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You can read the recommendations in the user guide, the technical guide or the installation guide for OMRON 3G3AX-MX2-PRT-E. You'll find the answers to all your questions on the OMRON 3G3AX-MX2-PRT-E in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual OMRON 3G3AX-MX2-PRT-E
User guide OMRON 3G3AX-MX2-PRT-E
Operating instructions OMRON 3G3AX-MX2-PRT-E
Instructions for use OMRON 3G3AX-MX2-PRT-E
Instruction manual OMRON 3G3AX-MX2-PRT-E

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MX2 PROFIBUS Option Board

Born to drive machines

Model: 3G3AX-MX2-PRT-E

USER'S MANUAL



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Manual abstract:

No. @@@@Always heed the information provided with them. @@@@Other product names and company names in this manual are trademarks or registered trademarks of their respective companies. The copyright of the 3G3AX-MX2-PRT-E Option Board belongs to OMRON Corporation. Intended Audience This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent). · Personnel in charge of installing FA systems. · Personnel in charge of designing FA systems. · Personnel in charge of managing FA systems and facilities. · Personnel in charge of maintaining FA systems. About this Manual This manual describes the 3G3AX-MX2-PRT-E PROFIBUS Option Board for OMRON's MX2-A@ Inverter.

It also describes how to install and operate the Unit. Please read this manual carefully so that you understand the information provided before installing or using the 3G3AX-MX2-PRT-E Option Board. Start with the Safety Messages on page ix. They describe the operating environment and application safety measures which must be observed prior to and when using the 3G3AX-MX2-PRT-E Option Board. OMRON, 2010 All rights reserved.

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Neither is any liability assumed for damages resulting from the use of the information contained in this publication. Please be sure to read the related user manuals to use the 3G3AX-MX2-PRT-E Option Board safely and properly. Be sure you are using the most current version of the manual: Manual MX2 User's

Manual PROFIBUS Installation Guideline for Cabling and Assembly PROFIBUS Profile for Variable Speed Drives PROFIBUS Master Units Products MX2-A@ Inverter PROFIBUS Contents Describes the installation and operation of the MX2-A@ Inverter Provides information on how to properly install PROFIBUS wiring and to provide practical guidance on the best ways to achieve this Provides information on the PROFIdrive device profile and its usage Operation manual for PROFIBUS master units Cat No. I570 PNO Order No. 8.022 PROFIdrive CSIW-PRM21 CJIW-PRM21 PNO Order No. 3.072 W409 Warranty and Limitations of Liability WARRANTY OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NONINFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

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PERFORMANCE DATA Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability. ERRORS AND OMISSIONS The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.



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73 75 77 79 viii *Safety Messages* For the best results with the MX2-A@ Inverter, carefully read this manual and all of the warning labels attached to the Inverter before installing and operating it, and follow the instructions exactly. Keep this manual handy for quick reference. Definitions and Symbols A safety instruction (message) includes a "Safety Alert Symbol" and a signal word or phrase such as WARNING or CAUTION. Each signal word has the following meaning: !HIGH VOLTAGE Indicates a potentially hazardous situation which, if not avoided, could result in electric shock. 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. !WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage. Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury, or property damage. Indicates a step in a series of action steps required to accomplish a goal.

The number of the step will be contained in the step symbol. Notes indicate an area or subject of special merit, emphasizing either the product's capability or common errors in operation or maintenance. Tips give a special instruction that can save time or provide other benefits while installing or using the product.

The tip calls attention to an idea that may not be obvious if you are a first-time user of the product. !Caution Step 1 Note Tip 1 Hazardous High Voltage !HIGH VOLTAGE Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and electronic controllers, there may be exposed components with housing 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. 2 General Precautions - Read These First! !WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given. ix General Precautions - Read These First! !WARNING This equipment should be installed, adjusted, and serviced by qualified electrical maintenance personnel familiar with the construction and operation of the equipment and the hazards involved.

Failure to observe this precaution could result in bodily injury. Wiring, maintenance or inspection must be performed by authorized personnel.



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Not doing so may result in electrical shock or fire. Hazard of electrical shock! Disconnect incoming power before working on the OMRON 3G3AX-MX2-PRT-E PROFIBUS Option Board or the MX2-A@ Inverter! Turn the power supply OFF and wait for the time specified on the Option Board front cover before performing wiring, maintenance or inspection. Not doing so may result in electrical shock.

The OMRON 3G3AX-MX2-PRT-E PROFIBUS Option Board is attached to an MX2-A@ Inverter. Dangerous voltage exists until the MX2-A@ Inverter power light is OFF. !WARNING !WARNING !HIGH VOLTAGE !HIGH VOLTAGE Do not touch the conductive parts such as the internal PCB, terminals or connector while power is being supplied. Doing so may result in electrical shock. Do not attempt to take an Option Board apart or touch any internal parts while the power is being supplied. Doing so may result in electric shock. Do not attempt to disassemble, repair, or modify an Option Board. Any attempt to do so may result in malfunction, fire, or electric shock. Provide emergency stop circuits, interlock circuits, limit circuits and similar safety measures in external circuits (NOT in the Option Board). This ensures safety in the system if an abnormality occurs due to malfunction of the Option Board or another external factor affecting the Option Board operation.

Not doing so may result in serious accidents. Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes. Not doing so may result in serious accidents. Do not touch the Inverter during power on, and immediately after power off. Hot surface may cause injury. The product will be used to control an adjustable speed drive connected to high voltage sources and rotating machinery that is inherently dangerous if not operated safely. Interlock all energy sources, hazardous locations, and guards in order to restrict the exposure of personnel to hazards. The adjustable speed drive may start the motor without warning. Signs on the equipment installation must be posted to this effect. A familiarity with auto-restart settings is a requirement when controlling adjustable speed drives. Failure of external or ancillary components may cause intermittent system operation, i.e., the system may start the motor without warning or may not stop on command. Improperly designed or improperly installed system interlocks and permissives may render a motor unable to start or stop on command. !WARNING !WARNING !WARNING !WARNING !Caution !Caution x Installation Precautions 3 Installation Precautions !WARNING Always connect the grounding cable to one of the ground terminals of the MX2-A@ Inverter.

Failure to abide could lead to serious or possibly fatal injury. Failure to observe these precautions could lead to faulty operation of the Option Board or the Inverter, or could damage either of the two. Always read these precautions. · Install external breakers and take other safety measures against short-circuits in external wiring. Not observing this may result in burning.

· Be sure that all cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction. · Do not allow metal clippings to enter either Option Board or Inverter when wiring or installing the unit. · Follow "PROFIBUS Installation Guideline for Cabling and Assembly" (PNO Order No. 8.022) · Wire the PROFIBUS cables and connectors correctly. Incorrect wiring may result in burning. · Apply termination at both ends of a PROFIBUS cable segment. Do not apply termination anywhere else. · Be sure that the Option Board is mounted correctly.

Improper mounting may result in malfunction. · Disconnect the grounding cable when performing withstand-voltage tests. Not disconnecting the grounding cable may result in burning. !Caution 4 Configuration Precautions !Caution Failure to observe these precautions could lead to unexpected operation of the Option Board or the Inverter. Always read these precautions. · Check the network related Inverter settings regarding PROFIBUS node address and PROFIBUS map selection. Not doing so may result in unexpected operation. · When replacing an Inverter be sure that all Inverter settings of the Inverter being replaced are restored to the replacement. · Restoring parameters stored in the remote operator also restores the PROFIBUS node address. Always check the node address and other network related Inverter settings after restore.

5 Application Precautions !WARNING Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative. It is extremely important that the Unit is used for its specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult your OMRON representative before using it in a system in the above-mentioned applications. !WARNING xi Application Precautions !WARNING Failure to observe these precautions could lead to serious or possibly fatal injury. Always read these precautions.

· Check any user program in the system that acts as a PROFIBUS master before actually running it. Not checking the program may result in unexpected operation. · A revision AAAA MX2-A@ Inverter allows the motor to run immediately if a trip condition is reset, and at the same time, a run command is active via PROFIBUS. For safe operation clear the run command via PROFIBUS as soon as a trip condition is detected. Refer to section 1-1-2 Inverter Support to determine the MX2-A@ Inverter revision.

!Caution Failure to observe these precautions could lead to faulty operation of the Option Board or the Inverter, or could damage to either of the two. Always read these precautions. · Check the Inverter settings for proper Inverter behaviour before actually operating the Inverter remotely via the PROFIBUS network. · Check the Inverter's EzSQ program and its interaction with the PROFIBUS master before actually running it on the Inverter. Not checking the program may result in unexpected operation. · Confirm that no adverse effect will occur at the moment the PROFIBUS master stops communicating with the Inverter or at the moment the PROFIBUS master has not yet started communicating to the Inverter. · Confirm that no adverse effect will occur in the Inverter before force-setting/force-resetting any bit in the system that acts as a PROFIBUS master. xii Operating Environment Precautions 6 Operating Environment Precautions !Caution Do not operate the MX2-A@ Inverter with a mounted 3G3AX-MX2-PRT-E Option Board in the following locations (doing so may result in malfunction, electric shock or burning): · Locations subject to direct sunlight · Locations subject to temperatures or humidity outside the range specified in the specifications · Locations subject to condensation as the result of severe changes in temperature · Locations subject to corrosive or flammable gases · Locations subject to dust (especially iron dust) or salts · Locations subject to exposure to water, oil, or chemicals · Locations subject to shock or vibration

!Caution Take appropriate and sufficient countermeasures when installing systems in the following locations (doing so may result in malfunction): · Locations subject to static electricity or other forms of noise · Locations subject to strong electromagnetic fields · Locations subject to possible exposure to radioactivity · Locations close to power supplies !Caution The operating environment of the MX2-A@ Inverter with a mounted 3G3AX-MX2-PRT-E Option Board can have a large effect on the longevity and reliability of the system.

!Caution Take appropriate and sufficient countermeasures when installing systems in the following locations (doing so may result in malfunction): · Locations subject to static electricity or other forms of noise · Locations subject to strong electromagnetic fields · Locations subject to possible exposure to radioactivity · Locations close to power supplies !Caution The operating environment of the MX2-A@ Inverter with a mounted 3G3AX-MX2-PRT-E Option Board can have a large effect on the longevity and reliability of the system.



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Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the system. Make sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

7 Handling, Storage and Disposal !Caution Failure to observe these precautions could lead to faulty operation of- or damage to the Option Board. Always read these precautions. · Before touching the Option Board or Inverter, be sure to first touch a grounded metallic object in order to discharge any static built-up. Not doing so may result in malfunction or damage. · When transporting or storing the 3G3AX-MX2-PRT-E Option Board keep the product within the specified storage temperature range. !Caution Never dispose electrical components by incineration. Contact your state environmental agency for details on disposal of electrical components and packaging in your area. 8 Compliance with EC Directives This product complies with EC Directives when mounted to an MX2-A@ Inverter with the grounding cable connected. xiii Compliance with EC Directives xiv SECTION 1 Getting Started 1-1 1-1-1 Introduction Main Features The 3G3AX-MX2-PRT-E allows controlling, monitoring and parameterization of an MX2-A@ Inverter via a PROFIBUS network. The 3G3AX-MX2-PRT-E serves as a gateway that passes communicated register values from the PROFIBUS network to the MX2-A@ Inverter and vice versa. The following functions are available via PROFIBUS communication by installing the 3G3AX-MX2-PRT-E: Cyclic Data Exchange The PROFIBUS Master and 3G3AX-MX2-PRT-E can exchange data via a PROFIBUS DP-V0 message connection: · Output data (from PROFIBUS Master to 3G3AX-MX2-PRT-E): E.g. Run/stop, Reference frequency and Fault reset · Input data (from 3G3AX-MX2-PRT-E to PROFIBUS Master): E.g. Inverter status, Output frequency and Output current Inverter Parameter Access The PROFIBUS Master can read and write parameter data via the 3G3AX-MX2-PRT-E using the mailboxes provided by some modules, as well as a PROFIdrive DP-V1 parameter channel.

The 3G3AX-MX2-PRT-E can be set up easily, just by wiring the Unit, setting the PROFIBUS node address (P180) and device profile (P182) and restarting the unit. The Unit's configuration is read automatically when the power is turned ON. It is not necessary to make any settings with a special Programming Device. All parameters required by the 3G3AX-MX2-PRT-E are stored in the MX2-A@ Inverter. The 3G3AX-MX2-PRT-E can be replaced, requiring no re-configuration.

*The 3G3AX-MX2-PRT-E automatically detects the Master's communication baud rate, and no user configuration is required. Simplified Start-up Simplified Replacement Automatic Baud Rate Recognition Note Note The PROFIdrive DP-V1 parameter channel is only available if the PROFIBUS Master also provides DP-V1 Class 2 (MSAC2) Messaging to the user. If the PROFIBUS Master's baud rate changes, the PROFIBUS Communication Unit must be turned OFF and then ON to detect the new baud rate. 1-1-2 Inverter Support An MX2-A@ Inverter that supports the 3G3AX-MX2-PRT-E Option Board can be recognised from the Inverter type label. Please check that your Inverter type label displays revision characters in the bottom right corner where the @@@@ is displayed in this illustration. @@@@ 1 Option Board Specifications Section 1-2 If these characters are absent, your Inverter does not support the 3G3AX-MX2-PRT-E, so please contact your local OMRON representative. 1-1-3 Inverter Safety (ISO 13849-1) An MX2-A@ Inverter provides a Gate Suppress function to perform a safe stop according to the EN60204-1, stop category 0. The 3G3AX-MX2-PRT-E Option Board has been designed not to interfere with this safety function. Note The 3G3AX-MX2-PRT-E is not a safety device and does not implement any safety protocols such as PROFIsafe 1-2 Option Board Specifications Item Unit type Model Dimensions (W x H x D) Weight Ambient operating temperature*1 Ambient operating humidity Ambient storage temperature Vibration resistance Dielectric strength Conformance to EMC and Electrical safety standards Enclosure rating Indicators Specification MX2 Series Option Card 3G3AX-MX2-PRT-E 68 x 58 x 45 mm 170g (typical) -10 to 55°C (no icing or condensation) 20 to 90%RH -20 to 65°C (no icing or condensation) 5.9m/s² (0.*

6G) at 10...55Hz 500 VAC (between isolated circuits) EN61800-3: 2004 (2004/108/EC) Second environment, Category C3 EN61800-5-1: 2007 (2006/95/EC) SELV IP 20 4 LEDs, indicating Option Board and PROFIBUS status: Option Board Status: RUN (Green) ERR (Red) PROFIBUS Status: BF (Red) COMM (Green) 9-pin sub-D female connector (#4/40 UNC thread) IEC 61158 Industrial communication networks - Fieldbus specifications PROFIBUS DP PROFIBUS DP-V1, Class 2 (MSAC2 acyclic messaging) PROFIBUS DP-V1 Slave RS-485, galvanically isolated from the MX2-A@ Inverter 9-pin sub-D female connector (#4/40 UNC thread) Termination according to EN50170 provided by the cable connector Test Specification for PROFIBUS DP Slaves, Version 3.0 DP-V0 DP-V1 Physical Layer 0 ~ 125, set with inverter parameter P180 Automatically detected from: 9.6 kbit/s 19.2 kbit/s 45.45 kbit/s 93.75 kbit/s 187.5 kbit/s 500 kbit/s 1.

5 Mbit/s 3 Mbit/s 6 Mbit/s 12 Mbit/s Table 1 Option Board Specifications Front Case PROFIBUS connector Applicable standards Protocol type supported PROFIBUS Unit type PROFIBUS Media type PROFIBUS Connector Certificate Unit device address range Baud rates supported PROFIBUS Interface Environment Installation Note 1 The derated- or ambient operating temperature of the MX2-A@ Inverter takes precedence over that of the Option Board. 2 Introduction to PROFIBUS Table 1 Option Board Specifications (continued) Item Master Class 1 Slave cyclic services Specification Section 1-3 Set_Prm Chk_Cfg Slave_Diag Data_Exchange Get_Cfg Rd_Inp Rd_Outp Global-Control (SYNC/UNSYNC, FREEZE/UNFREEZE & CLEAR) Master Class 1 Slave acyclic Not supported services Master Class 2 Slave acyclic MSAC2_Initiate MSAC2_Read MSAC2_Write MSAC2_Abort services Profiles supported PROFIdrive V2 (If P182 = 0) Conventional (If P182 = 1) Flexible (If P182 = 2) Supported I/O modules PROFIdrive V2 PPO Type 1 (4 words PKW + 2 words PZD) (If P182 = 0) PPO Type 2 (4 words PKW + 6 words PZD) PPO Type 3 (2 words PZD) PPO Type 4 (6 words PZD) PPO Type 5 (4 words PKW + 10 words PZD) Conventional Basic Data (If P182 = 1) Extended Data 1 Extended Data 2 Flexible Flexible (10 words output and input) (If P182 = 2) I/O data 28 bytes max. input data using PPO Type 5 28 bytes max. output data using PPO Type 5 11 bytes 0C_0C6A.gsd Diagnostics data size GSD file 1-3 1-3-1 I/O Data PROFIBUS DP Services and Profiles Introduction to PROFIBUS The Purpose of PROFIBUS PROFIBUS (PROcess FIEldBUS) is an open fieldbus standard for a wide range of applications in manufacturing, processing and building automation.



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The Standard, IEC 61158 (Industrial communication networks), to which PROFIBUS adheres, guarantees vendor independence and transparency of operation. It enables devices of various manufacturers to intercommunicate without having to make any special interface adaptations. 1-3-2 What is PROFIBUS DP PROFIBUS DP (for Decentralized Periphery) is a variant optimized for high speed and low-cost interfacing. It is specially designed for communication between automation control systems and distributed I/O at the device level. PROFIBUS DP uses the same transmission technology and uniform bus access protocol as PROFIBUS FMS (for Fieldbus Message Specification).

Consequently, both versions can be operated simultaneously on the same bus. DP field devices, however, cannot be controlled by FMS masters and vice versa. !Caution It is not possible to exchange a PROFIBUS DP device or master for a PROFIBUS FMS device or master. This will cause faulty operation. 3 Introduction to PROFIBUS Section 1-3 1-3-3 What is PROFIdrive The PROFIdrive device profile supplements the PROFIBUS standard. It defines a unified behaviour and technique to access Inverter and drive device data. All drives supporting the PROFIdrive profile respond the same way to control instructions.

!Caution For backward compatibility and direct use of the MX2-A@ Inverter registers, the 3G3AX-MX2-PRT-E offers two additional device profiles that are NOT PROFIdrive compliant. For PROFIdrive compliance, ensure that P182 = 0. 4 SECTION 2 Option Board Mounting and Installation 2-1 2-1-1 Orientation to Option Board Features Unpacking and Inspection Take a few moments to unpack your new 3G3AX-MX2-PRT-E Option Board and perform these steps: 1.

Look for any damage that may have occurred during transportation. 2. Verify the contents of the box: Option Board with Grounding Cable Instruction Sheet Warning Labels 3. Inspect the markings on the Option Board. Make sure it matches the product part number you ordered. 5 Orientation to Option Board Features Section 2-1 2-1-2 Main Physical Features underside A F B G C A Option board connector LED indicators (RUN, ERR, BF, COMM) Warning label Fieldbus connector Grounding cable Housing Mounting screw BCDEFG- D E Four LED indicators allow easy diagnosis. An attached grounding cable is sized to reach the ground terminals on all MX2-A@ Inverter models. A feature in the housing will retain the mounting screw when the Option Board is not mounted to the Inverter. The orientation of the Fieldbus connector allows unstrained connection and removal of the PROFIBUS connector. Please pay special attention to the Option Board connector: It must be properly connected with the Inverter when the Option Board is mounted.

2-1-3 LED Indicators The LED indicators on the front indicate the operational mode and status of the Option Board and the network. Table 2 LED Indicators Indicator RUN (Unit status) ERR (Unit error) BF (Bus Fail) Colour Green Status OFF Flashing ON ON Flashing OFF ON Flashing OFF ON OFF Meaning No power or not yet ready for operation Operating in commissioning mode Normal operation Fatal error Operational error No error No communication with PROFIBUS Master Unsupported parameters or module configuration received from PROFIBUS Master Communicating with PROFIBUS Master Cyclic data exchange or PROFIBUS diagnostics operational No cyclic data exchange or PROFIBUS diagnostics Red Red COMM Green (Comms status) Refer to Section 5-1 for Troubleshooting using the LED indicators on page 43 6 Basic System Description Section 2-2 2-2 Basic System Description PROFIBUS DP-V1 Master PLC MX2-A@ Inverter + Option Board Slave Engineering Station (For setting, monitoring and operation) PROFIBUS The Option Board connects to the Master via a PROFIBUS network cable. Inverter I/O data is generally shared with the Master's I/O memory through the PROFIBUS DP network. Every PROFIBUS communication cycle, Inverter I/O data is collected by the Option Board and exchanged with the Master. The Engineering Station allows you to configure, monitor, program, diagnose and operate the system.

2-3 2-3-1 Step-by-Step Basic Installation Option Board Mounting Always Switch OFF the mains power supply to the Inverter before removing any covers. Wait for the time specified on the Inverter front cover for the capacitors to discharge. Not doing so may result in electrical shock. Loosen the screw of the option board cover, remove the cover and put the cover aside. !HIGH VOLTAGE Step 1 7 Step-by-Step Basic Installation Step 2 For Inverters up to 4.0 kW only: loosen the screws of the terminal block cover and remove the cover to enable access to the chassis ground terminal screws. Section 2-3 Step 3 Secure the Option Board grounding cable to the MX2-A@ Inverter with a mounting screw. 1-phase 200 V 0.1 - 2.2 kW 3-phase 200 V 0.1 - 3.7 kW 3-phase 400 V 0.4 - 4.0 kW 3-phase 200 V 5.5 - 15 kW 3-phase 400 V 5.

5 - 15 kW Step 4 If removed in Step 2, mount the terminal cover again and tighten the screw(s). 8 Step-by-Step Basic Installation Step 5 Push the Option Board into the previous location of the option board cover until it clicks into place Section 2-3 Step 6 Press down on the indicated corner of the Option Board housing to ensure proper connection of the Option Board connector Step 7 Check that there is no gap between the top edges of the Option Board and the Inverter casing. Step 8 Secure the Option Board in place with the mounting screw (do not overtighten). 9 Step-by-Step Basic Installation Step 9 Note Note Section 2-3 Select the right warning language from the warning label sheet and replace the English warning if appropriate. Refer to section 2-1-3 in the MX2 user's manual (Cat.-No. I570) for operations related to assembly and disassembly of the MX2-A@ Inverter Some Inverter models do not include a screw for the grounding cable. Please supply the recommended screw, lock-washer and washer to attach the grounding cable Table 3 Ground cable screw selection Inverter models 3-phase 200 V 5.5 7.5 kW 3-phase 400 V 5.

5 7.5 kW 3-phase 200 V 11 15 kW 3-phase 400 V 11 15 kW Grounding Cable Attachment Screw M4 x 6 M5 x 6 Note Illustrations are only provided for one Inverter size. The instructions however are generic, and may be followed for all Inverter sizes. Make use of the MX2-A@ Inverter manual. Never operate the Inverter with the terminal block cover or backing plate removed.

Provide emergency stop circuits, interlock circuits, limit circuits and similar safety measures in external circuits (NOT in the Option Board). This ensures safety in the system if an abnormality occurs due to malfunction of the Option Board or another external factor affecting the Option Board operation. Not doing so may result in serious accidents. Always connect the grounding cable to one of the ground terminals of the MX2-A@ Inverter.



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Failure to abide could lead to serious or possibly fatal injury.

Never touch the heat sink during or just after operation; it can be very hot. Be sure that the Option Board is mounted correctly. Improper mounting may result in malfunction. Be sure that all cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction. !HIGH VOLTAGE !WARNING !WARNING !Caution !Caution !Caution 2-3-2 Installation Environment Clearance Please adhere to the requirements of section 2-3-2 in the MX2 user's manual on "Installation Environment clearance". In addition to this, provide sufficient clearance to allow connection and removal of the PROFIBUS Connector. No unnecessary strain should be placed on the PROFIBUS cable or connector that could be transferred to the Option Board. 10 Step-by-Step Basic Installation Section 2-3 2-3-3 PROFIBUS network connector The PROFIBUS connector on the bottom of the Unit is a 9-pin female sub-D connector, as recommended by IEC 61158. Fixtures have #4/40 UNC thread for compatibility with PROFIBUS-DP connectors.

No termination is provided inside the Option Board. Table 4 PROFIBUS connector pinout Pin No. 1 2 5 3 4 5 6 17 8 9 Signal Shield NC B-line RTS Description Functional ground (do not connect) Data signal Control signal for repeaters (direction control) DGND Signal ground VP Termination power NC A-line Data signal NC - 9 6 The signals DGND and VP are used to power the bus terminator located in the cable connector. Note 1 Note 2 The Option Board allows the use of PROFIBUS connectors with a straight cable outlet. The 9-pin sub-D connector uses #4/40 UNC thread for mechanical fixation of the cable connector. Always use PROFIBUS connectors. Do not use PROFIBUS connectors with a 90° cable outlet (Such connectors place unnecessary strain on the Option Board connector). !Caution 2-3-4 Option Board Dimensions d3 d4 w d2 Table 5 Option Board Dimensions Item h h1 w Dimension 63.6 mm 57.9 mm 67.

6 mm Item c d l1 Dimension 16.3 mm 52.6 mm 26.4 mm Item d2 d3 d4 Dimension 31.3 mm 44.

8 mm 28.4 mm l. Dimension d1 gives the increase in MX2@ Inverter dimension D when the Option Board is fitted (Refer to section 2-3 of the Inverter user's manual). c h1 d1 h 11 Step-by-Step Basic Installation Section 2-3 12 SECTION 3 Configuring Drive Parameters and Option Board 3-1 Configuring the Option Board All Option Board parameters are stored in the MX2-A@ Inverter. This allows for easy replacement of the Option Board without the need to re-configure.

After connecting the Option Board to an MX2-A@ Inverter for the first time however, proceed with the following steps: Step 1 The Option Board supports 3 device profiles. Each device profile supports a subset of the modules listed in the GSD file. The device profile is selected using Inverter parameter P182. Use the Inverter keypad to adjust P182 to select the device profile and supported modules. Table 6 Configuration of device profile P182 Device Profile 0 PROFIdrive (default) [Appendix B] Supported Modules PPO Type 1 (4 words PKW + 2 words PZD) PPO Type 2 (4 words PKW + 6 words PZD) PPO Type 3 (2 words PZD) PPO Type 4 (6 words PZD) PPO Type 5 (4 words PKW + 10 words PZD) Basic Data Extended Data 1 Extended Data 2 Flexible (10 words output and input) 1 Conventional [Appendix C] 2 Flexible [Appendix D] Step 2 It is recommended to set C102 = 3 to prevent the Inverter reset input and Stop/reset button from interfering with Option Board during operation (Setting C102 to another value causes the Option Board to reset when a trip condition is cleared). Use the Inverter keypad to set C102 to 3. Table 7 Configuration of Inverter Reset Mode Selection Param C102 Description Setting Reset mode selection Recommended to set to 3 (Reset mode selection resets trip only, not Option Board) Step 3 Inverter registers P180, P044, P045 and P181 configure the PROFIBUS network-related parameters. Adjust these to configure the node address, CLEAR mode behaviour and required action when a Fieldbus failure occurs. Table 8 Configuration of PROFIBUS parameters Param P180 P044 Description PROFIBUS Node Address Network Error Timer Setting 0 to 125, 0 (default) means node address 126 Time to wait after a network error occurs before executing action in P045: 0 to 9999 in 0.1 s units 13 Configuring the Option Board Table 8 Configuration of PROFIBUS parameters (continued) Param P045 Description Action on Network Error Section 3-1 P181 Output Data Keep Mode Setting Set to 0 for inverter trip Set to 1 for deceleration and trip Set to 2 for no action Set to 3 for stop due to free-run Set to 4 for deceleration and stop Define behaviour if PROFIBUS master indicates CLEAR mode or if a network error occurs: Set to 0 for clearing all output data (stop inverter) Set to 1 for keeping output data (inverter continues operating) Step 4 Registers A001 and A002 are used by the Inverter to adjust the frequency source and control source.

If the second motor parameter set is used, registers A201 and A202 also have to be set. Adjust these in accordance with the following table: Table 9 Configuration of Inverter source selection parameters Param A001 A201 A002 A202 Description Motor 1 Frequency Source Motor 2 Frequency Source Motor 1 Run Command Source Motor 2 Run Command Source Setting For option board as source: Set to 3 if P182 equals 2 Set to 4 if P182 equals 0 or 1 Step 5 Registers P033, P036, C021, C022 and C028 are used by the Inverter to adjust some Inverter function sources. If required (refer to usage examples), adjust these in accordance with the following table: Table 10 Configuration of Inverter function source parameters Param P033 Description Torque Command Source Setting For option board as source: Set to 6 (Use Option Board register) if P182 equals 1 Set to 3 (Use P034) if P182 equals 0 or 2 For option board as source: Set to 5 (Bias set by Option Board) if P182 equals 1 Set to 0 (Bias according to sign) or 1 (Bias according to rotation direction) if P182 equals 0 or 2 Set to 63 for option board as source Set to 63 for option board as source Set to 63 for option board as source (Optional) Set to 16 for option board as source P036 Torque Bias Mode C021 C022 C026 C028 Output Terminal 11 Source Output Terminal 12 Source Alarm Relay Output Terminal Source Analog Output AM Source Step 6 The PPO modules and Flexible module give you the freedom to select/customise the Inverter Modbus registers for Cyclic Data Exchange. Inverter registers P160 - P179 are used to configure and map the exchanged Modbus registers. If required, adjust these registers to change the default content of the exchanged data. Please refer to Appendices B-1 I/O Mapping on page 58 and D-1 Flexible I/O Mapping on page 66 for more details. 14 Configuring the Option Board Table 11 Configuration of input and output content Param P160 P161 P162 P163 P164 P165 P166 P167 P168 P169 P170 P171 P172 P173 P174 P175 P176 P177 P178 P179 Description Output Register 1 contents Output Register 2 contents Output Register 3 contents Output Register 4 contents Output Register 5 contents Output Register 6 contents Output Register 7 contents Output Register 8 contents Output Register 9 contents Output Register 10 contents Input Register 1 contents Input Register 2 contents Input Register 3 contents Input Register 4 contents Input Register 5 contents Input Register 6 contents Input Register 7 contents Input Register 8 contents Input Register 9 contents Input Register 10 contents Section 3-1 Setting Modbus register mapped into PZD1 or flexible output word 1 Modbus register mapped into PZD2 or flexible output word 2 Modbus register mapped into PZD3 or flexible output word 3 Modbus register mapped into PZD4 or flexible output word 4 Modbus register mapped into PZD5 or flexible output word 5 Modbus register mapped into PZD6 or flexible output word 6 Modbus register mapped into PZD7 or flexible output word 7 Modbus register mapped into PZD8 or flexible output word 8 Modbus register mapped into PZD9 or flexible output word 9 Modbus register mapped into PZD10 or flexible output word 10 Modbus register mapped into PZD1 or flexible input word 1 Modbus register mapped into PZD2 or flexible input word 2 Modbus register mapped into PZD3 or flexible input word 3 Modbus register mapped into PZD4 or flexible input word 4 Modbus register mapped into PZD5 or flexible input word 5 Modbus register mapped into PZD6 or flexible input word 6 Modbus register mapped into PZD7 or flexible input word 7 Modbus register mapped into PZD8 or flexible input word 8 Modbus register mapped into PZD9 or flexible input word 9 Modbus register mapped into PZD10 or flexible input word 10 Step 7 Note Restart the MX2-A@ Inverter for the changes to take effect.



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When restarting the MX2-A@ Inverter, wait for the Inverter power indicator to go out before switching on again. Action on Network Error (P045) is disabled when P181 is set to 1 (Keep the output data upon a network failure) I.e.

when a network error occurs, the Inverter will continue normal operation with the last received output data. Check the network related Inverter settings regarding PROFIBUS node address and PROFIBUS map selection. Not doing so may result in unexpected operation. Alternatively, P180 in Step 3 may be performed using the set-slave address functionality of your PROFIBUS master or diagnostic tool. !Caution !Caution Tip 15 Configuring the Network Tip Tip Section 3-2 Alternatively, Step 2 up to Step 6 may be performed using OMRON CX-Drive.

Alternatively, Step 7 may be performed by resetting the Option Board using PNU972 (Refer to APPENDIX F Option Board Parameters). 3-2 Configuring the Network Step 1 Step 2 Download the GSD file named OC_0C6A.gsd for the 3G3AX-MX2-PRT-E Option Board via the Omron website <http://industrial.omron.eu>.

Install / add this GSD file to the PROFIBUS master configuration program used to configure your PROFIBUS master. (It may be necessary to update the device catalogue before proceeding) Add your PROFIBUS master to the network in the configuration program. Add a 3G3AX-MX2-PRT-E Option Board to the network in the configuration program and open the Option Board's settings. Set the Option Board's node address (also referred to as station address) to match P180 in the Inverter. Choose a module that is supported by the selected device profile (Inverter parameter P182). Table 12 Configuration of module support P182 Device Profile 0 PROFIdrive [Appendix B] (default) Supported Modules PPO Type 1 (4 words PKW + 2 words PZD) PPO Type 2 (4 words PKW + 6 words PZD) PPO Type 3 (2 words PZD) PPO Type 4 (6 words PZD) PPO Type 5 (4 words PKW + 10 words PZD) Conventional [Appendix C] Basic Data Extended Data 1 Extended Data 2 Flexible [Appendix D] Flexible (10 words output and input) Step 3 Step 4 Step 5 Step 6 1 2 Step 7 Step 8 Step 9

Uncheck the Enable DPV1 option on the DPV1 tab before proceeding to Step 7 if you are using OMRON CX-Configurator. Save and download the configuration to your PROFIBUS master. Once the network is re-started with the new settings, check that the Option Board LED indicators indicate proper operation: If everything is correctly configured, only the RUN and COMM indicators will be ON (green). Please refer to section 5-1 Troubleshooting using the LED indicators on page 43 to troubleshooting any configuration errors if the LED indicators are displaying a different pattern. Nothing prevents you from selecting an unsupported module in Step 6.

If you are uncertain, check the value of P182 before selecting the module. Refer to SECTION 5 Troubleshooting and Maintenance on page 43 in case of errors. Note Tip 16 SECTION 4 Operations and Monitoring This section provides some common usage examples to help you get started. Unless otherwise specified, all usage examples make use of the PROFIdrive device profile and associated modules (Refer to section 3-1 Configuring the Option Board, Step 1). Prepare the Inverter and Option Board before starting with the usage examples: Step 1 Initialize the Inverter mode to Std. IM by first setting b171=1 and then b180=1 (Refer to MX2-A@ Inverter user's manual section 3-6-24). Please note that the Inverter may trip with an E60 during the initialisation. Clear the trip and continue. Set the Inverter rating to CT (constant torque) by setting b049=0 (Refer to the MX2-A@ Inverter user's manual section 3-2-5). Configure the Option Board and Network as explained in sections 3-1 Configuring the Option Board and 3-2 Configuring the Network, but limit the following choices: · When selecting the device profile when configuring the Option Board (Step 1 of section 3-1 Configuring the Option Board), select the PROFIdrive device profile by setting P182 to 0.

· When configuring the process area content (Step 6 of section 3-1 Configuring the Option Board), set all parameters (P160 - P179 to 0). · When choosing the module while configuring the network (Step 6 of section 3-2 Configuring the Network), select either the PPO Type 2 or PPO Type 5 module. If you configured everything correctly, your output and input process areas should contain the following data: Table 13 Output Process Area Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 STW 0 0000 +5 HSW 0 0000 +6 0 0000 +7 0 0000 +8 0 0000 +9 0 0000 Step 2 Step 3 Bit Name Value PKE IND PWE STW HSW 15 0 14 0 13 0 12 0 11 10 9 - Ovr JR 0 0 0 8 7 JF Rst 0 0 Ovr JR JF Rst Run En 6 0 5 0 4 3 Run En 0 0 2 0 1 0 0 0 Task ID and parameter number Parameter index Parameter value Control word Frequency reference Control override Jog run reverse Jog run forward Fault reset Run operation Run enable !WARNING A revision AAAA MX2-A@ Inverter allows the motor to run immediately if a trip condition is reset, and at the same time, Run (STW) is set. For safe operation clear Run (STW) when you detect a rising-edge on Flt (ZSW). Refer to section 1-1-2 Inverter Support to determine the MX2-A@ Inverter revision.

17 Source Selection Table 14 Input Process Area Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 ZSW 55 0037 +5 HIW 0 0000 +6 0 0000 +7 0 0000 Section 4-1 +8 0 0000 +9 0 0000 Bit Name Value PKE IND PWE ZSW HIW 15 0 14 0 13 0 12 0 11 0 10 9 8 7 - CS*I FA Alm 0 1 0 0 CS FA Alm F lt Rdy AC 6 0 5 -*2 1 4 3 2 1 -*2 Flt Rdy AC 1 0 1 1 0 - *2 1 Task response and parameter number Parameter index Parameter value or error code Status word Output frequency Control status Frequency arrival Alarm Fault Ready for operation AC mains detected Note 1 Note 2 !Caution Depending on your source selection, CS may already be 1 on your setup. For compatibility, some unsupported bits in ZSW are always 1. Check the Inverter settings for proper Inverter behaviour before actually operating the Inverter remotely via the PROFIBUS network. The product will be used to control an adjustable speed drive connected to high voltage sources and rotating machinery that is inherently dangerous if not operated safely.

Interlock all energy sources, hazardous locations, and guards in order to restrict the exposure of personnel to hazards.

The adjustable speed drive may start the motor without warning. Signs on the equipment installation must be posted to this effect. A familiarity with auto-restart settings is a requirement when controlling adjustable speed drives. Failure of external or ancillary components may cause intermittent system operation, i.e., the system may start the motor without warning or may not stop on command. Improperly designed or improperly installed system interlocks and permissives may render a motor unable to start or stop on command.



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!Caution 4-1 Source Selection Before operating the Inverter, it is necessary to select the appropriate control and frequency sources. We will be using the 1st motor: Set A001=4 and A002=4 so that the Inverter is controlled by the default PROFIdrive control and frequency references registers. Note The control override bit in the PROFIdrive control word (Section B-2 Control and Status Words - STW/ZSW) can be used to override A001, A201, A002 and A202.

When this bit is set, it has the same effect as temporarily setting A001, A201, A002 and A202=4. Clearing this bit removes the override, and the Inverter sources are once again determined by these registers. If you are using a version AAAA Inverter, the control override bit is always disabled if A002 = 2. 18

Operating the Motor Section 4-2 4-2-1 Operating the Motor Starting the Motor Step 1 Step 2 Set the En bit to enable controlled acceleration and deceleration of the motor. Set the Run bit to put the Inverter in run mode. The RUN indicator on the Inverter should light up at this point. If this is not the case, check your source selection (Section 4-1 Source Selection). Set HIW=1000 (10.00 Hz forward) Table 15 Output Process Area with Motor Started Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 STW 24 0018 +5 HSW +1000 03E8 +6 0 0000 +7 0 0000 +8 0 0000 +9 0 0000 Step 3 Bit Name Value 15 0 14 0 13 0 12 0 11 10 9 - Ovr JR 0 0 0 8 7 JF Rst 0 0 6 0 5 4 3 - Run En 01 1 2 0 1 0 0 0 The motor accelerates until it reaches the desired frequency. Notice that the FA bit is set once the inverter has reached the desired reference frequency.

Table 16 Input Process Area with Reference Frequency Reached Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 ZSW 823 0337 +5 HIW +1000 03E8 +6 0 0000 +7 0 0000 +8 0 0000 +9 0 0000 Bit Name Value 15 0 14 0 13 0 12 0 11 0 10 9 8 7 - CS FA Alm 0 11 0 6 0 5 1 4 3 2 1 - Flt Rdy AC 1 0 1 1 0 1 4-2-2 Changing Direction Step 4 Set HIW=-1000 (10.00 Hz reverse) Table 17 Output Process Area with Motor Set to Run Reverse Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 STW 24 0018 +5 HSW -1000 FC18 +6 0 0000 +7 0 0000 +8 0 0000 +9 0 0000 The motor decelerates, stops and then accelerates in the opposite direction. The FA bit clears as soon as the reference frequency is changed. Once the new reference frequency is reached, the FA bit is once again set. Table 18 Input Process Area with Reverse Frequency Reached Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 ZSW 823 0337 +5 HIW -1000 FC18 +6 0 0000 +7 0 0000 +8 0 0000 +9 0 0000 Bit Name Value 15 0 14 0 13 0 12 0 11 0 10 9 8 7 - CS FA Alm 0 11 0 6 0 5 1 4 3 2 1 - Flt Rdy AC 1 0 1 1 0 1 19 Operating the Motor Section 4-2 4-2-3 Stopping the Motor - Controlled Step 5 Clear the Run bit to bring the motor to a controlled stop.

Table 19 Output Process Area for Controlled Stop Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 STW 8 0008 +5 HSW -1000 FC18 +6 0 0000 +7 0 0000 +8 0 0000 +9 0 0000 Bit Name Value 15 0 14 0 13 0 12 0 11 10 9 - Ovr JR 0 0 0 8 7 JF Rst 0 0 6 0 5 4 3 - Run En 00 1 2 0 1 0 0 0 The motor decelerates, and comes to a stop. The FA bit clears as soon as the Run bit is cleared. Table 20 Input Process Area after Controlled Stop Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 ZSW 567 0237 +5 HIW 0 0000 +6 0 0000 +7 0 0000 +8 0 0000 +9 0 0000 Bit Name Value 15 0 14 0 13 0 12 0 11 0 10 9 8 7 - CS FA Alm 0 10 0 6 0 5 1 4 3 2 1 - Flt Rdy AC 1 0 1 1 0 1 Before continuing set HSW to 0. Note The motor can also be brought to a stop by setting HSW to 0 and leaving the Run bit set. The Inverter will however stay in run mode once the motor has stopped.

*4-2-4 Stopping the Motor - Free-running An alternative to Step 5 is to clear the En bit to request a free-run stop: The Inverter stops controlling the motor, and the motor coasts to a stop. During a free-run stop, you will notice that HIW immediately drops to 0 and the FA bit is cleared. 4-2-5 Jog Operation Step 6 Set the JF bit to start the jog operation. Table 21 Output Process Area with Motor Jogging Forward Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 STW 264 0108 +5 HSW 0 0000 +6 0 0000 +7 0 0000 +8 0 0000 +9 0 0000 Bit Name Value 15 0 14 0 13 0 12 0 11 10 9 - Ovr JR 0 0 0 8 7 JF Rst 1 0 6 0 5 4 3 - Run En 0 0 1 2 0 1 0 0 0 The motor immediately starts rotating forward at the pre-set jog frequency. The Inverter jog frequency can be set by adjusting Inverter parameter A038. When jogging, the Inverter immediately jumps to the jog frequency. No controlled acceleration is performed and the FA bit is immediately set. 20 Customising the Process Area Table 22 Input Process Area with Motor Jogging Forward Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 ZSW 823 0337 +5 HIW +600 0258 +6 0 0000 +7 0 0000 Section 4-3 +8 0 0000 +9 0 0000 Bit Name Value 15 0 14 0 13 0 12 0 11 0 10 9 8 7 - CS FA Alm 0 11 0 6 0 5 4 3 2 1 -*1 -*1 Flt Rdy AC 1 1 0 1 1 0 - *1 1 Note 1 To jog the motor in reverse, set the JR bit. 4-2-6 Changing Frequency Reference and Output Frequency Scaling HSW and HIW are signed word registers. Using normal scaling, you will therefore not be able to set HSW higher than 327.*

67 Hz (327.68 Hz in reverse). The Inverter can however be set to operate in HF mode (Refer to the MX2 User Manual section 3-6-24 for instructions on how to achieve this). Doing this changes the scaling of HSW and HIW to 0.1 Hz. At 0.1 Hz scaling you will be able to reach the full frequency range of the inverter by adjusting HSW. 4-3 Customising the Process Area The PROFIdrive device profile also gives you the capability to customise the process area by mapping your choice of Modbus registers. Normally, P160, P161, P170 and P171 are set to 0 so that STW, HSW, ZSW and HIW are exchanged. The remaining parameters (P162 - P169 and P172 - P179) are normally used to map additional Modbus registers into the cyclically exchanged process areas.

User parameters P160 - P169 configure the output process area mappings where parameters P170 - P179 configure the input process area mappings. 4-3-1 Double-word Frequency Reference and Output Frequency HSW and HIW are signed word registers. Using normal scaling, you will therefore not be able to set HSW higher than 327.67 Hz (327.68 Hz in reverse) unless you are using the Inverter HF mode.

You can however directly use the Inverter DWORD registers F001 and d001 to increase the usable range: These two registers offer fixed 0.



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01 Hz scaling while still allowing you to control the Inverter through its full frequency range. When using the PROFIdrive device profile, the F001 and d001 registers are also sign converted by the Option Board. You can therefore use F001 and d001 as functional substitutes for HSW and HIW. Step 1 Step 2 Step 3

Set parameters P161 and P162 to 0001h and 0002h to map Modbus registers 0001h and 0002h (Function code F001) into output PZD2 and PZD3. Set parameters P171 and P172 to 1001h and 1002h to map Modbus registers 1001h and 1002h (Function code d001) into input PZD2 and PZD3. Set A001=3 to use F001 as the Inverter frequency source (Note that you cannot make use of the Ovr bit in STW to take control of the Inverter when using F001 to control the reference frequency). Restart the Inverter or reset the Option Board for the changes to take effect. If the Inverter trips after restarting, check that you correctly set P161, P162, P171 and P172, and that all other registers in the P160 - P179 range are set to 0. Step 4 Tip 21 Customising the Process Area

Section 4-3 Your input and output process areas should now have the following layout: Table 23 Output Process Area with Double Word Frequency Reference Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 STW 0 0000 +5 +6 F001 (0001h/0002h) 0 0000 0000 +7 0 0000 +8 0 0000 +9 0 0000 Table 24 Input Process Area with Double Word Output Frequency Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 ZSW 567 0237 +5 +6 d001 (1001h/1002h) 0 0000 0000 +7 0 0000 +8 0 0000 +9 0 0000 Step 5 To turn the motor forward, set the Run and En bits in STW and change F001 (output PZD2 and PZD3) to the desired frequency. (Input PZD2 represents the most-significant word and input PZD3 the least-significant word) Table 25 Output Process Area with Forward Rotation Dword Frequency Reference Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 STW 24 0018 +5 +6 F001 (0001h/0002h) +1000 0000 03E8 +7 0 0000 +8 0 0000 +9 0 0000 The output frequency is given by d001 (input PZD2 contains the most-significant and input PZD3 the least-significant word). Table 26 Input Process Area with Forward Rotation Dword Output Frequency Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 ZSW 823 0337 +5 +6 d001 (1001h/1002h) +1000 0000 03E8 +7 0 0000 +8 0 0000 +9 0 0000 Step 6 To reverse the motor, change F001 (output PZD2 and PZD3) to a negative signed double-word frequency. Table 27 Output Process Area with Reverse Rotation Dword Frequency Reference Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 STW 24 0018 +5 +6 F001 (0001h/0002h) -1000 FFFF FC18 +7 0 0000 +8 0 0000 +9 0 0000 The motor decelerates, stops and then accelerates in the opposite direction. Table 28 Input Process Area with Reverse Rotation Dword Output Frequency Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 ZSW 823 0337 +5 +6 d001 (1001h/1002h) -1000 FFFF FC18 +7 0 0000 +8 0 0000 +9 0 0000 The remainder of the examples do not make use of double-word frequency registers. Set P160, P161, P170 and P171 back to 0, A001 back to 4 and restart the Inverter or reset the Option Board before following further examples.

Note If you want to use a DINT to write or read an Inverter double-word register, you will have to swap the high- and low-word in your PLC program (For double-words, an OMRON PLCs does not use the same word-order convention than the MX2-A@ Inverter). 22 Customising the Process Area Section 4-3 4-3-2 Mapping Coil Data 0 Modbus coils 0000h though 000Fh offer a large amount of functionality. The intelligent input terminal overrides (Coils 0007h though 000Dh) for example can be used to control any of the Inverter's assignable input terminal functions (Refer to section 3-7-2 of the MX2-A@ Inverter user's manual). The following example illustrates how to map Modbus coils 0000h though 000Fh into PZD3: Step 1 Step 2 Set parameters P162 to 1F01h to map coil data 0 into output PZD3. Restart the Inverter or reset the Option Board for the changes to take effect. Table 29 Output Process Area with Modbus Coil Data 0 Word offset Register dec Value hex +0 PKE 0 0000 +1 IND 0 0000 +2 +3 PWE 0 00000000 +4 STW 0 0000 +5 HSW 0 0000 +6 Coil data 0 0 0000 +7 0 0000 +8 0 0000 +9 0 0000 Bit Name Value EXT In1 In2 In3 15 -*1 0 14 0 13 12 11 10 9 8 7 6 0 5 0 4 3 2 -*1 0 1 -*1 0 0 0 In7 In6 In5 In4 In3 In2 In1 0 0 0 0 0 0 In4 In5 In6 In7 -*1 EXT 0 0 External Trip Intelligent input terminal [1] override Intelligent input terminal [2] override Intelligent input terminal [3] override Intelligent input terminal [4] override Intelligent input terminal [5] override Intelligent input terminal [6] override Intelligent input terminal [7] override Note 1 It is not possible or practical to use all the coils contained in Coil data 0 when the Option Board is using the PROFIdrive device profile: · The operation (0001h) and rotation direction (0002h) coils are not used by the Inverter when the run command source (A002) is set to 4 (Option Board). · The trip reset coil (0004h) duplicates the functionality of Rst in STW. · The operation status coil (000Fh) is not writeable. Step 3 The Modbus coils 0000h though 000Fh are now available for use via PZD3. Use parameters C001 to C007 to assign Inverter functions to any of the intelligent input terminals (Section 3-7-2 of the MX2-A@ Inverter user's manual).

To activate an assigned function, set the corresponding input terminal override (bits 7 to 13 in coil data 0). 4-3-3 Controlling Inverter Torque In addition to frequency control, the MX2-A@ Inverter allows direct control of the motor torque. !Caution Before following this example, disconnect your motor from any load to prevent injury or damage to property. The following example explains how to make use of the Option Board to control the motor torque: Step 1 Step 2 Step 3 Step 4 Set parameter P162 to 1F01h to map coil data 0 into output PZD3. Set parameter P163 to 1622h to map the torque command level input (P034) into output PZD4.

Set parameter P173 to 1010h to map the torque monitor (d012) into input PZD4. Restart the Inverter or reset the Option Board for the new settings to take effect. If the Inverter trips after restarting with an E64 and parameters P162, P163 and P172 appear to be configured correctly, it is likely that you made a 23 Customising the Process Area Section 4-3 mistake in Step 1 or Step 2 (The Inverter will only allow mapping of torque registers in the process area if it is configured to operate with CT rating in Std. IM mode). Set C001=52 (ATR: permission of torque command input) to use intelligent input terminal 1 as torque enable.

Your input and output process areas should now have the following layout: Table 30 Output Process Area Configured for Torque Control Word offset Register dec Value hex +0 PKE 0 0000 +1 IN D 0 0000 +2 +3 PWE 0 00000000 +4 STW 0 0000 +5 HSW 0 0000 +6 Coil data 0 0 0000 +7 P034 0 0000 +8 0 0000 +9 0 0000 Bit Name Value EXT ATR In2 In3 15 0 14 0 13 12 11 10 9 8 7 In7 In6 In5 In4 In3 In2 ATR 0 0 0 0 0 0 0 In4 In5 In6 In7 6 0 5 0 4 3 - EXT 0 0 2 0 1 0 0 0 External Trip Torque command input enable Intelligent input terminal [2] override Intelligent input terminal [3] override Intelligent input terminal [4] override Intelligent input terminal [5] override Intelligent input terminal [6] override Intelligent input terminal [7] override Table 31 Input Process Area Configured for Torque Control Word offset Register dec Value hex +0 PKE 0 0000 +1 IN D 0 0000 +2 +3 PWE 0 00000000 +4 ZSW 567 0237 +5 HIW 0 0000 +6 0 0000 +7 D012 0 0000 +8 0 0000 +9 0 0000 Step 5 Step 6 Set A001=4, A002=4 and P033=3 to set the appropriate source registers for the frequency reference, run command and torque command.



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