Manual abstract:

@@Offenders will be liable for damages. All rights including rights created by patent grant or registration of a utility model or design are reserved. © Siemens AG 2001. All Rights Reserved. MICROMASTER® is a registered trademark of Siemens Other functions not described in this document may be available. However, this fact shall not constitute an obligation to supply such functions with a new control, or when servicing. We have checked that the contents of this document correspond to the hardware and software described. @@@@We welcome suggestions for improvement. @@No solvents have been used in the printing or binding process. Document subject to change without prior notice.

@@Make sure that the warning labels are kept in a legible condition and replace missing or damaged labels. MICROMASTER documentation is structured within three distinct levels: Getting Started Guide The Getting Started Guide is designed to give the user quick access to all the basic information required to install and set up your MICROMASTER 440 for operation. Operating Instructions The Operating Instructions provide detailed information for installation and operation of your MICROMASTER 440. The Operating Instructions also provide detailed descriptions of the parameters available for customizing the functions of the MICROMASTER 440. Reference Manual The Reference Manual contains in-depth information on all technical issues relating to the MICROMASTER 440 Inverter.

Parameter List The Parameter List contains a complete detailed listing of all MICROMASTER 440 parameters. Information is also available from: Technical Support Nuremberg Tel: +49 (0) 180 5050 222 Fax: +49 (0) 180 5050 223 Email: techsupport@ad.siemens.de Monday to Friday: 7:00 am to 5:00 pm (local time) Internet Home Address Customers can access technical and general information at: http://www.siemens.

de/micromaster MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 5 Foreword International English Definitions and Warnings Danger For the purpose of this documentation and the product warning labels, "Danger" indicates that death, severe personal injury or substantial damage to property will result if proper precautions are not taken. Warning For the purpose of this documentation and the product warning labels, "Warning" indicates that death, severe personal injury or substantial damage to property can result if proper precautions are not taken. Caution For the purpose of this documentation and the product warning labels, "Caution" indicates that minor personal injury or material damage can result if proper precautions are not taken. Note For the purpose of this documentation, "Note" indicates important information relating to the product or highlights part of the documentation for special attention. Qualified personnel For the purpose of this Instruction Manual and product labels, a "Qualified person" is someone who is familiar with the installation, mounting, start-up and operation of the equipment and the hazards involved. He or she must have the following qualifications: 1. Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures. 2. Trained in the proper care and use of protective equipment in accordance with established safety procedures. 3.

Trained in rendering first aid. PE = Ground PE Protective Earth uses circuit protective conductors sized for short circuits where the voltage will not rise in excess of 50 Volts. This connection is normally used to ground the inverter. - Is the ground connection where the reference voltage can be the same as the Earth voltage. This connection is normally used to ground the motor. Use for intended purpose only The equipment may be used only for the application stated in the manual and only in conjunction with devices and components recommended and authorized by Siemens. Contact address Should any questions or problems arise while reading this manual, please contact the Siemens office concerned using the form provided at the back this manual. MICROMASTER 440 6 Operating instructions 6SE6400-5CA00-0BP0 International English Foreword Safety Instructions The following Warnings, Cautions and Notes are provided for your safety and as a means of preventing damage to the product or components in the machines connected. This section lists Warnings, Cautions and Notes, which apply generally when handling MICROMASTER 440 Inverters, classified as General, Transport & Storage, Commissioning, Operation, Repair and Dismantling & Disposal. Specific Warnings, Cautions and Notes that apply to particular activities are listed at the beginning of the relevant chapters and are repeated or supplemented at critical points throughout these sections.

Please read the information carefully, since it is provided for your personal safety and will also help prolong the service life of your MICROMASTER 440 Inverter and the equipment you connect to it. General Warnings This equipment contains dangerous voltages and controls potentially dangerous rotating mechanical parts. Non-compliance with Warnings or failure to follow the instructions contained in this manual can result in loss of life, severe personal injury or serious damage to property. Only suitable qualified personnel should work on this equipment, and only after becoming familiar with all safety notices, installation, operation and maintenance procedures contained in this manual. The successful and safe operation of this equipment is dependent upon its proper handling, installation, operation and maintenance.

Risk of electric shock. The DC link capacitors remain charged for five minutes after power has been removed. It is not permissible to open the equipment until 5 minutes after the power has been removed. HP ratings are based on the Siemens 1LA motors and are given for guidance only; they do not necessarily comply with UL or NEMA HP ratings. Caution Children and the general public must be prevented from accessing or approaching the equipment! This equipment may only be used for the purpose specified by the manufacturer.

Unauthorized modifications and the use of spare parts and accessories that are not sold or recommended by the manufacturer of the equipment can cause fires, electric shocks and injuries. Notes Keep these operating instructions within easy reach of the equipment and make them available to all users Whenever measuring or testing has to be performed on live equipment, the regulations of Safety Code VBG 4.0 must be observed, in particular §8 "Permissible Deviations when Working on Live Parts". Suitable electronic tools should be used. Before installing and commissioning, please read these safety instructions and warnings carefully and all the warning labels attached to the equipment. Make sure that the warning labels are kept in a legible condition and replace missing or damaged labels MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 7 Foreword International English Transport & Storage Warning Correct transport, storage, erection and mounting, as well as careful operation and maintenance are essential for proper and safe operation of the equipment.

Caution Protect the inverter against physical shocks and vibration during transport and storage. Also be sure to protect it against water (rainfall) and excessive temperatures (see table on page 78). Commissioning Warnings Work on the device/system by unqualified personnel or failure to comply with warnings can result in severe personal injury or serious damage to material. Only suitably qualified personnel trained in the setup, installation, commissioning and operation of the product should carry out work on the device/system.

Only permanently-wired input power connections are allowed. This equipment must be grounded (IEC 536 Class 1, NEC and other applicable standards). If a Residual Current-operated protective Device (RCD) is to be used, it must be an RCD type B. Machines with a three-phase power supply, fitted with EMC filters, must not be connected to a supply via an ELCB (Earth Leakage Circuit-Breaker - see DIN VDE 0160, section 5.5.2 and EN50178 section 5.2.11.1). The following terminals can carry dangerous voltages even if the inverter is inoperative: - the power supply terminals L/L1, N/L2, L3.
- the motor terminals U, V, W, DC+/B+, DC-, B- and DC/R+ This equipment must not be used as an èmergency stop mechanism' (see EN 60204, 9.2.5.4) Caution The connection of power, motor and control cables to the inverter must be carried out as shown in Figure 2-4 on page 30, to prevent inductive and capacitive interference from affecting the correct functioning of the inverter. MICROMASTER 440 8 Operating instructions 6SE6400-5CA00-0BP0 International English Foreword Operation Warnings MICROMASTERS operate at high voltages.
When operating electrical devices, it is impossible to avoid applying hazardous voltages to certain parts of the equipment. @@@@@@@@independent limit switches, mechanical interlocks, etc.). Certain parameter settings may cause the inverter to restart automatically after an input power failure. Motor parameters must be accurately configured for motor overload protection to operate correctly.
This equipment is capable of providing internal motor overload protection in 2 accordance with UL508C section 42. Refer to P0610 (level 3) and P0335, I t is ON by default. Motor overload protection can also be provided using an external PTC (disabled by default P0601). This equipment is suitable for use in a circuit capable of delivering not more than 10,000 symmetrical amperes (rms), for a maximum voltage of 230V/460V/575V when protected by a H or K type.....

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16 MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 15 1 Overview International English 1.1 The MICROMASTER 440 The MICROMASTER 440s are a range of frequency inverters for controlling the speed of three phase AC motors. The various models available range from the 120 W single-phase input to the 75 kW three phase input. The inverters are microprocessor-controlled and use state-of-the-art Insulated Gate BipoIar Transistor (IGBT) technology. This makes them reliable and versatile.
A special pulse-width modulation method with selectable Pulse frequency permits quiet motor operation. Comprehensive protective functions provide excellent inverter and motor protection. The MICROMASTER 440 with its default factory settings is ideal for a large range of simple motor control applications. The MICROMASTER 440 can also be used for more advanced motor control applications via its comprehensive functionality. The MICROMASTER 440 can be used in both 'stand-alone' applications as well as being integrated into 'Automation Systems'.
1.2 Features Easy to install, parameterize and commission Rugged EMC design Can be operated on IT line supplies Fast repeatable response time to control signals Comprehensive range of parameters enabling configuration for a wide range of applications Simple cable connection Output relays Analog outputs (0 20 mA) 6 Isolated and switchable NPN/PNP digital inputs 2 Analog inputs: AIN1: 0 10 V, 0 20 mA and -10 to +10 V AIN2: 0 10 V, 0 20 mA th th The 2 analog inputs can be used as the 7 and 8 digital inputs BiCo technology Modular design for extremely flexible configuration High switching frequencies for low-noise motor operation Detailed status information and integrated message functions External options for PC communications, Basic Operator Panel (BOP), Advanced Operator Panel (AOP), PROFIBUS communications module Main Characteristics MICROMASTER 440 16 Operating instructions 6SE6400-5CA00-0BP0 International English 1 Overview Performance Characteristics Sensorless Vector Control Flux Current Control (FCC) for improved dynamic response and motor control Fast Current Limitation (FCL) for trip-free operation Built-in DC injection brake Compound braking to improve braking performance Acceleration/deceleration times with programmable smoothing Closed-loop control using PID (Proportional, Integral and Differential) control loop function, with auto-tuning Built-in braking chopper Selectable up and down ramps 4-point ramp smoothing Multi-point V/f characteristic parameter sets which can be switched, allowing one inverter to control several alternative processes Protection characteristics Overvoltage/undervoltage protection Overtemperature protection for the inverter Ground fault protection Short-circuit protection 2 I t thermal motor protection PTC/KTY for motor protection MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 17 1 Overview International English MICROMASTER 440 18 Operating instructions 6SE6400-5CA00-0BP0 International English 2 Installation 2 Installation General data relating to installation Dimensions of Inverter Wiring guidelines to minimize the effects of EMI Details concerning electrical installation This Chapter contains: 2.1 2.2 2.3 2.4 General.....

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. 21 Ambient operating conditions.....

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... 22 Mechanical Installation ..
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. 25 MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 19 2 Installation International English Warnings Work on the device/system by unqualified personnel or failure to comply with warnings can result in severe personal injury or serious damage to material.

Only suitably qualified personnel trained in the setup, installation, commissioning and operation of the product should carry out work on the device/system. Only permanently-wired input power connections are allowed. This equipment must be grounded (IEC 536 Class 1, NEC and other applicable standards). If a Residual Current-operated protective Device (RCD) is to be used, it must be an RCD type B. Machines with a three-phase power supply, fitted with EMC filters, must not be connected to a supply via an ELCB (Earth Leakage Circuit-Breaker EN50178 Section 5.2.11.1).

The following terminals can carry dangerous voltages even if the inverter is inoperative: - the power supply terminals L/L1, N/L2, L3. - the motor terminals U, V, W, DC+/B+, DC-, B- and DC/R+ Always wait 5 minutes to allow the unit to discharge after switching off before carrying out any installation work. This equipment must not be used as an `emergency stop mechanism' (see EN 60204, 9.2.5.4) The minimum size of the earth-bonding conductor must be equal to or greater than the cross-section of the power supply cables. Caution The connection of power, motor and control cables to the inverter must be carried out as shown in Figure 2-4 on page 30, to prevent inductive and capacitive interference from affecting the correct functioning of the inverter. MICROMASTER 440 20 Operating instructions 6SE6400-5CA00-0BP0 International English 2 Installation 2.1 General Following a prolonged period of storage, you must reform the capacitors in the inverter. It is important that the time of storage is calculated from the time of manufacture and not the time of delivery. The requirements are listed below. Period of Storage 1 year or less 1 to 2 years Installation after a Period of Storage Required Action No reforming required Preparation Time No preparation Apply power to the inverter for one hour before issuing the run 1 hour command Use a variable AC supply Apply 25% of input voltage for 30 minutes Increase volts to 50% for a further 30 minutes Increase volts to 75% for a further 30 minutes Increase volts to 100% for a further 30 minutes Inverter ready for run signal Use a variable AC supply Apply 25% of input voltage for 2 hours Increase volts to 50% for a further 2 hours Increase volts to 75% for a further 2 hours Increase volts to 100% for a further 2 hours Inverter ready for run signal 2 to 3 years 2 hours 3 years and over 8 hours MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 21 2 Installation International English 2.2 Ambient operating conditions Temperature Frame Size Min. [° C] ° Max. [° C] ° Max.
(Variable Torque) [° C] ° A -10 50 - B -10 50 - C -10 50 40 D -10 50 40 E -10 50 40 F -10 50 40 Note The variable torque rating is the capability of the inverter to increase the nominal power output for use with pump and fan applications. When variable torque is selected the inverter ceases to have an overload capacity. Humidity Range 95% Non-condensing Altitude If the inverter is to be installed at an altitude > 1000m, derating will be required. (Refer to MM440 Reference Manual) Shock Do not drop the inverter or expose to sudden shock. Vibration Do not install the inverter in an area where it is likely to be exposed to constant vibration.
Electromagnetic Radiation Do not install the inverter near sources of electromagnetic radiation. Atmospheric Pollution Do not install the inverter in an environment, which contains atmospheric pollutants such as dust, corrosive gases, etc. Water Take care to site the inverter away from potential water hazards, e.g. do not install the inverter beneath pipes that are subject to condensation. Avoid installing the inverter where excessive humidity and condensation may occur. Installation and overheating Warning The inverters MUST not be mounted in an horizontal position. Mount the inverter vertically to ensure optimum cooling, see Figure 2-1 on page 23. It is also possible to mount the inverters side-by-side. Ensure that the inverter's air vents are not obstructed.

Allow 100 mm clearance above and below the inverter. MICROMASTER 440 22 Operating instructions 6SE6400-5CA00-0BP0 International English 2 Installation 2.3 Mechanical Installation Warning THIS EQUIPMENT MUST BE GROUNDED. To ensure the safe operation of the equipment, it must be installed and commissioned by qualified personnel in full compliance with the warnings laid down in these operating instructions. Take particular note of the general and regional installation and safety regulations regarding work on dangerous voltage installations (e.g. EN 50178), as well as the relevant regulations regarding the correct use of tools and personal protective equipment (PPE). The mains input, DC and motor terminals, can carry dangerous voltages even if the inverter is inoperative; wait 5 minutes to allow the unit to discharge after switching off before carrying out any installation work. 4 Frame Size A Frame Size B Frame Size C Ø 5.5 mm 0.
22" Ø 4.8 mm 0.19" 55 mm 0.22" 174 mm 160 mm 6.30" 6.
85" Operator Panel Operator Panel 204 mm 8.03" Ø 4.5 mm 0.17" 138 mm 5.43" 174 mm 6.
85" Frame Size D Frame Size E Frame Size F Operator Operator Operator Panel Ø 17.5 mm 0.68" Panel Ø 17.5 mm 0.68" Panel Ø 15 mm 0.59" 486 mm 19.13" 616.4 mm 24.27" 810 mm 31.89" With Filter 1110 mm 43.

70" 235 mm 9.25" 235 mm 9.25" 300 mm 11.81" Figure 2-1 Drill pattern for MICROMASTER 440 MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 23 2 Installation International English Table 2-1 Dimensions and Torques of MM440 (all frame sizes) Fixing Method 2 x M4 Bolts 2 x M4 Nuts 2 x M4 Washers Connecting to DIN rail 4 x M4 Bolts 4 x M4 Nuts 4 x M4 Washers 4 x M5 Bolts 4 x M5 Nuts 4 x M5 Washers 4 x M8 Bolts 4 x M8 Nuts 4 x M8 Washers 4 x M8 Bolts 4 x M8 Nuts 4 x M8 Washers 4 x M8 Bolts 4 x M8 Nuts 4 x M8 Washers Frame- Overall Dimensions Size Height Width A 173 mm 73 mm Depth 149 mm Tightening Torque 2.5 Nm with washers fitted 2.5 Nm with washers fitted 2.5 Nm with washers fitted 3.0 Nm with washers fitted 3.0 Nm with washers fitted 3.0 Nm with washers fitted B 202 mm 149 mm 172 mm C 245 mm 185 mm 195 mm D 520 mm 275 mm 245 mm E 650 mm 850 mm with filter 1150 mm 275 mm 245 mm F 350 mm 300 mm 2.
3.1 DIN Rail Mounting Frame Size A Fitting the Inverter to the DIN Rail Release Mechanism 1. Fit the inverter to the DIN rail using the upper DIN rail latch. 2. Push the inverter against the DIN rail and the lower DIN rail latch should click into place.
Upper DIN rail latch Lower DIN rail latch Removing the Inverter from the DIN Rail 1.

To disengaged the release mechanism of the inverter, insert a screwdriver into the release mechanism. 2. Apply a downward pressure and the lower DIN rail latch will disengage. 3.

Pull the inverter from the DIN rail. MICROMASTER 440 24 Operating instructions 6SE6400-5CA00-0BP0 International English 2 Installation 2.4 Electrical Installation Warning THIS EQUIPMENT MUST BE GROUNDED. To ensure the safe operation of the equipment, it must be installed and commissioned by qualified personnel in full compliance with the warnings laid down in these operating instructions. Take particular note of the general and regional installation and safety regulations regarding work on dangerous voltage installations (e.g. EN 50178), as well as the relevant regulations regarding the correct use of tools and personal protective gear. The mains input, DC and motor terminals, can carry dangerous voltages even if the inverter is inoperative; wait 5 minutes to allow the unit to discharge after switching off before carrying out any installation work. The inverters can be installed in a side-by-side configuration, but a distance of 100 mm (3.94 inches) must be maintained if the inverters are installed on top of each other.

2.4.1 General Warning The inverter must always be grounded. If the inverter is not grounded correctly, extremely dangerous conditions may arise within the inverter, which could prove potentially fatal. Operation with ungrounded (IT) supplies The MICROMASTER will operate from ungrounded supplies and will continue to operate if an input phase is shorted to ground. If an output phase is shorted to ground, the MICROMASTER will trip and indicate F0001. On ungrounded supplies, it will be necessary to remove the Y' capacitor from the inside of the unit and fit an output choke. The procedure for removing this capacitor is described in Appendices G, H, I and J. Operation with Residual Current Device If an RCD (also referred to as ELCB or RCCB) is fitted, the MICROMASTER inverters will operate without nuisance tripping, provided that: A type B RCD is used. The trip limit of the RCD is 300mA.

The neutral of the supply is grounded. Only one inverter is supplied from each RCD. The output cables are less than 50m (screened) or 100m (unscreened). MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 25 2 Installation International English Operation with long cables Caution The control, power supply and motor leads must be laid separately. Do not feed them through the same cable conduit/trunking.

Never use high voltage insulation test equipment on cables connected to the inverter. All inverters will operate at full specification with cable lengths up to 50 m screened or 100 m unscreened. 2.4.2 Power and motor connections Warning Isolate the mains electrical supply before making or changing connections to the unit.

Ensure that the inverter is configured for the correct supply voltage: single / three-phase 230 V MICROMASTERS must not be connected to a higher voltage supply. When synchronous motors are connected or when coupling several motors in parallel, the inverter must be operated with voltage/frequency control characteristic (P1300 = 0, 2 or 3). Caution After connecting the power and motor cables to the proper terminals, make sure that the covers have been replaced properly before supplying power to the unit! Note Ensure that the appropriate circuit-breakers/fuses with the specified current rating are connected between the power supply and inverter (see Tables starting on page 77). o Use Class 1 60/75 C copper wire only (for UL compliance). For tightening torque see table on page 79. To tighten up the power terminal screws use a 4 - 5 mm cross-tip screwdriver. Access to the power and motor terminals The procedure for accessing the power and motor terminals on the MICROMASTER 440 Inverter is illustrated in Appendices. Please also refer to the photographs showing the Power Terminal connections and the Control Terminal connections on the inside of the back cover of this manual. When the covers have been removed to reveal the terminals, connect the power and motor connections as shown on the next page. MICROMASTER 440 26 Operating instructions 6SE6400-5CA00-0BP0 International English 2 Installation L3 L L1 U V W PE PE Ground Ground L N L2 DC+ DC- L3 N R+ DC B+ L2 L3 DC- DC+ B+ DC R+ B- U V W Ground Ground FRAME SIZE A FRAME SIZE B & C L L1 N L2 L3 DC- B+ DC+ R+ DC B- U V W PE Ground Ground FRAME SIZE D & E DC- B- R+ B+ DC+ DC+ B+ DC+ L L1 N L2 L3 U V W PE Ground Ground FRAME SIZE F Figure 2-2 MICROMASTER 440 Connection Terminals MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 27 2 Installation International English L3 L2 L1 N OPTIONAL FILTER (Class B only) CABLE SCREENING MICROMASTER L/L1 U V PE PE N/L2 W PE U V W MOTOR FUSE CONTACTOR SINGLE PHASE L3 L2 L1 TYPICAL INSTALLATION CABLE SCREENING CONTACTOR OPTIONAL FILTER MICROMASTER L3 L2 PE PE L1 PE U V W U V W MOTOR FUSE THREE PHASE Figure 2-3 Motor and Power Connections MICROMASTER 440 28 Operating instructions 6SE6400-5CA00-0BP0 International English 2 Installation 2.

4.3 Avoiding Electro-Magnetic Interference (EMI) The inverters are designed to operate in an industrial environment where a high level of EMI can be expected. Usually, good installation practices will ensure safe and trouble-free operation. If you encounter problems, follow the guidelines stated below. Action to Take Ensure that all equipment in the cubicle is well grounded using short, thick grounding cable connected to a common star point or busbar Make sure that any control equipment (such as a PLC) connected to the inverter is connected to the same ground or star point as the inverter via a short thick link. Connect the return ground from the motors controlled by the inverters directly to the ground connection (PE) on the associated inverter Flat conductors are preferred as they have lower impedance at higher frequencies Terminate the ends of the cable neatly, ensuring that unscreened wires are as short as possible Separate the control cables from the power cables as much as possible, using separate trunking, if necessary at 90º to each other. Whenever possible, use screened leads for the connections to the control circuitry Ensure that the contactors in the cubicle are suppressed, either with R-C suppressors for AC contactors or 'flywheel' diodes for DC contactors fitted to the coils. Varistor suppressors are also effective. This is important when the contactors are controlled from the inverter relay Use screened or armored cables for the motor connections and ground the screen at both ends using the cable clamps Warning Safety regulations must not be compromised when installing inverters! 2.

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4 Screening Methods Frame Sizes A, B and C For frame sizes A, B and C the Gland Plate Kit is supplied as an option. It allows easy and efficient connection of the necessary screening. See the Gland Plate Installation Instructions contained on the Document CD-ROM, supplied with the MM440. Frame Sizes D, E and F The Gland Plate is factory fitted. The installation of the screening is accomplished using the same methodology as in frame sizes A, B and C. MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 29 2 Installation International English Screening without a Gland Plate Should a Gland Plate not be available, then the inverter can be screened using the methodology shown in Figure 2-4. 1 5 1 7 2 L1 L2 L3 7 3 4 6 2 3 Figure 2-4 Wiring Guidelines to Minimize the Effects of EMI Legend 1 2 3 4 5 6 7 Mains power input Control cable Motor cable to I/O board Footprint filter Metal back plate Use suitable clips to fix motor and control cable screens securely to metal back plate Screen cable Note To enhance the screening of the motor and control cables, the optional Gland Plate can be used (not shown in Figure 2-4). MICROMASTER 440 30 Operating instructions 6SE6400-5CA00-0BP0 International English 3 Commissioning 3 Commissioning Description of the front panel controls A brief description of the optional front panels available and an explanation of the operation of the Basic Operator Panel (BOP) An 8-step guide at the end of the Chapter, which provides a simple procedure for changing parameters This Chapter contains: 3.1 3.2 3.

3 Block Diagram .....

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.. 43 MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 31 3 Commissioning International English Warning MICROMASTERS operate at high voltages. When operating electrical devices, it is impossible to avoid applying hazardous voltages to certain parts of the equipment. @@@@@@@@independent limit switches, mechanical interlocks, etc.). Certain parameter settings may cause the inverter to restart automatically after an input power failure. Motor parameters must be accurately configured for motor overload protection to operate correctly. This equipment is capable of providing internal motor overload protection in 2 accordance with UL508C section 42. Refer to P0610 (level 3) and P0335, I t is ON by default.

Motor overload protection can also be provided using an external PTC (disabled by default P0601). This equipment is suitable for use in a circuit capable of delivering not more than 10,000 symmetrical amperes (rms), for a maximum voltage of 230V/460V/575V when protected by a H or K type fuse (see Tables starting on page 77). This equipment must not be used as an `emergency stop mechanism' (see EN 60204, 9.2.5.4) Caution Only qualified personnel may enter settings in the control panels. Particular attention must be paid to safety precautions and warnings at all times. MICROMASTER 440 32 Operating instructions 6SE6400-5CA00-0BP0 International English 3 Commissioning 3.1 Block Diagram PE 1 - 3 AC 200 - 240 V 3 AC 380 - 480 V 3 AC 500 - 600 V 1 +10 V 0V AIN1+ AIN1AIN2+ AIN2DIN1 SI PE L/L1, N/L2 or L/L1, N/L2, L3 4.7k9 MINIMUM 2 3 4 10 11 5 6 7 8 16 A/D BOP Serial BOP Hz 150. 00 I 0 Jog Fn P A/D Protocol OPTO ISOLATION DIN2 DIN3 DIN4 DIN5 DIN6 ~ = DC/R+ PNP NPN MOTOR PTC or 17 9 28 14 15 12 13 26 27 Isolated +24 V (Output) Isolated 0 V (Output) PTCA PTCB Factory Fitted B+/DC+ Link R BDC- CPU D/A D/A Not Used 60 Hz 50 Hz 0 - 20 mA 5009 MAXIMUM AOUT 1+ AOUT 1- = 3~ The analog input circuit can be alternatively configured to provide additional digital inputs (DIN7 & DIN8) as shown: 1 2 1 2 0 - 20 mA 5009 MAXIMUM AOUT 2+ AOUT 2COM DIN7 NOTES: 1. 3 4 DIN8 10 11 20 NO RELAY 1 19 NC 18 30 V DC / 5 A (resistive) RELAY 2 250 V AC / 2 A (resistive) 12 DIP Switches (On Control Board) 0 - 10 V AIN1 AIN2 Voltage 0 - 20 mA Current When an analogue input is configured as a digital input the threshold values are as follows: 1.75 V DC = Off 3.70 V DC = On 22 NO 21 COM 2. AIN1 can be used with: 0 - 10 V, 0 - 20 mA and -10 V to +10 V AIN2 can be used with: 0 - 10 V and 0 - 20 mA Terminal 9 (24 V) can also be used to drive the analog inputs when used as digital inputs.

Terminals 2 and 28 (0 V) must be linked together. 25 NO RELAY 3 24 NC 23 29 30 N- COM 1 2 DIP Switches (On I/O Board) 3. P+ RS485 PE U,V,W M Figure 3-1 Inverter block diagram MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 33 3 Commissioning International English 3.2 Commission Modes The MICROMASTER 440 is supplied with a Status Display Panel (SDP) as the standard operator panel. Default parameter settings cover the following requirements: The motor rating data; voltage, current and frequency data is keyed into the inverter to ensure that the motor is compatible with the inverter.

(A standard Siemens motor is recommended). Linear V/f motor speed, controlled by an analogue potentiometer. Maximum speed 3000 min-1 with 50 Hz (3600 min-1 with 60 Hz); controllable using a potentiometer via the inverter's analogue inputs. Ramp-up time / Ramp-down time = 10 s. If more complex application settings are required, please refer to Sections 3.2.4.1 "Quick commissioning (P0010=1)" and 5 "System Parameters" . Note Frequency setting; the DIP switch is located on the control board, underneath the I/O board as shown in Figure 3-2 below. The inverter is delivered as follows: DIP switch 2: Off position: European defaults (50 Hz, kW etc.

) On position: North American defaults (60 Hz, hp etc.) DIP switch 1: Not for customer use. Frequency Setting DIP Switches Analog Setting DIP Switches Figure 3-2 DIP locations on I/O board and the Control Board 3.2.1 Reset to Factory default To reset all parameters to the factory default settings; the following parameters should be set as follows (BOP, AOP or Communication Option needed): 1. Set P0010=30. 2. Set P0970=1. Note The reset process can take up to 3 minutes to complete. MICROMASTER 440 34 Operating instructions 6SE6400-5CA00-0BP0 International English 3 Commissioning Front Panels for the MICROMASTER 440 To change the parameters of the inverter you will require one of the optional operator panels, either the "Basic Operator Panel" (BOP) or an "Advanced Operator Panel" (AOP).

To assist in the quick and efficient changing of parameters, commissioning software tools such as DriveMonitor can be used; this software is supplied on the Documentation CD-ROM. Figure 3-3 Panels available for the MICROMASTER 440 Inverter The parameters can also be changed using one of the communication options. For further information, please refer to the Reference Manual. For instructions on how to exchange/replace the Operator Panels, please refer to the appropriate Appendices in this manual.

Note The terminal layout for connecting power and control cables is shown in the photograph on the inside of the back cover of this manual. 3.2.2 Commissioning with the Status Display Panel (SDP) The SDP is supplied with your MICROMASTER 440 Inverter as standard. This panel has two LEDs on the front, which indicate the operational status of the inverter. With the SDP the inverter can be used with its default settings, for a number of applications. The default settings are shown in Table 3-1. The terminal layout is shown in the photograph of the Control Terminal Connections on the inside of the back cover of this manual. Warnings and faults states on the Status Display Panel The two LEDs on the Status Display Panel indicate the operating status of your inverter. These LEDs also indicate various warnings or fault states. In section 6.1 the inverter states, indicated by the two LEDs are explained. MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 35 3 Commissioning International English Table 3-1 Default settings for operation using the Status Display Panel Terminals Parameter P0701 = '1' P0702 = '12' P0703 = '9' P0704 = '15' P0705 = '15' P0706 = '15' P0707 = '0' P0708 = '0' Default Operation ON right Reverse Fault Acknowledge Fixed Frequency Fixed Frequency Fixed Frequency Inactive Inactive Digital Input 1 Digital Input 2 Digital Input 3 Digital Input 4 Digital Input 5 Digital Input 6 Digital Input 7 Digital Input 8 5 6 7 8 16 17 Via AIN1 Via AIN2 3.2.3 Basic operation with SDP With the SDP fitted, the following is possible: Start and stopping the motor (DIN1 via external switch) Reversing the motor (DIN2 via external switch) Fault Reset (DIN3 via external switch) Controlling the speed of the motor is accomplished by connecting the analog inputs as shown in the Figure 3-4. AIN2 OFF = Voltage 0 - 10 V ON = 0 - 20 mA AIN1 OFF = Voltage 0 - 10 V ON = 0 - 20 mA P+ N- Analogue Output 0 - 20 mA (500) ACK Figure 3-4 Basic operation with SDP MICROMASTER 440 36 Operating instructions 6SE6400-5CA00-0BP0 International English 3 Commissioning 3.

2.4 Commission Overview with BOP or AOP Prerequisites: Mechanical and electrical Installation are completed. Setting the motor frequency DIP Switch 2: Off = 50 Hz / ON = 60 Hz Power ON Quick Commissioning P0010 = 1 See Section 3.2.4.1 Further Commissioning via P0004 and P0003 An overview of the parameter structure is given in Section 5.3 For a detailed description of the parameter, see the Parameter List. Note We recommend the commissioning according this scheme. Nevertheless an expert user is allowed to do the commissioning without the filter functions of P0004. 3. 2.4.1 Quick commissioning (P0010=1) It is important that parameter P0010 is used for commissioning and P0003 is used to select the number of parameters to be accessed. This parameter allows a group of parameters to be selected that will enable quick commissioning. Parameters such as Motor settings and Ramp settings are included.

At the end of the quick commissioning sequence, P3900 should be selected, which, when set to 1, will carry out the necessary motor calculations and clear all other parameters (not included in P0010=1) to the default settings. This will only happen in the Quick Commissioning mode. MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 37 3 Commissioning International English Flow chart Quick Commissioning (Level 1 Only) P0010 Start Quick Commissioning 0 Ready to Run 1 Quick Commissioning 30 Factory Setting Note P0010 must always be set back to '0' before operating the motor. However if P3900 = 1 is set after commissioning this is done automatically. P0700 Selection of Command Source 2) (on / off / reverse) 0 Factory Setting 1 Basic Operator Panel 2 Terminal / Digital Inputs P0100 Operation for Europe/N.

America 0 Power in kW; f default 50 Hz 1 Power in hp; f default 60 Hz 2 Power in kW; f default 60 Hz Note Settings 0 & 1 should be changed using the DIP switches to allow permanent setting. P1000 Selection of Frequency Setpoint 2) 0 No frequency setpoint 1 BOP frequency control 2 Analogue Setpoint P0304 Rated Motor Voltage1) 10 V - 2000 V Nominal motor voltage (V) from rating plate P1080 Min. Motor Frequency Sets minimum motor frequency (0-650Hz) at which the motor will run irrespective of the frequency setpoint. The value set here is valid for both clockwise and anti-clockwise rotation. P0305 Rated Motor Current1) 0 - 2 x inverter rated current (A) Nominal motor current (A) from rating plate P1082 Max. Motor Frequency Sets maximum motor frequency (0-650Hz) at which the motor will run at irrespective of the frequency setpoint. The value set here is valid for both clockwise and anti-clockwise rotation. P0307 Rated Motor Power1) 0 kW - 2000 kW Nominal motor power (kW) from rating plate. If P0100 = 1, values will be in hp P1120 Ramp-Up Time 0 s - 650 s Time taken for the motor to accelerate from standstill up to maximum motor frequency. P0310 Rated Motor Frequency1) 12 Hz - 650 Hz Nominal motor frequency (Hz) from rating plate P1121 Ramp-Down Time 0 s - 650 s Time taken for motor to decelerate from maximum motor frequency down to standstill.

P0311 Rated Motor Speed1) 0 - 40000 1/min Nominal motor speed (rpm) from rating plate P3900 End Quick Commissioning 0 End Quick Commissioning without motor calculation or factory reset. 1 End Quick Commissioning with motor calculation and factory reset (Recommended) 2 End Quick Commissioning with motor calculation and with I/O reset. 3 End Quick Commissioning with motor calculation but without I/O reset. 1) Motor related parameters please refer to motor rating plate drawing. 2) Denotes parameters that contain more detailed lists of possible settings for use in specific applications. Please refer to the Reference Manual and Operating Instructions on the CD MICROMASTER 440 38 Operating instructions 6SE6400-5CA00-0BP0 International English 3 Commissioning 3.2.4.2 Commissioning with the Basic Operator Panel (BOP) The Basic Operator Panel (BOP) provides access to the inverter parameters and enables the user to customize the settings of your MICROMASTER 440. The BOP can be used to configure several MICROMASTER 440 Inverters.

This is accomplished by using the BOP to set the required parameters and once the process is complete, then the BOP can be replaced by the SDP. The BOP contains an five-digit display that allows the user to read the input and output characteristics of any parameter. The BOP does not have the capability to store parameter information. Table 3-1 shows the factory default settings for operation via the Basic Operator Panel. Notes The BOP motor control functions are disabled by default.

To control the motor via the BOP, parameter P0700 should be set to 1 and P1000 set to 1. The BOP can be fitted to and removed from the inverter whilst power is applied.

If the BOP has been set as the I/O control (P0700 = 1), the drive will stop if the BOP is removed. Default settings for operation using the BOP Meaning Operating Mode Europe/US Power (rated motor) Motor frequency rating Motor speed rating Maximum Motor Frequency Table 3-1 Parameter P0100 P0307 P0310 P0311 P1082 Default Europe (North America) 50 Hz, kW (60Hz, hp) Dimension (kW (Hp)) depending on setting of P0100. @@Pressing the button starts the converter.

This button is disabled by default. @@Disabled by default; to enable set P0700 = 1. @@This function is always enabled. @@Reverse is indicated by a minus (-) sign or a flashing decimal point. @@The Jog motor inverter stops when the button is released. @@This button can be used to view additional information. @@DC link voltage (indicated by d units V). 2. Output current. (A) 3.

Output frequency (Hz) 4. Output voltage (indicated by o units V). 5. @@Additional presses will toggle around the above displays. @@@@Access Pressing this button allows access to the parameters. @@Changing P0004 parameter filter function Step 1 Press to access parameters Result on display 2 Press until P0004 is displayed 3 Press to access the parameter value level 4 Press or to the required value 5 6 Press to confirm and store the value Only the motor parameters are visible to the user. Changing P1082 an indexed parameter setting maximum motor frequency Step 1 Press to access parameters Result on display 2 Press until P1082 is displayed 3 Press to access the parameter value level 4 Press to display current set value 5 Press or to the required value 6 Press to confirm and store the value 7 Press until r0000 is displayed 8 Press to return the display to the standard drive display (as defined by the customer) Figure 3-6 Changing parameters via the BOP MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 41 3 Commissioning International English Note - Busy Message In some cases - when changing parameter values - the display on the BOP shows . This means the inverter is busy with tasks of higher priority. Changing single digits in Parameter values For changing the parameter value rapidly, the single digits of the display can be changed by performing the following actions: Ensure you are in the parameter value changing level (see "Changing parameters with BOP"). 1.

Press (function button), which causes the right hand digit to blink. / . 2. Change the value of this digit by pressing 3. Press (function button) again causes the next digit to blink.

4. Perform steps 2 to 4 until the required value is displayed. 5. Press the to leave the parameter value changing level. Note The function button may also be used to acknowledge a fault condition Motor data for parameterization P0308 P0310 P0304 3_Mot IEC 56 IM B3 230/400V 0.

61 0.35 A 0.12kW 2800 / min P0305 P0311 P0307 Nr. ED510 3053 IP54 Rot KL 16 60 Hz 440V Y 0.34A 0.14 kW Cos j0.81 3310 /min S.F. -- 1.15 12.

022 I.CI.F 50 Hz Cos j0.81 65% P0309 Figure 3-7 Typical Motor Rating Plate Example MICROMASTER 440 42 Operating instructions 6SE6400-5CA00-0BP0 International English 3 Commissioning Note P0308 & P0309 are only visible if P0003 2. @@P0307 indicates kW or HP depending upon the setting of P0100. For detailed information, please see the Parameter List. Changing motor parameters is not possible unless P0010=1. Ensure that the inverter is configured correctly to the motor, i.e. @@@@@@@@Notes 1.

@@@@2. @@3. @@@@See Figure 3-7 for details on how to read motor data. 4. Changing motor parameters is not possible unless P0010 = 1.

5. @@@@@@@@@@@@@@@@@@@@@@@@@@@independent limit switches, mechanical interlocks, etc.). MICROMASTERS operate at high voltages. Certain parameter settings may cause the inverter to restart automatically after an input power failure.

Motor parameters must be accurately configured for motor overload protection to operate correctly. This equipment is capable of providing internal motor overload protection in 2 accordance with UL508C section 42. Refer to P0610 (level 3) and P0335, I t is ON by default. Motor overload protection can also be provided using an external PTC (disabled by default P0601). This equipment is suitable for use in a circuit capable of delivering not more than 10,000 symmetrical amperes (rms), for a maximum voltage of 230V/460V/575V when protected by a H or K type fuse (see Tables starting on page 77) This equipment must not be used as an `emergency stop mechanism' (see EN 60204, 9.2.5.4) 4.1 Frequency Setpoint (P1000) Default: Terminal 3/4 (AIN+/ AIN -, 0..

.10 V corresponds to 0...50/60 Hz) Other settings: see P1000 Notes For USS see Reference Manual, for PROFIBUS see Reference Manual and PROFIBUS Instructions. MICROMASTER 440 46 Operating instructions 6SE6400-5CA00-0BP0 International English 4 Using the MICROMASTER 440 4.2 Command Sources (P0700) Notes The ramp times and ramp-smoothing functions also affect how the motor starts and stops. For details of these functions, please refer to parameters P1120, P1121, P1130 P1134 in the Parameter List. Starting the motor Default: Other settings: Terminal 5 (DIN 1, high) see P0700 to P0708 Stopping the motor There are several ways to stop the motor: Default: OFF1 OFF2 Terminal 5 (DIN 1, low) Off button on BOP/AOP, pressing the Off button once long (two seconds) or twice (with default settings not possible without BOP/AOP) OFF3 no standard setting Other settings: see P0700 to P0708 Reversing the motor Default: Other settings: Terminal 6 (DIN 2, high) see P0700 to P0708 4.3 4.

3.1 OFF and braking Functions OFF1 This command (produced by canceling the ON command) causes the inverter to come to a standstill at the selected ramp-down rate. Parameter to change ramp-down time see P1121 Notes ON and the following OFF1 command must have the same source. If the ON/OFF1 command is set to more than one digital input, only the last set digital input is valid e.g.

DIN3 is active. OFF1 can be combined with DC braking, Compound braking or dynamic braking. MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 47 4 Using the MICROMASTER 440 International English 4.3.2 OFF2 This command causes the motor to coast to a standstill (pulses disabled).

Note The OFF2 command can have one or more sources. By default the OFF2 command is set to BOP/AOP. This source still exists even if other sources are defined by one of the following parameters, P0700 to P0708 inclusive. 4.3.3 OFF3 An OFF3 command causes the motor to decelerate rapidly. For starting the motor when OFF3 is set, the binary input has to be closed (high). If OFF3 is high, the motor can be started and stopped by OFF1 or OFF2. If OFF3 is low the motor cannot be started. Ramp down time: see P1135 Note OFF3 can be combined with DC braking, Compound braking or Dynamic braking.

4.3.4 DC braking DC braking is possible together with OFF1 and OFF3. A DC current is applied to stop the motor quickly and hold the shaft stationary until the end of the braking period. Enable DC braking: see P0701 to P0708 Set DC braking period: see P1233 Set DC braking current: see P1232 Set DC braking start frequency: see P1234 Note If no digital input is set to DC braking and P1233 0, DC braking will be active after every OFF1 command with the time set in P1233. 4.3.5 Compound Braking Compound Braking is possible with both OFF1 and OFF3. For Compound Braking a DC component is added to the AC current. Set the braking current: see P1236 4.

3.6 Braking with external braking resistor Braking with an external resistor is a method of braking that allows a smoothed, controlled reduction in motor speed in a linear manner. The technique is also known as Dynamic braking. For further details please refer to the Applications Handbook. MICROMASTER 440 48 Operating instructions 6SE6400-5CA00-0BP0 International English 4 Using the MICROMASTER 440 4.

4 Control Modes (P1300) The various modes of operation of the MICROMASTER 440 control the relationship between the speed of the motor and the voltage supplied by the inverter. @@@@@@@@@It is designed to function when the preset setpoint speed is reached. @@The Imax controller refers to the voltage instead of frequency. @@@@@Allows change from vector control to torque control (see P1501). @@@@If the inverter is working correctly, the following LED sequence is visible: Green and Yellow = Ready to run Green = Run BOP fitted If a BOP is fitted, the fault states (P0947) and warnings (P2110) are displayed should a fault condition occur.

For further details, please refer to the Parameter List. AOP fitted If the AOP is fitted, the fault and warning codes are displayed on the LCD panel. MICROMASTER 440 50 Operating instructions 6SE6400-5CA00-0BP0 International English 5 System Parameters 5 System Parameters A functional overview of the parameters available for customizing your MICROMASTER MM440 Inverter A list of the parameters used This Chapter contains: 5.1 5.2 5.3 Introduction to MICROMASTER System Parameters.....

. 54 MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 51 5 System Parameters International English 5.1 Introduction to MICROMASTER System Parameters The parameters can only be changed by using the Basic Operator Panel (BOP), the Advance Operator Panel (AOP) or the Serial Interface. Parameters can be changed and set using the BOP to adjust the desired properties of the inverter, such as ramp times, minimum and maximum frequencies etc. The parameter numbers selected and the setting of the parameter values are indicated on the optional five-digit LCD display.

Read only parameters are indicated with r instead of P. P0010 initiates "quick commissioning". The inverter will not run unless P0010 is set to 0 after it has been accessed. This function is automatically perform if P3900 > 0. P0004 acts as a filter, allowing access to parameters according to their functionality. If an attempt is made to change a parameter that cannot be changed in this status, for example, cannot be changed whilst running or can only be changed in quick commissioning, then will be displayed. Busy Message In some cases - when changing parameter values - the display on the BOP shows for maximum of five seconds. This means the inverter is busy with tasks of higher priority. 5.1.1 Access Levels There are three access levels available to the user; Standard, Extended and Expert. The level of access is set by parameter P0003. For most applications, the Standard and Extended levels are sufficient. The number of parameters that appear within each functional group depends on the access level set in parameter P0003. For further details regarding parameters, see the Parameter List on the Documentation CD-ROM.

MICROMASTER 440 52 Operating instructions 6SE6400-5CA00-0BP0 International English 5 System Parameters 5.2 Parameter Overview P0004 = 2 Inverter Unit P0004 = 2, P0003 = 1, Parameters level 1 concerning the inverter unit P0004 = 2, P0003 = 2, Parameters level 1 and 2 concerning the inverter unit P0004 = 0 (no filter function) allows direct access to the parameters, For BOP and AOP depending on the selected access level P0004 = 2, P0003 = 3, Parameters level 1, 2 and 3 concerning the inverter unit P0004 = 2, P0003 = 4, Parameters level 1, 2, 3 and 4concerning the inverter unit P0004 = 22 PI Controller P0004 = 2 Inverter Unit P0004 = 21 Alarms, Warnings & Monitoring P0004 = 3 Motor Data P0004 = 20 Communication P0004 = 4 Speed sensor P0004 = 13 Motor Control P0004 = 5 Technol. Application / units P0004 = 12 Drive Features P0004 = 7 P0004 = 10 Setpoint Channel & Ramp Generator P0004 = 8 Analogue I/O Commands and Digital I/O Figure 5-1 Parameter Overview MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 53 5 System Parameters International English 5.3 Parameter List (short form) Three states are possible for all the parameters: Commissioning C Ready to run U Run T This indicates when the parameter can be changed. One, two or all three states may be specified. If all three states are specified, this means that it is possible to change this parameter setting in all three inverter states. Always Par. No. r0000 P0003 P0004 P0010 Parametername Drive display User access level Parameter filter Commissioning parameter filter Default 1 0 0 Acc 1 1 1 1 WS CUT CUT CT QC N N N Quick Commissioning Par.-No.

P0100 P3900 Parametername Europe / North America End of quick commissioning Default 0 0 Level 1 1 WS C C QC Q Q Parameter Reset Par.-No. P0970 Parametername Factory reset Default 0 Level 1 WS C QC N Inverter Unit (P0004 = 2) Par. No. r0018 r0026[1] r0037[2] r0039 P0040 r0070 r0200 P0201 r0203 r0204 P0205 r0206 r0207 r0208 r0209 P0210 r0231[2] P0290 P0292 Parametername Firmware version CO: Act.

DC-link voltage CO: Inverter temperature [°C] CO: Energy consumpt. meter [kWh] Reset energy consumption meter CO: Act. DC-link voltage Act. power stack code number Power stack code number Act. inverter type Power stack features Inverter application Rated inverter power [kW] / [hp] Rated inverter current Rated inverter voltage Maximum inverter current Supply voltage Max.

cable length Inverter overload reaction Inverter overload warning Default 0 0 0 230 2 15 Acc 1 2 3 2 2 3 3 3 3 3 3 2 2 2 2 3 3 3 3 WS CT C C CT CT CUT QC N N Q N N N MICROMASTER 440 54 Operating instructions 6SE6400-5CA00-0BP0 International English 5 System Parameters Par. No. P1800 r1801 P1802 P1820[3] P1911 r1925 r1926 Parametername Pulse frequency CO: Act. switching frequency Modulator mode Reverse output phase sequence No.

*of phase to be identified Identified on-state voltage Ident. gating unit dead time Default 4 0 0 3 - Acc 2 3 3 2 2 2 2 WS CUT CUT CT CT - QC N N N N - Motor Data (P0004 = 3) Par. No. r0035[3] P0300[3] P0304[3] P0305[3] P0307[3] P0308[3] P0309[3] P0310[3] P0311[3] r0313[3] P0320[3] r0330[3] r0331[3] r0332[3] r0333[3] P0335[3] P0340[3] P0341[3] P0342[3] P0344[3] r0345[3] P0346[3] P0347[3] P0350[3] P0352[3] r0384[3] r0395 r0396 P0601[3] P0604[3] P0610[3] P0625[3] P0640[3] P1910 r1912[3] Parametername CO: Act. motor temperature Select motor type Rated motor voltage Rated motor current Rated motor power Rated motor cosPhi Rated motor efficiency Rated motor frequency Rated motor speed Motor pole pairs Motor magnetizing current Rated motor slip Rated magnetization current Rated power factor Rated motor torque Motor cooling Calculation of motor parameters Motor inertia [kg*m^2] Inertia ratio total/motor Motor weight Motor start-up time Magnetization time Demagnetization time Stator resistance (line-to-line) Cable resistance Rotor time constant CO: Total stator resistance [%] CO: Act. rotor resistance Motor temperature sensor Threshold motor temperature Motor I2t temperature reaction Ambient motor temperature Motor overload factor [%] Select motor data identification Identified stator resistance Default 1 230 3.*

25 0.75 0.000 0.0 50.00 0 0.0 0 0 0.00180 1.000 9.4 1.000 1.
000 4.0 0.0 0 130.0 2 20.0 150.
0 0 - Acc 2 2 1 1 1 2 2 1 1 3 3 3 3 3 3 2 2 3 3 3 3 3 3 2 3 3 3 3 2 2 3 3 2 2 2 WS C C C C C C C C CT CT CT CUT CUT CUT CUT CUT CUT CUT CUT CUT CT CUT CUT CT - QC Q Q Q Q Q Q Q Q Q N N N N N N N N N N N Q Q - MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 55 5 System Parameters International English r1913[3] r1914[3] r1915[3] r1916[3] r1917[3] r1918[3] r1919[3] r1920[3] Identified rotor time constant Ident. total leakage inductance Ident. nom. stator inductance Identified stator inductance 1 Identified stator inductance 2 Identified stator inductance 3 Identified stator inductance 4 Identified dyn.leak.
induct. - 2 2 2 2 2 2 2 2 - - Commands and Digital I/O (P0004 = 7) Par. No. r0002 r0019 r0050 r0051[2] r0052 r0053 r0054 r0055 P0700[3] P0701[3] P0702[3] P0703[3] P0704[3] P0705[3] P0706[3] P0707[3] P0708[3] P0719[3] r0720 r0722 P0724 P0725 r0730 P0731[3] P0732[3] P0733[3] r0747 P0748 P0800[3] P0801[3] P0809[3] P0810 P0811 P0819[3] P0820[3] Parametername Drive state CO/BO: BOP control word CO: Active command data set CO: Active drive data set CO/BO: Act. status word 1 CO/BO: Act. status word 2 CO/BO: Act. control word 1 CO/BO: Add. act. control word Selection of command source Function of digital input 1 Function of digital input 2 Function of digital input 3 Function of digital input 4 Function of digital input 5 Function of digital input 6 Function of digital input 7 Function of digital input 8 Selection of cmd. & freq.

setp. Number of digital inputs CO/BO: Binary input values Debounce time for digital inputs PNP / NPN digital inputs Number of digital outputs BI: Function of digital output 1 BI: Function of digital output 2 BI: Function of digital output 3 CO/BO: State of digital outputs Invert digital outputs BI: Download parameter set 0 BI: Download parameter set 1 Copy Command Data Set BI: CDS bit 0 (Local / Remote) BI: CDS bit 1 Copy Drive Data Set BI: DDS bit 0 Default 2 1 12 9 15 15 15 0 0 0 3 1 52:3 52:7 0:0 0 0:0 0:0 0 0 0:0 0:0 0 0:0 Acc 2 3 2 2 2 2 3 3 1 2 2 2 2 2 2 2 2 3 3 2 3 3 3 3 2 2 2 3 3 3 3 2 2 2 2 3 WS CT CT CT CT CT CT CT CT CT CT CT CT CT CUT CUT CUT CUT CT CT CT CUT CUT CT CT QC Q N N N N N N N N N N N N N N N N N N N N N MICROMASTER 440 56 Operating instructions 6SE6400-5CA00-0BP0 International English 5 System Parameters Par. No. P0821[3] P0840[3] P0842[3] P0844[3] P0845[3] P0848[3] P0849[3] P0852[3] P1020[3] P1021[3] P1022[3] P1023[3] P1026[3] P1028[3] P1035[3] P1036[3] P1055[3] P1056[3] P1074[3] P1110[3] P1113[3] P1124[3] P1230[3] P2103[3] P2104[3] P2106[3] P2220[3] P2221[3] P2222[3] P2223[3] P2226[3] P2228[3] P2235[3] P2236[3] Parametername BI: DDS bit 1 BI: ON/OFF1 BI: ON/OFF1 reverse BI: 1. OFF2 BI: 2. OFF2 BI: 1. OFF3 BI: 2. OFF3 BI: Pulse enable BI: Fixed freq. selection Bit 0 BI: Fixed freq. selection Bit 1 BI: Fixed freq.
selection Bit 2 BI: Fixed freq. selection Bit 3 BI: Fixed freq. selection Bit 4 BI: Fixed freq. selection Bit 5 BI: Enable MOP (UP-command) BI: Enable MOP (DOWN-command) BI: Enable JOG right BI: Enable JOG left BI: Disable additional setpoint BI: Inhibit neg. freq.
setpoint BI: Reverse BI: Enable JOG ramp times BI: Enable DC braking BI: 1. Faults acknowledgement BI: 2. Faults acknowledgement BI: External fault BI: Fixed PID setp. select Bit 0 BI: Fixed PID setp. select Bit 1 BI: Fixed PID setp.
select Bit 2 BI: Fixed PID setp. select Bit 3 BI: Fixed PID setp. select Bit 4 BI: Fixed PID setp. select Bit 5 BI: Enable PID-MOP (UP-cmd) BI: Enable PID-MOP (DOWN-cmd) Default 0:0 722:0 0:0 1:0 19:1 1:0 1:0 1:0 0:0 0:0 0:0 722:3 722:4 722:5 19:13 19:14 0:0 0:0 0:0 0:0 722:1 0:0 0:0 722:2 0:0 1:0 0:0 0:0 0:0 722:3 722:4 722:5 19:13 19:14 Acc 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 WS CT CT CT CT CT CT CT CT CT CT CT CT CT CT CT CT CT CT CUT CT CT CUT CT CT CUT CT CT CT CT CT CT CT CT CT CT CT CT QC N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N MICROMASTER 440 Operating instructions 6SE6400-5CA00-0BP0 57 5 System Parameters International English Analogue I/O (P0004 = 8) Par. No. P0295 r0750 r0752[2] P0753[2] r0754[2] r0755[2] P0756[2] P0757[2] P0758[2] P0759[2] P0760[2] P0761[2] P0762[2] r0770 P0771[2] P0773[2] r0774[2] P0777[2] P0778[2] P0779[2] P0780[2] P0781[2] Parametername Inverter fan off delay time Number of ADCs Act. input of ADC [V] or [mA] Smooth time ADC Act. ADC value after scaling [%] CO: Act. ADC after scal. [4000h] Type of ADC Value x1 of ADC scaling [V / mA] Value y1 of ADC scaling Value x2 of ADC scaling [V / mA] Value y2 of ADC scaling Width of ADC deadband [V / mA] Delay for loss of signal action Number of DACs CI: DAC Smooth time DAC Act.

DAC value [V] or [mA] Value x1 of DAC scaling Value y1 of DAC scaling Value x2 of DAC scaling Value y2 of DAC scaling Width of DAC deadband Default 0 3 0 0 0.0 10 100.0 0 10 21:0 2 0.0 0 100.0 20 0 Acc 3 3 2 3 2 2 2 2 2 2 2 2 2 3 3 2 3 2 2 2 2 2 2 WS CUT CUT CT CUT CUT CUT CUT CUT CUT CUT CUT CUT CUT CUT CUT CUT CUT CUT CUT QC N N N N N N N N N N N N N N N N N N N Setpoint Channel and Ramp Generator (P0004 = 10) Par. No. P1000[3] P1001[3] P1002[3] P1003[3] P1004[3] P1005[3] P1006[3] P1007[3] P1008[3] P1009[3] P1010[3] P1011[3] P1012[3] P1013[3] P1014[3] P1015[3] P1016 P1017 Parametername Selection of frequency setpoint Fixed frequency 1 Fixed frequency 2 Fixed frequency 3 Fixed frequency 4 Fixed frequency 5 Fixed frequency 6 Fixed frequency 7 Fixed frequency 8 Fixed frequency 9 Fixed frequency 10 Fixed frequency 11 Fixed frequency 12 Fixed frequency 13 Fixed frequency 14 Fixed frequency 15 Fixed frequency mode - Bit 0 Fixed frequency mode - Bit 1 Default 2 0.