Bypass Enable** Watchdog Fault Bypass Enable.	**1,2,3**	RW
P10.1.19	**1707**	**Fan Cooling Fault Bypass Enable** Fan Cooling Fault Bypass Enable.	**1,2,3**	RW
P10.1.20	**1708**	**Keypad Com Fault Bypass Enable** Keypad Com Fault Bypass Enable.	**1,2,3**	RW
P10.1.21	**1709**	**Option Card Fault Bypass Enable** Option Card Fault Bypass Enable.	**1,2,3**	RW
P10.1.22	**1710**	**RTC Clock Fault Bypass Enable** RTC Clock Fault Bypass Enable.	**1,2,3**	RW
P10.1.23	**1711**	**Ctrl Board OverTemp Fault Bypass Enable** Ctrl Board OverTemp Fault Bypass Enable.	**1,2,3**	RW
P10.1.24	**1713**	**Fieldbus Fault Bypass Enable** Fieldbus Fault Bypass Enable.	**1,2,3**	RW
P10.1.25	**2832**	**Op Cont Interlock Fault Bypass Enable** Op Cont Interlock Fault Bypass Enable.	**1,2,3**	RW
P10.2.1	**2476**	**Redundant Drive Enable** Use this parameter to enable the Redundant drive setup where multiple drives can be connected via Para communications to start if the main drive fails or runtime settings below expires.	**2,3**	RW
P10.2.2	**2278**	**Drive ID** Use this parameter to set the drive address when using multi drive redundant 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**	RW
P10.2.3	**2477**	**Redundant Run Time Enable** Use this parameter to enables the Run time limit for the Redundant drive mode so that drives will be cycled based off the Run time limit value.	**2,3**	RW
P10.2.4	**2478**	**Redundant Run Time Reset** Use this parameter to manually Reset the Redundant Drive Run timer.	**2,3**	RW
P10.2.5	**2479**	**Redundant RunTime Limit** Use this parameter to set the time limit for Run time of the drive when enabled for the Redundant drive scheme.	**2,3**	RW
P11.1.1	**2487**	**Interval 1 Setting** Use this parameter with the Interval time setting for interval 1 to set the desired time frame for the selection; to be Weekly or Daily. 0 = Weekly—would setup the timer for the week long. Drive starts on the on day/time and runs to the stop day and time. 1 = Daily—would setup the timer for the defined day. Drive starts on time and stops on that day off time, for the listed days in the sequence	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P11.1.2	**491**	**Interval 1 On Time** Use this parameter to set the on time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2,3**	RW
P11.1.3	**493**	**Interval 1 Off Time** Use this parameter to set the off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2,3**	RW
P11.1.4	**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**	RW
P11.1.5	**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**	RW
P11.1.6	**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**	RW
P11.2.1	**2488**	**Interval 2 Setting** Use this parameter with the Interval time setting for interval 2 to set the desired time frame for the selection; to be Weekly or Daily. 0 = Weekly—would setup the timer for the week long. Drive starts on the on day/time and runs to the stop day and time. 1 = Daily—would setup the timer for the defined day. Drive starts on time and stops on that day off time, for the listed days in the sequence	**2,3**	RW
P11.2.2	**495**	**Interval 2 On Time** Use this parameter to set the on time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2,3**	RW
P11.2.3	**497**	**Interval 2 Off Time** Use this parameter to set the off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2,3**	RW
P11.2.4	**520**	**Interval 2 From Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2,3**	RW
P11.2.5	**521**	**Interval 2 To Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P11.2.6	**522**	**Interval 2 Channel** Select affected time channel to store the interval time. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2,3**	RW
P11.3.1	**2489**	**Interval 3 Setting** Use this parameter with the Interval time setting for interval 3 to set the desired time frame for the selection; to be Weekly or Daily. 0 = Weekly would setup the timer for the week long. Drive starts on the on day/time and runs to the stop day and time. 1 = Daily—would setup the timer for the defined day. Drive starts on time and stops on that day off time, for the listed days in the sequence	**2,3**	RW
P11.3.2	**499**	**Interval 3 On Time** Use this parameter to set the on time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2,3**	RW
P11.3.3	**501**	**Interval 3 Off Time** Use this parameter to set the off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2,3**	RW
P11.3.4	**523**	**Interval 3 From Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2,3**	RW
P11.3.5	**524**	**Interval 3 To Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2,3**	RW
P11.3.6	**525**	**Interval 3 Channel** Select affected time channel to store the interval time. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2,3**	RW
P11.4.1	**2490**	**Interval 4 Setting** Use this parameter with the Interval time setting for interval 4 to set the desired time frame for the selection; to be Weekly or Daily. 0 = Weekly—would setup the timer for the week long. Drive starts on the on day/time and runs to the stop day and time. 1 = Daily—would setup the timer for the defined day. Drive starts on time and stops on that day off time, for the listed days in the sequence	**2,3**	RW
P11.4.2	**503**	**Interval 4 On Time** Use this parameter to set the on time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2,3**	RW
P11.4.3	**505**	**Interval 4 Off Time** Use this parameter to set the off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P11.4.4	**526**	**Interval 4 From Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2,3**	RW
P11.4.5	**527**	**Interval 4 To Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2,3**	RW
P11.4.6	**528**	**Interval 4 Channel** Select affected time channel to store the interval time. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2,3**	RW
P11.5.1	**2491**	**Interval 5 Setting** Use this parameter with the Interval time setting for interval 5 to set the desired time frame for the selection; to be Weekly or Daily. 0 = Weekly—would setup the timer for the week long. Drive starts on the on day/time and runs to the stop day and time. 1 = Daily—would setup the timer for the defined day. Drive starts on time and stops on that day off time, for the listed days in the sequence	**2,3**	RW
P11.5.2	**507**	**Interval 5 On Time** Use this parameter to set the on time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2,3**	RW
P11.5.3	**509**	**Interval 5 Off Time** Use this parameter to set the off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	**2,3**	RW
P11.5.4	**529**	**Interval 5 From Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2,3**	RW
P11.5.5	**530**	**Interval 5 To Day** On day of week for Interval function. 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	**2,3**	RW
P11.5.6	**531**	**Interval 5 Channel** Select affected time channel to store the interval time. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2,3**	RW
P11.6.1	**511**	**Timer 1 Duration** Use this parameter to set the duration of time the timer will run when activated. (Activated by DI)	**2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P11.6.2	**532**	**Timer 1 Channel** Select affected time channel. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2,3**	RW
P11.6.3	**513**	**Timer 2 Duration** Use this parameter to set the duration of time the timer will run when activated. (Activated by DI)	**2,3**	RW
P11.6.4	**533**	**Timer 2 Channel** Select affected time channel. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2,3**	RW
P11.6.5	**515**	**Timer 3 Duration** Use this parameter to set the duration of time the timer will run when activated. (Activated by DI)	**2,3**	RW
P11.6.6	**534**	**Timer 3 Channel** Select affected time channel. 0 = Not used 1 = Time channel 1 2 = Time channel 2 3 = Time channel 3	**2,3**	RW
P12.1.1	**2533**	**FB Process Data Input 1 Sel** Fieldbus Data Input Selects the parameter/monitor IDs which can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Input are: Process Data In Select 1 - FB Torque Reference = 2541 Process Data In Select 2 - FB PID 1 Set Point1 = 2542 Process Data In Select 3 - FB PID 1 Feedback1 = 2550 Process Data In Select 4 - No default Selection Process Data In Select 5 - No default Selection Process Data In Select 6 - No default Selection Process Data In Select 7 - No default Selection Process Data In Select 8 - No default Selection	**1,2,3**	RW
P12.1.2	**2534**	**FB Process Data Input 2 Sel** Fieldbus Data Input Selects the parameter/monitor IDs which can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Input are: Process Data In Select 1 - FB Torque Reference = 2541 Process Data In Select 2 - FB PID 1 Set Point1 = 2542 Process Data In Select 3 - FB PID 1 Feedback1 = 2550 Process Data In Select 4 - No default Selection Process Data In Select 5 - No default Selection Process Data In Select 6 - No default Selection Process Data In Select 7 - No default Selection Process Data In Select 8 - No default Selection	**1,2,3**	RW
P12.1.3	**2535**	**FB Process Data Input 3 Sel** Fieldbus Data Input Selects the parameter/monitor IDs which can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Input are: Process Data In Select 1 - FB Torque Reference = 2541 Process Data In Select 2 - FB PID 1 Set Point1 = 2542 Process Data In Select 3 - FB PID 1 Feedback1 = 2550 Process Data In Select 4 - No default Selection Process Data In Select 5 - No default Selection Process Data In Select 6 - No default Selection Process Data In Select 7 - No default Selection Process Data In Select 8 - No default Selection	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P12.1.4	**2536**	**FB Process Data Input 4 Sel** Fieldbus Data Input Selects the parameter/monitor IDs which can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Input are: Process Data In Select 1 - FB Torque Reference = 2541 Process Data In Select 2 - FB PID 1 Set Point1 = 2542 Process Data In Select 3 - FB PID 1 Feedback1 = 2550 Process Data In Select 4 - No default Selection Process Data In Select 5 - No default Selection Process Data In Select 6 - No default Selection Process Data In Select 7 - No default Selection Process Data In Select 8 - No default Selection	**1,2,3**	RW
P12.1.5	**2537**	**FB Process Data Input 5 Sel** Fieldbus Data Input Selects the parameter/monitor IDs which can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Input are: Process Data In Select 1 - FB Torque Reference = 2541 Process Data In Select 2 - FB PID 1 Set Point1 = 2542 Process Data In Select 3 - FB PID 1 Feedback1 = 2550 Process Data In Select 4 - No default Selection Process Data In Select 5 - No default Selection Process Data In Select 6 - No default Selection Process Data In Select 7 - No default Selection Process Data In Select 8 - No default Selection	**1,2,3**	RW
P12.1.6	**2538**	**FB Process Data Input 6 Sel** Fieldbus Data Input Selects the parameter/monitor IDs which can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Input are: Process Data In Select 1 - FB Torque Reference = 2541 Process Data In Select 2 - FB PID 1 Set Point1 = 2542 Process Data In Select 3 - FB PID 1 Feedback1 = 2550 Process Data In Select 4 - No default Selection Process Data In Select 5 - No default Selection Process Data In Select 6 - No default Selection Process Data In Select 7 - No default Selection Process Data In Select 8 - No default Selection	**1,2,3**	RW
P12.1.7	**2539**	**FB Process Data Input 7 Sel** Fieldbus Data Input Selects the parameter/monitor IDs which can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Input are: Process Data In Select 1 - FB Torque Reference = 2541 Process Data In Select 2 - FB PID 1 Set Point1 = 2542 Process Data In Select 3 - FB PID 1 Feedback1 = 2550 Process Data In Select 4 - No default Selection Process Data In Select 5 - No default Selection Process Data In Select 6 - No default Selection Process Data In Select 7 - No default Selection Process Data In Select 8 - No default Selection	**1,2,3**	RW
P12.1.8	**2540**	**FB Process Data Input 8 Sel** Fieldbus Data Input Selects the parameter/monitor IDs which can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Input are: Process Data In Select 1 - FB Torque Reference = 2541 Process Data In Select 2 - FB PID 1 Set Point1 = 2542 Process Data In Select 3 - FB PID 1 Feedback1 = 2550 Process Data In Select 4 - No default Selection Process Data In Select 5 - No default Selection Process Data In Select 6 - No default Selection Process Data In Select 7 - No default Selection Process Data In Select 8 - No default Selection	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P12.2.1	**1556**	**FB Process Data Output 1 Sel** Use this parameter to accessing the Fieldbus Data Output Selections, parameter/monitor ID's can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1—Output Frequency = ID 1 Process Data Out2—Motor Speed = ID 2 Process Data Out3—Motor Current = ID 3 Process Data Out4—Motor Torque = ID 4 Process Data Out5—Motor Power = ID 5 Process Data Out6—Motor Voltage = ID 6 Process Data Out7—DC Link Voltage = ID 7 Process Data Out8—Active Fault Code = ID 28 see Communication Manual MN040010EN for more details.	**1,2,3**	RW
P12.2.2	**1557**	**FB Process Data Output 2 Sel** Use this parameter to accessing the Fieldbus Data Output Selections, parameter/monitor ID's can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1—Output Frequency = ID 1 Process Data Out2—Motor Speed = ID 2 Process Data Out3—Motor Current = ID 3 Process Data Out4—Motor Torque = ID 4 Process Data Out5—Motor Power = ID 5 Process Data Out6—Motor Voltage = ID 6 Process Data Out7—DC Link Voltage = ID 7 Process Data Out8—Active Fault Code = ID 28 see Communication Manual MN040010EN for more details.	**1,2,3**	RW
P12.2.3	**1558**	**FB Process Data Output 3 Sel** Use this parameter to accessing the Fieldbus Data Output Selections, parameter/monitor ID's can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1—Output Frequency = ID 1 Process Data Out2—Motor Speed = ID 2 Process Data Out3—Motor Current = ID 3 Process Data Out4—Motor Torque = ID 4 Process Data Out5—Motor Power = ID 5 Process Data Out6—Motor Voltage = ID 6 Process Data Out7—DC Link Voltage = ID 7 Process Data Out8—Active Fault Code = ID 28 see Communication Manual MN040010EN for more details.	**1,2,3**	RW
P12.2.4	**1559**	**FB Process Data Output 4 Sel** Use this parameter to accessing the Fieldbus Data Output Selections, parameter/monitor ID's can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1—Output Frequency = ID 1 Process Data Out2—Motor Speed = ID 2 Process Data Out3—Motor Current = ID 3 Process Data Out4—Motor Torque = ID 4 Process Data Out5—Motor Power = ID 5 Process Data Out6—Motor Voltage = ID 6 Process Data Out7—DC Link Voltage = ID 7 Process Data Out8—Active Fault Code = ID 28 see Communication Manual MN040010EN for more details.	**1,2,3**	RW
P12.2.5	**1560**	**FB Process Data Output 5 Sel** Use this parameter to accessing the Fieldbus Data Output Selections, parameter/monitor ID's can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1—Output Frequency = ID 1 Process Data Out2—Motor Speed = ID 2 Process Data Out3—Motor Current = ID 3 Process Data Out4—Motor Torque = ID 4 Process Data Out5—Motor Power = ID 5 Process Data Out6—Motor Voltage = ID 6 Process Data Out7—DC Link Voltage = ID 7 Process Data Out8—Active Fault Code = ID 28 see Communication Manual MN040010EN for more details.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P12.2.6	**1561**	**FB Process Data Output 6 Sel** Use this parameter to accessing the Fieldbus Data Output Selections, parameter/monitor ID's can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1—Output Frequency = ID 1 Process Data Out2—Motor Speed = ID 2 Process Data Out3—Motor Current = ID 3 Process Data Out4—Motor Torque = ID 4 Process Data Out5—Motor Power = ID 5 Process Data Out6—Motor Voltage = ID 6 Process Data Out7—DC Link Voltage = ID 7 Process Data Out8—Active Fault Code = ID 28 see Communication Manual MN040010EN for more details.	**1,2,3**	RW
P12.2.7	**1562**	**FB Process Data Output 7 Sel** Use this parameter to accessing the Fieldbus Data Output Selections, parameter/monitor ID's can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1—Output Frequency = ID 1 Process Data Out2—Motor Speed = ID 2 Process Data Out3—Motor Current = ID 3 Process Data Out4—Motor Torque = ID 4 Process Data Out5—Motor Power = ID 5 Process Data Out6—Motor Voltage = ID 6 Process Data Out7—DC Link Voltage = ID 7 Process Data Out8—Active Fault Code = ID 28 see Communication Manual MN040010EN for more details.	**1,2,3**	RW
P12.2.8	**1563**	**FB Process Data Output 8 Sel** Use this parameter to accessing the Fieldbus Data Output Selections, parameter/monitor ID's can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Default Values for Process Data Out in Fieldbus (build table for below values) Process Data Out1—Output Frequency = ID 1 Process Data Out2—Motor Speed = ID 2 Process Data Out3—Motor Current = ID 3 Process Data Out4—Motor Torque = ID 4 Process Data Out5—Motor Power = ID 5 Process Data Out6—Motor Voltage = ID 6 Process Data Out7—DC Link Voltage = ID 7 Process Data Out8—Active Fault Code = ID 28 see Communication Manual MN040010EN for more details.	**1,2,3**	RW
P12.2.9	**2415**	**Standard Status Word Bit0 Function Select** Use this parameter to select status indication of this bit0 to be read over the communication Standard Status Word.	**1,2,3**	RW
P12.2.10	**2416**	**Standard Status Word Bit1 Function Select** Use this parameter to select status indication of this bit1 to be read over the communication Standard Status Word.	**1,2,3**	RW
P12.2.11	**2417**	**Standard Status Word Bit2 Function Select** Use this parameter to select status indication of this bit2 to be read over the communication Standard Status Word.	**1,2,3**	RW
P12.2.12	**2418**	**Standard Status Word Bit3 Function Select** Use this parameter to select status indication of this bit3 to be read over the communication Standard Status Word.	**1,2,3**	RW
P12.2.13	**2419**	**Standard Status Word Bit4 Function Select** Use this parameter to select status indication of this bit4 to be read over the communication Standard Status Word.	**1,2,3**	RW
P12.2.14	**2420**	**Standard Status Word Bit5 Function Select** Use this parameter to select status indication of this bit5 to be read over the communication Standard Status Word.	**1,2,3**	RW
P12.2.15	**2421**	**Standard Status Word Bit6 Function Select** Use this parameter to select status indication of this bit6 to be read over the communication Standard Status Word.	**1,2,3**	RW
P12.2.16	**2422**	**Standard Status Word Bit7 Function Select** Use this parameter to select status indication of this bit7 to be read over the communication Standard Status Word.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P12.3.1.1	**586**	**RS485 Comm Set** This parameter defines the communication protocol for RS-485. 0 = Modbus RTU 1 = BACnet MS/TP	**1,2,3**	RW
P12.3.2.1	**587**	**Slave Address** Use this parameter set the slave address for RS-485 communication.	**1,2,3**	RW
P12.3.2.2	**584**	**Baud Rate** Use this parameter set communication speed for RS-485 communication.	**1,2,3**	RW
P12.3.2.3	**585**	**Parity Type** Use this parameter set parity type for RS-485 communication.	**1,2,3**	RW
P12.3.2.4	**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**	RO
P12.3.2.5	**593**	**Comm Timeout Modbus RTU** Selects the time to waits before a communication fault occurs over Modbus RTU if a message isn't received.	**1,2,3**	RW
P12.3.2.6	**2516**	**Modbus RTU Fault Response** Use this parameter to set the Fieldbus Fault condition for Modbus RTU Communication. 0 = Only in Fieldbus Control Mode—when Fieldbus is the control place and Fieldbus fault is active drive will fault on loss of coms, if not in Fieldbus Control place will not fault. 1 = In all Control Modes—no matter the control place setting if communication is lost Fieldbus fault response will occur.	**1,2,3**	RW
P12.3.3.1	**594**	**MSTP Baud Rate** This parameter defines communication speed for RS-485 communication.	**1,2,3**	RW
P12.3.3.2	**595**	**MSTP Device Address** Defines the device address of the drive on the BACnet MSTP network.	**1,2,3**	RW
P12.3.3.3	**596**	**MSTP Instance Number** Defines the instance number of the drive on the BACnet MSTP network.	**1,2,3**	RW
P12.3.3.4	**598**	**MSTP Comm Timeout** Selects the time to waits before a communication fault occurs over BACnet MSTP if a message isn't received.	**1,2,3**	RW
P12.3.3.5	**599**	**MSTP Protocol Status** This parameter shows the protocol status for BACnet MSTP communication. 0 = Stopped 1 = Operational 2 = Faulted	**1,2,3**	RO
P12.3.3.6	**600**	**MSTP Fault Code** This parameter shows the protocol status for BACnet MSTP communication. 0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud rate fault	**1,2,3**	RO
P12.3.3.7	**2526**	**MSTP Fault Response** Defines the Fieldbus Fault condition for BACnet MSTP Communication. 0 = Only in Fieldbus Control Mode—when fieldbus is the control place and Fieldbus fault is active drive will fault on loss of communications, if not in Fieldbus Control place will not fault. 1 = In all Control Modes—no matter the control place setting if communication is lost Fieldbus fault response will occur.	**1,2,3**	RW
P12.3.3.8	**1537**	**MSTP Max Master** MSTP Max Master.	**1,2,3**	RW
P12.3.4.1	**1727**	**SA Bus Baud Rate** SA Bus Baud Rate.	**1,2,3**	RW
P12.3.4.2	**1726**	**SA Bus Device Address** SA Bus Device Address.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P12.3.4.3	**1728**	**SA Bus Instance Number** SA Bus Instance Number.	**1,2,3**	RW
P12.3.4.4	**1730**	**SA Bus Comm Timeout** SA Bus Comm Timeout.	**1,2,3**	RW
P12.3.4.5	**1731**	**SA Bus Protocol Status** SA Bus Protocol Status	**1,2,3**	RO
P12.3.4.6	**1732**	**SA Bus Fault Response** SA Bus Fault Response.	**1,2,3**	RW
P12.4.1.1	**1500**	**IP Address Mode** This parameter defined the IP address configuration mode for EIP/Modbus TCP. 0 = Static IP 1 = DHCP with AutoIP	**1,2,3**	RW
P12.4.1.2	**1507**	**Active IP Address** Reads the current active IP address.	**1,2,3**	RO
P12.4.1.3	**1509**	**Active Subnet Mask** Reads the current active Subnet mask.	**1,2,3**	RO
P12.4.1.4	**1511**	**Active Default Gateway** Reads the current active Default gateway.	**1,2,3**	RO
P12.4.1.5	**1513**	**MAC Address** Reads the current MAC address.	**1,2,3**	RO
P12.4.1.6	**1501**	**Static IP Address** Defines the static IP address.	**1,2,3**	RW
P12.4.1.7	**1503**	**Static Subnet Mask** Defines the static Subnet mask.	**1,2,3**	RW
P12.4.1.8	**1505**	**Static Default Gateway** Defines the static Default gateway.	**1,2,3**	RW
P12.4.1.9	**1725**	**Enable BACnetIP** Indicates if BACNET_IP is active or not. 0 = Disabled 1 = Enabled	**1,2,3**	RW
P12.4.1.10	**1942**	**Modbus TCP enable** Enables Modbus TCP communications, must be enabled to connect to Power Xpert *in*Control.	**1,2,3**	RW
P12.4.2.1	**609**	**Connection Limit** Maximum number of connections allowed to the drive.		
P12.4.2.2	**610**	**Modbus TCP Unit ID** Unit identifier unit value for Modbus TCP.	**1,2,3**	RW
P12.4.2.3	**611**	**Comm Timeout Modbus TCP** Use this parameter to set the time it waits before a communication fault occurs over Ethernet.	**1,2,3**	RW
P12.4.2.4	**612**	**Modbus TCP Protocol Status** This parameter shows the protocol status for Modbus TCP communication. 0 = Stopped 1 = Operational 2 = Faulted	**1,2,3**	RO
P12.4.2.5	**2517**	**Modbus TCP Fault Response** Defines the Fieldbus Fault condition for Modbus TCP Communication. 0 = Only in Fieldbus Control Mode—when fieldbus is the control place and Fieldbus fault is active drive will fault on loss of communications, if not in Fieldbus Control place will not fault. 1 = In all Control Modes—no matter the control place setting if communication is lost Fieldbus fault response will occur.	**1,2,3**	RW
P12.4.2.6	**74**	**Modbus TCP Trusted IP Enable** Modbus TCP Trusted IP Enable.	**1,2,3**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P12.4.2.7	68	**Trusted IP White List** Trusted IP White List.	1,2,3	RW
P12.4.3.1	1733	**BACnet IP UDP port number** BACnet IP UDP port number.	1,2,3	RW
P12.4.3.2	1734	**BACnet IP Foreign Device** BACnet IP Foreign Device.	1,2,3	RW
P12.4.3.3	1735	**BACnet IP BBMD IP** BACnet IP BBMD IP.	1,2,3	RW
P12.4.3.4	1737	**BACnet IP BBMD Port** BACnet IP BBMD Port.	1,2,3	RW
P12.4.3.5	1738	**BACnet IP Registration Interval** BACnet IP Registration Interval.	1,2,3	RW
P12.4.3.6	1739	**BACnet IP Comm Timeout** BACnet IP Comm Timeout.	1,2,3	RW
P12.4.3.7	1740	**BACnet IP Protocol Status** BACnet IP Protocol Status.	1,2,3	RO
P12.4.3.8	1741	**BACnet IP Fault Behavior** BACnet IP Fault Behavior.	1,2,3	RW
P12.4.3.9	1742	**BACnetIP Instance Number** BACnetIP Instance Number.	1,2,3	RW
P12.4.4.1	2915	**WebUI Protocol Status**	1,2,3	RO
P12.4.4.2	2916	**WebUI Fault Response**	1,2,3	RW
P12.4.4.3	2919	**WebUI Communication Timeout**	1,2,3	RW
P12.4.4.4	2921	**WebUI Enable**	1,2,3	RW
P13.1.1	340	**Language** This parameter offers the ability to control the frequency converter through the keypad in the language of your choice. Currently available language is only English.	1,2,3	RW
P13.1.2	142	**Application** Use this parameter to set the active application marco to use.	1,2,3	RW
P13.1.3	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 = Reload Set 1 3 = Reload Set 2 4 = Store parameter set1 5 = Store parameter set2 6 = Reset 7 = Reload Defaults VM	1,2,3	RW
P13.1.4	620	**Up To Keypad** This function uploads all existing parameter groups to the keypad. 0 = No 1 = Yes (All parameters)	1,2,3	RW
P13.1.5	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	RW

Code	Modbus ID	Parameter	Application	RO/RW
P13.1.6	**623**	**Parameter Comparison** Use this parameter to initiate a 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**	RW
P13.1.7	**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**	RW
P13.1.8	**625**	**Parameter Lock** Use this parameter to prevent user from changing parameters. User has to come to this parameter to allow changing. When 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**	RW
P13.1.9	**627**	**Multimonitor Set** Use this parameter lock in the values set for the multimonitor page and not allow changing unless re enabled.	**1,2,3**	RW
P13.1.10	**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**	RW
P13.1.11	**629**	**Timeout Time** Use this parameter to set the time after which the keypad display returns to the Default Page, if no keypad keys are pressed. Note: If the Default Page value is 0 the Timeout Time setting has no effect.	**1,2,3**	RW
P13.1.12	**630**	**Contrast Adjust** If the remote keypad display is not clear, you can adjust the keypad contrast with this parameter.	**1,2,3**	RW
P13.1.13	**631**	**Backlight Time** Use this parameter to set the time to illuminate the display.	**1,2,3**	RW
P13.1.14	**632**	**Fan Control** This function allows you to control the drive cooling fan. You can set the fan to run: 0 = Continuous-fan runs continuously. 1 = 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." 2 = Run Follow-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.	**1,2,3**	RW
P13.1.15	**633**	**Keypad ACK Timeout** This function allows the user to change the timeout of the Keypad acknowledgement time. This is the communication performed between the control module and the keypad. This would be adjusted when using long communication cables between drive and a keypad to delay message timeouts. **Example:** • Transfer delay between the frequency converter and the PC = 600 ms. • The value of HMI Acknowledge Timeout is set to 1200 ms (2 x 600, sending delay + receiving delay). • The corresponding setting shall be entered in the [Misc]-part of the file. 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**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P13.1.16	**634**	**Keypad Retry Number** 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**	RW
P13.1.17	**626**	**Startup Wizard** The Startup Wizard facilitates commissioning the drive. If selected Enable, the Startup Wizard prompts operator for application desired and then advances parameters through the start-up parameter list/ Application Mini wizard in keypad. 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 is always enabled for the initial power up of the drive. 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. 0 = Enabled 1 = Disabled	**1,2,3**	RW
P13.1.18	**2412**	**Jog Softkey Hidden** Use this parameter to hide the jog function from the soft key buttons. 0 = Disable 1 = Enable	**1,2,3**	RW
P13.1.19	**2413**	**Reverse Softkey Hidden** Use this parameter to hide the Reverse function from the soft key buttons. 0 = Disable 1 = Enable	**1,2,3**	RW
P13.1.20	**2424**	**Output Display Unit** Output Display Unit Allows for changing the monitor value to a desired unit that will reflect the application. From there with process unit it will allow setting a min/max limit for the value to display desired output. 0,PERCENTAGE,% / 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**	RW
P13.1.21	**2460**	**Output Display Unit Min** Use this parameter to set the minimum scaled value when changing the display unit to a value other than the default Hz.	**1,2,3**	RW
P13.1.22	**2425**	**Output Display Unit Max** Use this parameter to set the maximum scaled value when changing the display unit to a value other than the default Hz.	**1,2,3**	RW
P13.1.23	**75**	**Keypad Lock Password** The keypad can be protected against unauthorized changes with the keypad lock function after no press keys 5 minutes. When the password function is enabled, the user will be prompted to enter a password before keypad display parameter or response to key press except up/down/left/right. 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**	RW
P13.2.1	**640**	**Keypad Software Version** Keypad firmware Version	**1,2,3**	RO
P13.2.2	**642**	**Motor Control Software Version** DSP/Motor Control Software Version	**1,2,3**	RO
P13.2.3	**644**	**Application Software Version** MCU/Application Software Version	**1,2,3**	RO

Code	Modbus ID	Parameter	Application	RO/RW
P13.2.4	**1714**	**Software Bundle Version** Software Bundle Version.	**1,2,3**	RO
P13.3.1	**646**	**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**	RW
P13.3.2	**647**	**Brake Resistor Status** The Hardware information—indication of the Brake Resistor status being connected or disconnect.	**1,2,3**	RO
P13.3.3	**648**	**Serial Number** The Hardware information—Serial number of the drive.	**1,2,3**	RO
P13.3.4	**1270**	**Power Unit Serial Number** Power unit serial number.	**1,2,3**	RO
P13.3.5	**1276**	**Control Unit Serial Number** Control board serial number.	**1,2,3**	RO
P13.3.6	**1758**	**Serial Number** The Hardware information - Serial number of the drive.	**1,2,3**	RO
P13.4.1	**566**	**Real Time Clock** This parameter provides the ability to see and adjust the time clock settings in the drive. Formatted in MM.DD.YY, HH:MM:SS.	**1,2,3**	RW
P13.4.2	**582**	**Daylight Saving** Daylight saving rule 0 = Off 1 = EU 2 = US 3 = Russia	**1,2,3**	RW
P13.4.3	**601**	**Total MWh Count** Total Megawatt hours of the drive output.	**1,2,3**	RO
P13.4.4	**603**	**Total Power Day Count** Number of days the drive has been supplied with power.	**1,2,3**	RO
P13.4.5	**606**	**Total Power Hr Count** Number of hours the drive has been supplied with power.	**1,2,3**	RO
P13.4.6	**604**	**Trip MWh Count** Megawatts hours of the drive output active since last reset.	**1,2,3**	RO
P13.4.7	**635**	**Clear Trip MWh Count** Resets megawatts hours counter and clears Energy Meter in the Menu.	**1,2,3**	RW
P13.4.8	**636**	**Trip Power Day Count** Number of days since the last reset.	**1,2,3**	RO
P13.4.9	**637**	**Trip Power Hr Count** Number of hours the drive has been running a motor since the last reset.	**1,2,3**	RO
P13.4.10	**639**	**Clear Trip Power Count** Resets the day and hour motor or drive running counter and resets the Motor Run Time in the Menu.	**1,2,3**	RW
M1.1	**1**	**Output Frequency** Output frequency (Hz)		RO
M1.2	**24**	**Freq Reference** Reference frequency (Hz)	**1,2,3**	RO
M1.3	**2**	**Motor Speed** Motor output speed (RPM)	**1,2,3**	RO

Code	Modbus ID	Parameter	Application	RO/RW
M1.4	**3**	**Motor Current** Motor output current RMS (Amps)	**1,2,3**	RO
M1.5	**4**	**Motor Torque** Percent motor torque calculated from nameplate values and measured motor current (%)	**1,2,3**	RO
M1.6	**5**	**Motor Power** Percent motor power calculated from nameplate values and measured motor current (%)	**1,2,3**	RO
M1.7	**6**	**Motor Voltage** Output ac motor voltage (Vac)	**1,2,3**	RO
M1.8	**7**	**DC-link Voltage** DC bus voltage (Vdc)	**1,2,3**	RO
M1.9	**8**	**Unit Temperature** Heat sink temperature (Deg. C)	**1,2,3**	RO
M1.10	**9**	**Motor Temperature** Motor temperature value calculated from nameplate values and measured motor current (%)	**1,2,3**	RO
M1.11	**28**	**Latest Fault Code** Last active fault code value. See fault codes for the value shown here.	**1,2,3**	RO
M1.12	**1686**	**Instant Motor Power** Instantaneous motor power (kW)	**1,2,3**	RO
M1.13	**583**	**RTC Battery Status** Real time clock battery status.	**1,2,3**	RO
M2.1	**10**	**Analog Input 1** Analog input 1 measured value (Vdc or Amps) selectable with dipswitch	**1,2,3**	RO
M2.2	**11**	**Analog Input 2** Analog input 2 measured value (Vdc or Amps) selectable with dipswitch	**1,2,3**	RO
M2.3	**25**	**Analog Output 1** Analog Output 1 measured value (Vdc or Amps) selectable with parameter	**1,2,3**	RO
M2.4	**575**	**Analog Output 2** Analog Output 2 measured value (Vdc or Amps) selectable with parameter	**1,2,3**	RO
M2.5	**12**	**DI1, DI2, DI3** Digital Input 1/2/3 status	**1,2,3**	RO
M2.6	**13**	**DI4, DI5, DI6** Digital Input 4/5/6 status	**1,2,3**	RO
M2.7	**576**	**DI7, DI8** Digital Input 7/8 status	**1,2,3**	RO
M2.8	**14**	**DO1, Virtual RO1, Virtual RO2** Digital Output status and Firmware Virtual Relay status. The Virtual RO1 and Virtual RO2 status are of internal relays in the control board not for external use, allows for turning on functions internal to the drive without the use of hardwire connections.	**1,2,3**	RO
M2.9	**557**	**RO1, RO2, RO3** Relay output 1/2/3 status	**1,2,3**	RO
M2.10	**3214**	**Control board DI status** Control board DI Status will give the input status on control board.	**1,2,3**	RO
M2.11	**3248**	**Control board DI status** Slot DI Status will give the input status of a board inserted in the expander board slot.	**1,2,3**	RO
M2.12	**3249**	**SlotA DI status** Slot DI Status will give the input status of a board inserted in the expander board slot.	**1,2,3**	RO
M3.1	**27**	**PT100 Temperature** Maximum PT100 thermistor temperature value in °C.	**1,2,3**	RO

Code	Modbus ID	Parameter	Application	RO/RW
M4.1	**2120**	**Energy Savings** Displays the Energy savings of the drive compared to linear V/f curve.	**1,2,3**	RO
M5.1	**2209**	**Control Board DIDO Status** Control Board DIDO Status provides the status of inputs and outputs on the control board. It is looking at DIN1—Terminal 20, DIN2—Terminal 21, DIN3—Terminal 22, DIN4—Terminal 23, DIN5—Terminal 7, DIN6—Terminal 8, DIN7—Terminal 9, DIN8—Terminal 10, DO1—Terminal 14, RO1—Terminal 28-29, RO2—Terminal 32-34, RO3—Terminal 27 and 31. Along with the onboard I/O being monitored it also provides status info on if there are boards in the A or B expander Board slots. Bit 0 = DIN1 Status Bit 1 = DIN2 Status Bit 2 = DIN3 Status Bit 3 = DIN4 Status Bit 4 = DIN5 Status Bit 5 = DIN6 Status Bit 6 = DIN7 Status Bit 7 = DIN8 Status Bit 8 = DO1 Status Bit 9 = RO1 Status Bit 10 = RO2 Status Bit 11 = RO3 Status Bit 12 = Slot A with Board Bit 13 = Slot B with Board Bit 14 = Virtual_RO1_Status Bit 15 = Virtual_RO2_Status	**1,2,3**	RO
M5.2	**2210**	**SlotA DIDO Status** SlotA DIDO Status will give the input and output status of a board inserted in the A expander board slot. Depending on the board inserted different bits will become active if the I/O is enabled.	**1,2,3**	RO
M5.3	**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.	**1,2,3**	RO
M5.4	**29**	**Application Status Word** Application Status word will provide additional status indication of the health of the drive. Bit 0 = MC Ready Bit 1 = MC_Run Bit 2 = MC_Fault Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning/AR-Fault Bit 7 = MC_ZeroSpeed Bit 8 = I/O Control Indicate Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Indicator Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 = Motor Regulator Status not Zero Bit 14 = Ext Brake Control Bit 15 = Application Status word will provide additional status indication of the health of the drive	**1,2,3**	RO
M5.6	**2414**		**1,2,3**	RO
M5.6	**2101**	**FB Status Word** Fieldbus Status Word is drive status mapped to protocols.	**1,2,3**	RO
M5.7	**2001**	**FB Control Word** Fieldbus control Word is protocols control word which mapped to drive.	**1,2,3**	RW
M5.8	**2003**	**FB Speed Reference** Fieldbus frequency reference from protocol.	**1,2,3**	RW
M6.1	**16**	**PID1 Set Point** PID setpoint in process units.	**2,3**	RO
M6.2	**18**	**PID1 Feedback** PID feedback level in process units.	**2,3**	RO
M6.3	**20**	**PID1 Error Value** PID error in process units.	**2,3**	RO
M6.4	**22**	**PID1 Output** PID output (%).	**2,3**	RO
M6.5	**23**	**PID1 Status** PID status indication, indicates if drive is stopped, running in PID mode, or in PID sleep mode.	**2,3**	RO
M6.6	**32**	**PID2 Set Point** PID setpoint in process units.	**2,3**	RO
M6.7	**34**	**PID2 Feedback** PID feedback level in process units.	**2,3**	RO

Code	Modbus ID	Parameter	Application	RO/RW
M6.8	**36**	**PID2 Error Value** PID error in process units.	**2,3**	RO
M6.9	**38**	**PID2 Output** PID output (%).	**2,3**	RO
M6.10	**39**	**PID2 Status** PID status indication, indicates if drive is stopped, running in PID mode, or in PID sleep mode.	**2,3**	RO
M7.1	**558**	**TC1, TC2, TC3** Timer channel status.	**2,3**	RO
M7.2	**559**	**Interval 1** Time interval 1 status.	**2,3**	RO
M7.3	**560**	**Interval 2** Time interval 2 status.	**2,3**	RO
M7.4	**561**	**Interval 3** Time interval 3 status.	**2,3**	RO
M7.5	**562**	**Interval 4** Time interval 4 status.	**2,3**	RO
M7.6	**563**	**Interval 5** Time interval 5 status.	**2,3**	RO
M7.7	**569**	**Timer 1** Timer 1 value in seconds.	**2,3**	RO
M7.8	**571**	**Timer 2** Timer 2 value in seconds.	**2,3**	RO
M7.9	**573**	**Timer 3** Timer 3 value in seconds.	**2,3**	RO
M8.1	**2445**	**Output** User defined output value that can be configured with the users desired unit and scale.	**1,2,3**	RO
M8.2	**2447**	**Reference** User defined reference value that can be configured with the users desired unit and scale.	**1,2,3**	RO
M9.1	**601**	**Total MWh Count** Total Megawatt hours of the drive output.	**1,2,3**	RO
M9.2	**603**	**Total Power Day Count** Number of days the drive has been supplied with power.	**1,2,3**	RO
M9.3	**606**	**Total Power Hr Count** Number of hours the drive has been supplied with power.	**1,2,3**	RO
M9.4	**604**	**Trip MWh Count** Megawatts hours of the drive output active since last reset.	**1,2,3**	RO
M9.5	**636**	**Trip Power Day Count** Number of days since the last reset.	**1,2,3**	RO
M9.6	**637**	**Trip Power Hr Count** Number of hours the drive has been running a motor since the last reset.	**1,2,3**	RO
M9.7	**2827**	**Total Run Time Count** The total time when drive is running.	**1,2,3**	RO
M9.8	**2830**	**Number of Starts** The numbers of drives starts.	**1,2,3**	RO
M9.9	**2829**	**Trip Run Time Count** The run time from last start signal.	**1,2,3**	RO
M11.1	**1753**	**Multi-Monitoring** Displays any 9 monitoring values in a 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.	**1,2,3**	RW

Appendix B— Fault Log

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

Table 225. 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 226. 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 Description	Fault Type	Default Config.	CIP Code	PROFI Code	Possible Cause	Remedy
1	Over Current	Over Current	Fault		0x2310	8976	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	Over Voltage	Fault		0x3210	12816	The DC-link voltage has exceeded the limits defined: • Too short a deceleration time • Brake chopper is disabled • High overvoltage spikes in supply • Start/Stop sequence too fast	• Make deceleration time longer • Use brake chopper or brake resistor (available as options) • Activate overvoltage controller • Check input voltage
3	Earth Fault	Earth Fault	Configurable	Fault	0x2330	9008	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	Charging Switch	Fault		0xA000	12849	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
7	Saturation Trip	Saturation Trip	Fault		0xA002	29040	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	UnderVoltage	Configurable	Fault	0x3220	12576	DC link voltage is under the voltage limits defined: • Most probable cause: Too low a supply voltage • AC drive internal fault • Defect input fuse • External charge switch not closed Note: This fault is activated only if the drive is in Run state.	In case of temporary supply voltage break reset the fault and restart the AC drive. Check the supply voltage. If it is adequate, an internal failure has occurred. Contact the distributor near you.
10	Input Phase Superv	Input Phase Spv	Configurable	No Action	0xA004	8528	Input line phase is missing	Check supply voltage, fuses and cable
11	Output Phase Superv	Output Phase Spv	Configurable	Fault	0xA005	9040	Current measurement has detected that there is no current in one motor phase	Check motor cable and motor

Fault Code	Fault Name	Fault Description	Fault Type	Default Config.	CIP Code	PROFI Code	Possible Cause	Remedy
12	Brake Chopper Superv	BrakeChopper Spv	Fault		0x7110	28944	No brake resistor installed • Brake resistor is broken • Brake chopper failure	Check brake resistor and cabling. If these are OK, the chopper is faulty. Contact the distributor near you.
13	Drive Under Temp	Drive UnderTemp	Configurable	Warning	0x4320	16928	Too low temperature measured in power Unit's heat sink or board. Heat sink temperature is under –10 °C.	
14	Drive Over Temp	Drive OverTemp	Fault		0x4310	16912	Too high temperature measured in power Unit's heat sink or board. Heat sink temperature is over 90 °C.	Check the correct amount and flow of cooling air • Check the heat sink for dust • Check the ambient temperature • Make sure that the switching frequency is not too high in relation to ambient temperature and motor load
15	Motor Stalled	Motor Stalled	Configurable	No Action	0x7121	28963	Motor is stalled	Check motor and load
16	Motor Overload	Motor OverTemp	Configurable	No Action	0x4210	17168	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 Under Load	Motor UnderLoad	Configurable	No Action	29	28979	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	IP conflict	Configurable	Warning	0xA006	30070	IP setting issue.	Check settings for IP address, verify no duplicates are on the network.
19	Power Board EEPROM Fault	Power board EEPROM Fault	Fault		0xA007	21795	Power board eeprom fault, memory lost in eeprom.	Cycle power to drive. Try updating software, if issue continues contact Distributor near you.
20	Control Board EEPROM fault	FRAM/MCU eeprom Fault	Fault		0xA008	21777	FRAM/MCU eeprom data error in memory.	Try updating software, reload default. If issue contines contact a Distributor near you.
21	S-Flash Fault	Serial Flash Fault	Warning		0xA009	21796	Serial flash error, serial flash memory failed.	Cycle power to drive. Try updating software, if issue contines contact a Distributor near you.
25	Watchdog Fault	MCU WatchDog Fault	Fault		0x6010	24848	Watchdog register overflows in MCU	Stop drive and resend start command.
26	Start-up Prevent	Start-up Prevent	Fault		0xA00A	35585	The time when Interlock signal activates is over setting time.	Stop drive and resend start command.
29	Thermistor Fault	Thermistor Fault	Configurable	Fault	0x7300	28978	Option board or control board thermistor resistor lager than 4.7K	Thermistor open or short, over temperature
32	Fan Cooling	Fan Cooling	Configurable	Fault	0xA00B	28689	Fan is damaged or stalled.	Check fan and fan connected wires, verify 24Vdc is supplied to fan.
36	Compatibility Fault	Compatibility Fault	Fault		0xA061	24849	The control board isn't match with the power board.	Cycle power to drive. Try updating software, if issue contines contact a Distributor near you.
37	Device Change	Device Change	Warning		0xA00C	35360	Power board or option card change.	Alarm will reset
38	Device Added	Device Added	Warning		0xA00D	35361	Power board or option board added.	Device is ready for use
39	Device Removed	Device Removed	Fault		0xA00E	35362	Optional board removed from slot, or power board removed from control board.	Device no longer available in drive.
40	Device Unknown	Device Unknown	Fault		0xA00F	35363	Unknown device connected (power board/option board)	Check eeprom connection. Check board connection on slot A/B Power cycle to drive.
41	IGBT Over Temp	IGBT Temperature	Fault		66	16913	IGBT temperature is too high.	Check output loading • Check motor size • Decrease switching frequency
50	AI < 4mA (4to20mA)	AIN<4mA (4to20mA)	Configurable	No Action	0xA011	29520	Loss in analog input signal, dropped below 4mA.	Verify analog input current reference value on either AI1 or AI2, check cabling.
51	External Fault	External Fault	Configurable	Fault	0x9000	36864	Digital input is activated for external fault input.	check digital input settings and verify input level, could be an extrnal device causing fault.

Fault Code	Fault Name	Fault Description	Fault Type	Default Config.	CIP Code	PROFI Code	Possible Cause	Remedy
52	Keypad Comm Fault	Keypad Communication Fault	Configurable	Fault	0xA012	21264	The connection between the control keypad and frequency converter is broken	Verify analog input current reference value on either AI1 or AI2, check cabling. Check digital input settings and verify input level, could be an extrnal device causing fault.
54	Option Card Fault	OPT Card Fault	Configurable	Fault	0xA013	35073	Defective option card or option card slot	Check right option card and optoin card slot connections. Check Board Status on Keypad for exact cause of fault. Contact distributor nearest you.
55	Realtime Clock Fault	Real time clock fault	Configurable	Warning	0xA015	35344	• 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 contines contact distributor near you.
56	PT100 Fault	PT100 Fault	Configurable	Fault	0xA016	29536	Temperature is beyond the limit of sensing capacity of PT100	Pt100 short, open or over temperature, check PT100 temperature probe.
57	Motor ID Fault	Motor ID fault	Fault		0xA017	29072	The Motor parameters Identification running was not completed successfully	Check motor size Verify the input and output wiring is connected properly.
58	Current Measure Fault	Current Measure Fault	Fault		0x2100	9217	Current measurement is out of range	Restart the drive again. Should the fault re-occur, contact the distributor near to you.
60	Control Board Overtemp	Control Board OverTemp	Configurable	Fault	0x4300	16914	Control board is over +85 degrees or under –30 degrees	Check NTC resistor Check control board temperature
61	Internal Control Supply	Internal-ctrl Supply	Fault		0x5112	20737	+24 V 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.
64	Replace Battery	Replace Battery	Configurable	Warning	0xA019	35345	RTC Battery voltage is too low.	Check the RTC battery voltage, contact distributor near you for replacement battery.
65	Replace Fan	Replace Fan	Configurable	Warning	0xA01A	28688	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	Safety Torque Off	Configurable	Fault	0xA01B	21665	STO Triggered, STO input is open.	Reset STO Trigger and verify wiring. Reset fault after input is enabled.
67	Current Limit Control	current limit control	Warning		0x2200	8977	The output current has reached the current limit value	Check the load Set the acceleration time longer
68	Over Voltage Control	over voltage control	Warning		0x3310	12817	The DC link voltage has reached its voltage limit value	Check the input voltage Set the acceleration/deceleration time longer
69	System Fault	Thermistor spi fault	Fault		0xA01C	21009	Thermistor spi communication error	Check thermistor chip.
70	System Fault	DSP parameter fault	Fault		0xA01D	22018	MCU send wrong parameters to DSP	Restart the drive again. Should the fault re-occur, contact the distributor near to you.
71	System Fault	intercom fault	Fault		0xA01E	22019	MCU and DSP communication error	Restart the drive again. Should the fault re-occur, contact the distributor near to you.
80	Fieldbus Fault	FieldBus Bacnet IP Fault	Configurable	Fault	0xA062	30073	BACnet IP fieldbus fault	Check the fieldbus communication wiring. Verify drive parameters are set correctly. Check BACnet master programming to verify proper addressing.
81	Fieldbus Fault	FieldBus SA Bus Fault	Configurable	Fault	0xA063	30074	SABus fieldbus fault	Check the fieldbus communication wiring on A/B terminal. Verify drive parameters are set correctly. Check SA Bus master programming to verify proper addressing.
82	Bypass Overload	BypassOverLoad	Fault		0xA025	28980	Over load when motor is in bypass mode	Check motor connection situation

Fault Code	Fault Name	Fault Description	Fault Type	Default Config.	CIP Code	PROFI Code	Possible Cause	Remedy
83	Fieldbus Fault	FieldBus RTU Fault	Configurable	Fault	0xA026	30064	(1)DCI_ubRTUBacNetFaultBehavior parameter's value is 0, Loss of communication with Modbus RTU, and The fieldbus reference is the remote reference or The fieldbus control place is the remote control place, and the fault protection is not "NO action"; (2) DCI_ubRTUBacNetFaultBehavior parameter's value is 1, Loss of communication with Modbus RTU	Check RS485 communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.
84	Fieldbus Fault	FieldBus TCP Fault	Configurable	Fault	0xA027	30065	(1)DCI_ubTCPFaultBehavior parameter's value is 0, Loss of communication with Modbus TCP, and The fieldbus reference is the remote reference or The fieldbus control place is the remote control place, and The fault protection is not "NO action"; (2)DCI_ ubTCPFaultBehavior parameter's value is 1, Loss of communication with Modbus TCP	Check Ethernet communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.
85	Fieldbus Fault	FieldBus MSTP Fault	Configurable	Fault	0xA028	30066	Loss of communication with BACnet, and The fieldbus reference is the remote reference OR The fieldbus control place is the remote control place, and The fault protection is not "NO action"	Check RS485 communication wiring. Verify drive parameter are set correctly. Check BACnet master configuration programming to verify proper addressing.
87	Fieldbus Fault	FieldBus SlotA Fault	Configurable	Fault	0xA029	30068	Loss of communication with Profibus/Canopen/Devicenet master on Slot A, and The fieldbus reference is the remote reference OR The fieldbus control place is the remote control place, and The fault protection is not "NO action"	Check Profibus/Canopen/ Devicenet/ProfiNet communication wiring. Verify drive parameter are set correctly. Check Profibus/ Canopen/Devicenet/ProfiNet master configuration programming to verify proper addressing.
88	Fieldbus Fault	FieldBus SlotB Fault	Configurable	Fault	0xA02A	30069	Loss of communication with Profibus/Canopen/Devicenet master on Slot B, and The fieldbus reference is the remote reference OR The fieldbus control place is the remote control place, and The fault protection is not "NO action"	Check Profibus/Canopen/ Devicenet/ProfiNet communication wiring. Verify drive parameter are set correctly. Check Profibus/ Canopen/Devicenet/ProfiNet master configuration programming to verify proper addressing.
89	Undervoltage	Under Voltage Stop	Fault		0xA02B	12580		
90	Drive Under Temp	Cold Weather Drive Under Temp	Configurable	Warning	0x3221	16928	• Cold weather mode is not enabled, and unit temperature is less than –10 degree. • Cold weather mode is enabled and Under Temp Fault Override is not set, unit temperature is less than –30 degree. • Cold weather mode is enabled and Under Temp Fault Override is not set, unit temperature is –20 ~ –30 degree. The temp < –20 degree when cold weather start time out.	If unit temp –20 ~ –10 degree, start motor in cold weather mode. If unit temp < –20 degree, Warm up unit above –20 °C for proper operation using cold weather mode.If still < –20 degree when cold weather mode time out, try higher output voltage in cold weather mode.
91	Option Card Fault	Device Net External Power Fail Fault	Configurable	Fault	0xA02C	30103	External supply on the DeviceNet communication connector is not present.	Check voltage and wiring of power supply of the DeviceNet communication.
92	External Fault	External Fault 2	Configurable	Fault	0xA02D	36865	Digital input is activated for external fault input.	check digital input settings and verify input level, could be an extrnal device causing fault.
93	External Fault	External Fault 3	Configurable	Fault	0xA02E	36866	Digital input is activated for external fault input.	check digital input settings and verify input level, could be an extrnal device causing fault.

Fault Code	Fault Name	Fault Description	Fault Type	Default Config.	CIP Code	PROFI Code	Possible Cause	Remedy
103	Drive Over Temp	Drive OverTemp Warning	Warning		0xA037	16912	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	DSP Compatibility Fault	Warning		0xA038	22529	DSP firmware is not compatible with MCB firmware	Check the DSP firmware revision
105	Compatibility Fault	Keypad Compatibility Fault	Warning		0xA039	22532	Keypad firmware is not compatible with MCB firmware	Check the keypad firmware revision
106	Compatibility Fault	IO1 Compatibility Fault	Warning		0xA03A	22785	IO1 card firmware is not compatible with MCB firmware	Check the IO1 card firmware revision
107	Compatibility Fault	IO2 Compatibility Fault	Warning		0xA03B	22786	IO2 card firmware is not compatible with MCB firmware	Check the IO2 card firmware revision
108	Compatibility Fault	IO3 Compatibility Fault	Warning		0xA03C	22784	IO3 card firmware is not compatible with MCB firmware	Check the IO3 card firmware revision
109	Compatibility Fault	IO4 Compatibility Fault	Warning		0xA03D	22787	IO4 card firmware is not compatible with MCB firmware	Check the IO4 card firmware revision
110	Compatibility Fault	IO5 Compatibility Fault	Warning		0xA03E	22788	IO5 card firmware is not compatible with MCB firmware	Check the IO5 card firmware revision
111	Compatibility Fault	PROFIBUS Compatibility Fault	Warning		0xA03F	22792	Profibus card firmware is not compatible with MCB firmware	Check the Profibus card firmware revision
124	OP Cont Interlock Fault	Op Cont Interlock Fault	Configurable	Fault	0xA047	22796	OP Cont Interlock function is active.	Checking OP Cont interlock input signal.
22	Speed Deviation	Speed Deviation	Fault		0xA05C	21522	Estimated speed is greater than 115% of maximum frequency. Or current loop is oscillating.	Check motor parameters and run identification. Adjust the Observer Kp.
133	Fieldbus Fault	FieldBus Web UI Fault	Configurable	Fault	0xA050	33120	FieldBus Web UI Fault	Check the web connection with RJ45 connector. Verify drive parameters are set correctly. Check the Web UI tool to know if there is proper request going to drive or not.
134	Bumpless Transfer Fail	Bumpless Transfer Fail	Warning		0xA053	21123	There is fault currently. There is no start command from new control place after transition.	Check whether there is fault currently. Check whether there is no start command from new control place after transition.
135	CP Interlock Fault	CP Interlock Fault Run	Configurable	Fault	0xA054	13569	CP interlock input open and drive in run status	Check CP interlock input signal
136	CP Interlock Fault	CP Interlock Fault Stop	Configurable	Warning	0xA055	13570	CP interlock input open and drive in stop status	Check CP interlock input signal
137	Foldback active	Foldback active	Warning				IGBT temperature is too high, and foldback is needed to lower speed	IGBT temperature is too high, please try to lower it
138	Foldback fault	Foldback fault	Fault				IGBT temperature is too high, and lowering speed can not remedy it	IGBT temperature is too high, please try to lower it

Appendix C—PowerXL Recommended Secure Hardening Guidelines

Introduction

This section "secure configuration" or "hardening" guidelines provide information to the users to securely deploy and maintain this product to adequately minimize the cybersecurity risks to their system.

Eaton is committed to minimizing the Cybersecurity risk in its products and deploys cybersecurity best practices and latest cybersecurity technologies in its products and solutions; making them more secure, reliable and competitive for our customers. Eaton also offers Cybersecurity Best Practices whitepapers to its customers that can be referenced at www.eaton.com/cybersecurity

PowerXL—SECURE CONFIGURATION GUIDELINES

Category	Description
Asset identification and Inventory	Keeping track of all the devices in the system is a pre-requisite for effective management of Cybersecurity of a system. Ensure you maintain an inventory of all the components in your system in a manner in which you uniquely identify each component. To facilitate this PowerXL Series VFD supports the following identifying information—manufacturer, type, serial number, f/w version number, and location. Customers/users can read following information from product label • Model Number • Serial Number • Device Name Information specific to communication protocols is available form parameter menu as below • IP Address Mode • Active IP Address • MAC Address See application manual for these parameter locations.

Category	Description

Restrict Physical access	Industrial Control Protocols don't offer cryptographic protections at protocol level leaving them exposed to Cybersecurity risk. Physical security is an important layer of defense in such cases. PowerXL Series VFD is designed with the consideration that it would be deployed and operated in a physically secure location.
	• Eaton suggests that physical access to cabinets and/or enclosures containing PowerXL Series VFD and the associated system should be restricted, monitored and logged at all times.
	• Physical access to the communication lines should be restricted to prevent any attempts of wiretapping, sabotage. It's a best practice to use metal conduits for the communication lines running between one cabinet to another cabinet.
	• Attacker with unauthorized physical access to the device could cause serious disruption of the device functionality. A combination of physical access controls to the location should be used, such as locks, card readers, and/or guards etc.
	• PowerXL Series VFD supports the following physical access ports,
	  • RJ45 connector for removable keypad as well as Modbus RTU communications
	  • RJ45 for EtherNet IP/Modbus TCP communications
	  • Terminal block for Modbus RTU and other Digital IOs
	Eaton suggests access to above physical ports need to be restricted.

Restrict Logical access to PowerXL Series Drive	It is extremely important to securely configure the logical access mechanisms provided in PowerXL Series VFD to safeguard the device from unauthorized access. PowerXL Series VFD provides various types of administrative, operational, configuration privilege levels. Eaton recommends that the available access control mechanisms be used properly to ensure that access to the system is restricted to legitimate users only. And, such users are restricted to only the privilege levels necessary to complete their job roles/functions.
	Eaton recommends below best practices to be followed to ensure adequate cybersecurity of the setup/system
	• Default credentials are changed upon first login. PowerXL Series VFD should not be commissioned for production with Default credentials, it's a serious Cybersecurity flaw as the default credentials are published in the manuals. Restrict administrative privileges—Threat actors are increasingly focused on gaining control of legitimate credentials, especially those associated with highly privileged accounts. Limit privileges to only those needed for a user's duties. Make sure that the password used in the device is only available to authorized users like Configuring Engineers and not shared among all operational users.
	• Perform periodic account maintenance to make sure that password is changed whenever there is personnel change.
	• Change passwords and other system access credentials as appropriate
	• PowerXL Series VFD is provided with data/access protection mechanism on keypad, follow below steps to utilize it
	PowerXL Series VFD provides four levels of data protection for users to ensure the security:
	1. Lock parameters on keypad. User can lock the parameters through DI or disable change, in which way all the parameters cannot be edited.
	2. Lock parameters while motor running. Motor control parameters can only be modified when motor is in stop mode. In which way to enhance the motor security. The parameters are listed in the application manual.
	3. Through Power Xpert inControl tool, facility to hide parameters on keypad is available. User can hide the parameters he/she thinks are significant for himself/herself. Such as IP address and so on.
	4. Password on keypad.
	  • 0000 means no password, which is the default.
	  • Password range is 0001 ~ 9999.
	  • With password, user can monitor parameters value but need enter password if he/she wants to edit parameters.
	  • User needs to re-enter the password if there is no key operation in 1 min after enter the password.
	  • User needs to enter the old password if he/she wants to change to a new one.

Category	Description
Restrict Network Access	PowerXL Series VFD provides network access to facilitate communication with other devices in the systems and configuration. But this capability could open up a big security hole if it's not configured securely. Eaton recommends segmentation of networks into logical enclaves and restrict the communication to host-to-host paths. This helps protect sensitive information and critical services and limits damage from network perimeter breaches. At a minimum, a utility Industrial Control Systems network should be segmented into a three-tiered architecture (as recommended by NIST SP800-82[R3]) for better security control. Deploy adequate network protection devices like Firewalls, Intrusion Detection / Protection devices, Below are the protocols and their port details available on PowerXL Series VFD. Use below information for configuring the firewalls. PowerXL Series VFD provides below communication protocols – • EtherNet IP protocols on RJ45 connector – enabled by default on port 44818 and 2222 • Modbus TCP protocol on RJ45 connector – enabled by default on port 502 • Modbus RTU on RS485 physical layer – enabled by default • BACnet MS/TP on RS485 physical layer – disabled by default, when this is enabled, Modbus RTU is disabled. All the protocols have dedicated menu structure, and details are described in User's Manual for how to activate or configure them. • Eaton has published detailed information about various Network level protection strategies in Eaton Cybersecurity Considerations for Electrical Distribution Systems [R1].
Logging and Event Management	**Best Practices** • PowerXL Series VFD provides parameters change log and fault log functions for user, to help diagnose the drive 1. Parameters change log: • PowerXL Series VFD will log the parameter information in FRAM when the parameter changes. The max number of 66 items can be logged. New log will rewrite the old one. User cannot clear this fault information. 2. Fault log: • PowerXL Series VFD will log the drive information in FRAM when fault occurs. The max number of 10 items can be logged. New log will rewrite the old one. User can clear the history fault by pressing OK key more than 5 Sec. • PowerXL Series VFD will log the fault information in FRAM when fault occurs. The max number of 50 items can be logged. New log will rewrite the old one. User cannot clear this fault information.
Secure Maintenance	**Best Practices** **Apply Firmware updates and patches regularly** Due to rapidly increasing Cyber Threats in Industrial Control Systems, Eaton implements a comprehensive patch and update process for its products. Users are encouraged to maintain a consistent process to promptly monitor for fresh firmware updates and apply the update whenever required. • The latest firmware can be acquired from the www.eaton.com/drives website. There will be separate link for PowerXL Series VFD FR0 to FR6 and PowerXL Series VFD FR7 & FR8 • Users can also sign up on our website to get emails when new material is released to the site if desired. • Using the PC Tool or verifying on the keypad the current version of firmware can be verified. • For additional information or technical support on Eaton's Variable frequency drive products contact us at TRCDrives@eaton.com or by phone at 800-386-2273 for US customers. For European customers contact us at AfterSalesEGBonn@eaton.com or by phone at +49 (0) 228602-3640 Eaton also has a robust vulnerability response process. In the event of any security vulnerability getting discovered in its products, Eaton patches the vulnerability and releases information bulletin through its cybersecurity website—http://www.eaton.com/cybersecurity and patches through www.eaton.com/drives.

References

[R1] Cybersecurity Considerations for Electrical Distribution Systems (WP152002EN):

http://www.eaton.com/ecm/groups/public/@pub/@eaton/@corp/documents/content/pct_1603172.pdf

[R2] Cybersecurity Best Practices Checklist Reminder (WP910003EN):

http://www.cooperindustries.com/content/dam/public/powersystems/resources/library/1100_EAS/WP910003EN.pdf

Notes

Notes

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