Automation direct gs2- 11p0 manual

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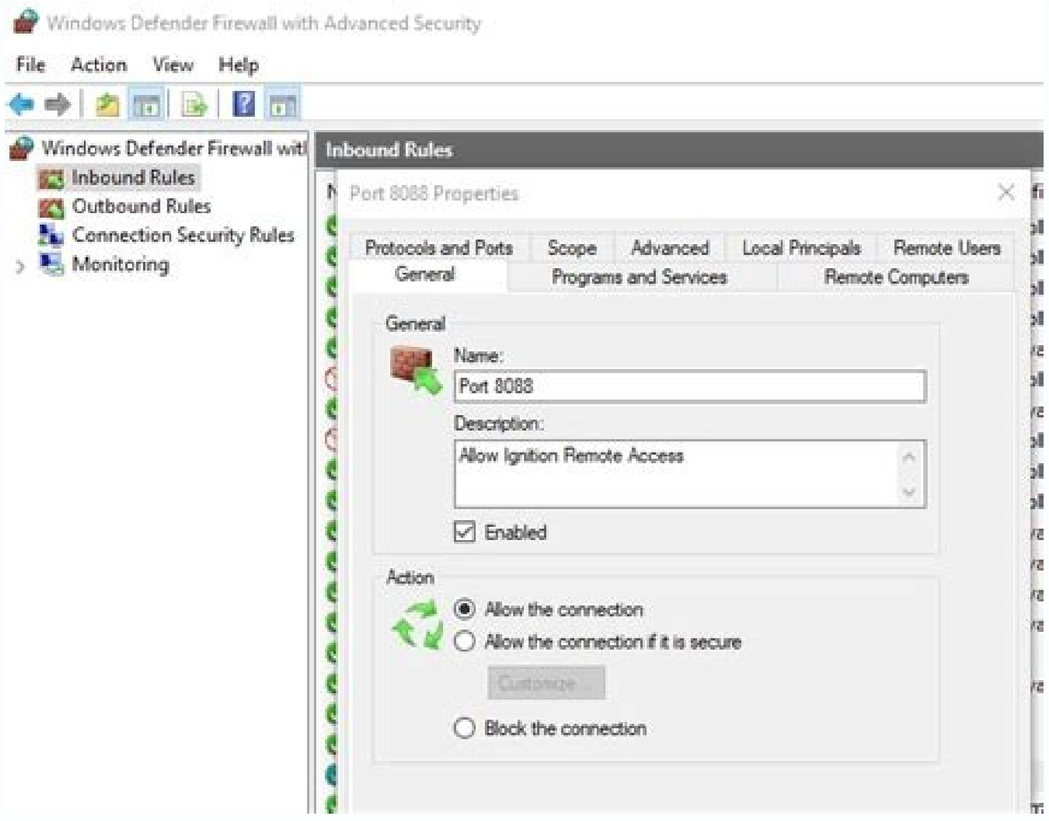

Automation direct gs1-20p2. Automation direct gs2-11p0. Automation direct gs2-21p0. Automation direct gs2-11p0 manual. Automation direct gs1-10p2.

Thank you for your participation! Page 1 GS1 Series Drives U s e r M a n u a l 120V Input: 0.25 - 0.5 Hp 230V Input: 0.25 - 2.0 Hp... Page 2 This publication is based on information that was available at the time it was printed. At Automationdirect.com™ we constantly strive to improve our products and services, so we reserve the right to make changes to the products and/or publications at any time without notice and without any obligation. Page 3 Nulle partie de ce manuel ne doit être copiée, reproduite ou transmise de quelque façon que ce soit sans le consentement préalable écrit de la société Automationdirect.com™ Incorporated. Automationdirect.com™ conserve les droits exclusifs à l'égard de tous les renseignements contenus dans le présent document. Page 4 WARNING : Always read this manual thoroughly before using GS1 Series AC Motor Drives. ARNING : AC input power must be disconnected before performing any maintenance. ARNING Do not connect or disconnect wires or connectors while power is applied to the circuit. Page 5 GS1 S AC D ERIES RIVE U S E R M A N U A L Please include the Manual Number and the Manual Issue, both shown below, when communicating with Technical Support regarding this publication. Manual Number: GS1-M Issue: First Edition Issue Date: 6/07/02... ABLE OF ONTENTS Chapter 1: Getting Started ....1–1 Manual Overview .....1–2 GS1 AC Drive Introduction . Page 7 Table of Contents Display Parameters .....4–45 Communication Parameters . HAPTER HAPTER HAPTER ETTING TARTED In This Manual... Manual Overview .....1–2 GS1 AC Drive Introduction ....1–3 GS1 AC Drive Specifications . By Telephone: 770-844-4200 (Mon.-Fri., 9:00 a.m.-6:00 p.m. E.T.) On the Web: www.automationdirect.com Our technical support group is glad to work with you in answering your questions. If you cannot find the solution to your particular application, or, if for any reason you need additional technical assistance, please call technical support at 770-844-4200. Chapter 1: Getting Started GS1 AC Drive Introduction Unpacking

After receiving the AC motor drive, please check for the following: • Make sure that the package includes an AC drive, the GS1 Series AC Drive User Manual, and the GS1 Series AC Drive Quick Reference. •... Page 11 Chapter 1: Getting Started External Parts and Labels: Digital Keypad Ventilation Slots Mounting Screw Holes Nameplate Label Input Power Terminals Control Input/Output Terminals Output Power Terminals 1–4 GS1 Series AC Drive User Manual... Chapter 1: Getting Started GS1 AC Drive Specifications 100V Class Model Name GS1-10P2 GS1-10P5 1/4HP 1/2HP Motor Rating 0.2kW 0.4kW Rated Input Voltage Single-phase 100-120VAC ±10%, 50/60Hz, ±5% Maximum Output Voltage Three-phase: 200-240VAC (x2 of input voltage) Rated Input Current (A) Page 13 Chapter 1: Getting Started General Specifications Control Characteristics Control System Sinusoidal Pulse Width Modulation, carrier frequency 3kHz - 10kHz Rated Output Frequency 1.0 to 400.0 Hz Output Frequency Resolution 0.1 Hz Overload Capacity 150% of rated current for 1 minute Torque Characteristics Includes auto-slip compensation and starting torque 150% @5.0Hz Operation frequency 60Hz, 0-30% rated voltage. Page 14 Chapter 1: Getting Started General Specifications (cont.) Overcurrent, Overvoltage, Undervoltage, Electronic thermal Protective Functions motor overload, Overheating, Overload, Self testing Operator Devices 5-key, 4-digit, 7-segment LED, 4 status LEDs, potentiometer Programming Parameter values for setup and review, fault codes Master Frequency, Output Frequency, Scaled Output Frequency, Operator Parameter Monitor Output Voltage, DC Bus Voltage, Output Direction, Trip Event... Page 16 HAPTER HAPTER NSTALLATION AND IRING In This Chapter... Ambient Conditions ..... . .2–2 Installation ....2–3 GS1 AC Drive Dimensions . Chapter 2: Installation and Wiring Ambient Conditions The AC drive should be kept in the shipping carton before installation. In order to retain the warranty coverage, the AC drive should be stored properly when it is not to be used for an extended period of time. Some storage suggestions are: •... Chapter 2: Installation and Wiring Installation Improper installation of the AC drive will greatly reduce its life. Be sure to observe the following precautions when selecting a mounting location. : Failure to observe these precautions may damage the drive and void the warranty! ARNING •... Chapter 2: Installation and Wiring GS1 AC Drive Dimensions 68.0 (2.68) 56.0 (2.20) STOP DISPL RESET PROG STOP ENTER Unit: mm (in) 2–4 GS1 Series AC Drive User Manual... : Any electrical or mechanical modification to this equipment without prior ARNING written consent of AutomationDirect.com, Inc. will void all warranties, may result in a safety hazard, and may void the UL listing. Wiring Notes: PLEASE READ PRIOR TO INSTALLATION. Page 21 Chapter 2: Installation and Wiring 8. Do not attach or remove wiring when power is applied to the AC drive. 9. Do not monitor the signals on the circuit board while the AC drive is in operation. 10. For the single-phase, 200V class AC drives, the AC power can be connected to any two of the three input terminals L1, L2, and L3. L1, L2, L3 Input Power T1, T2, T3 AC Drive Output Ground Main Circuit Wiring Specifications Max. Current AC Drive Model Wire Gauge Torque (Input/Output) GS1-10P2 6A/1.6A GS1-10P5 9A/2.5A 12-16 AWG 5.5kgf-cm GS1-20P2 (1-phase) 4.9A/1.6A GS1-20P2 (3-phase) 1.9A/1.6A GS1-20P5 (1-phase) 6.5A/2.5A... Page 23 1-phase Input Power* Single-phase 100-120VAC 100V Class ±10%, 50/60Hz, ±5% Single-phase: 200-240VAC 200V Class ± 10%, 50/60Hz ±5% *Only models GS1-10P2, GS1-10P5, GS1-20P2, GS1-20P5, and GS1-21P0 are rated for single-phase input power. GS1 Top View 2–8 GS1 Series AC Drive User Manual... Page 24 Chapter 2: Installation and Wiring Output Power Connections GS1 Bottom View T1 T2 T3 100V Class Model Name GS1-10P2 GS1-10P5 1/4HP 1/2HP Max. Motor Output 0.2kW 0.4kW Maximum Output Voltage Three phase: 200-240VAC (x2 of input voltage) Rated Output Current 1.6A... Page 25 Chapter 2: Installation and Wiring Control Terminal Wiring (Factory Settings) GS1 Bottom View Control Circuit Terminals Terminal Symbol Description Remarks Relay Output Common 120VAC/24VDC @5A, 230VAC @2.5A Relay Output Normally Open +10V Internal Power Supply +10VDC 0 to +10 V (Max. Output Frequency) Input or Analog Input 4 to 20mA (Max. Page 26 Chapter 2: Installation and Wiring Basic Wiring Diagram Note: Users must connect wiring according to the circuit diagram shown below. Power Source * AC Motor 100-120V±10% GS1-xxxx (50/60Hz ±5%) 200-240V±10% (50/60Hz±5%) * Use terminals L1 and L2 for single phase models Multi-function contacts 120VAC/24VDC @5A 230VAC @2.5A... Page 27 Chapter 2: Installation and Wiring External Wiring From power supply Power Supply Please follow the specific power supply requirements shown in C HAPTER Fuse Input fuses protect the AC drive from excessive input current due to line surges, short circuits, Disconnect and ground faults. HAPTER HAPTER HAPTER EYPAD PERATION UICKSTART In This Chapter... The GS1 Digital Keypad .....3–2 GS1 Quickstart ......3–5... Chapter 3: Keypad Operation and Quickstart The GS1 Digital Keypad The digital keypad includes a 4-digit LED display, 4 LED indicators, 5 function keys, and a potentiometer. The diagram below shows all of the features of the digital keypad and an overview of their functions. LED Display w/ RUN, FWD, REV, Down Key... Page 30 Chapter 3: Keypad Operation and Quickstart Displaying the Status of the GS1 AC Drive Press the button on the keypad repeatedly to cycle through the status DISPL/RESET messages on the AC drive. The diagram below shows the order of the status messages and their definitions. Page 31 Chapter 3: Keypad Operation and Quickstart Programming the GS1 AC Drive The GS1 AC Drive parameters are organized into 10 different groups according to their functions. The illustration below shows you how to navigate through the parameter groups and parameter settings. For a complete list of parameters, see C HAPTER Press the PROG/ENTER key to enter program mode. Chapter 3: Keypad Operation and Quickstart GS1 Quickstart The following examples will help you quickly setup your GS1 AC Drive for two common applications.The first example applies to an application that requires constant torque, and the second example requires variable torque in its application. Page 33 Chapter 3: Keypad Operation and Quickstart Parameter Setup In order to meet the needs of this application, the parameters should be set as follows: 0-00 Motor Nameplate Voltage Setting: 230 Range: 200V series: 200/208/220/230/240 Default Setting: 240 This parameter setting is determined by the motor nameplate. 0-01 Motor Nameplate Amps Setting: 4.2... Page 34 Chapter 3: Keypad Operation and Quickstart 1-01 Acceleration Time Setting: 5.0 Range: 0.1 to 600 sec Default Setting: 10 sec The motor should accelerate from 0 RPM to Base RPM (0-03) in 5 seconds. Deceleration Time Setting: 5.0 1-02 Range: 0.1 to 600 sec Default Setting: 30 sec The motor should decelerate from Maximum RPM (0-04) to 0 RPM in 5 seconds. Page 35 Chapter 3: Keypad Operation and Quickstart 4-00 Source of Frequency Command Setting: 2 The frequency of the AC drive will be determined by an external potentiometer with a 0 to +10V signal. Default: 0 Settings: Frequency determined by keypad potentiometer Frequency determined by digital keypad up/down Frequency determined by 0 to +10V input on AI terminal. Chapter 3: Keypad Operation and Quickstart Example 2: Variable torque (e.g. fans, centrifugal pumps, etc.) In this example, the AC drive needs to operate a motor that is connected to a centrifugal pump. As in Example 1, we will make a list of the needs for the application in order to decide which parameters need modifications. Page 37 Chapter 3: Keypad Operation and Quickstart 0-02 Motor Base Frequency Setting: 60 Range: 50/60/400 Default Setting 60 This parameter setting is determined by the motor nameplate. Motor Base RPM Setting: 3525 0-03 Range: 375 to 9999 RPM Default Setting: 1750 This parameter setting is determined by the motor nameplate. Page 38 Chapter 3: Keypad Operation and Quickstart 3-00 Source of Operation Command Setting: 0 The AC drive operation will be determined by external control terminals and the keypad stop is enabled. Default Setting: 0 Settings Operation Determined by Digital Keypad Operation determined by external control terminals. Page 39 Chapter 3: Keypad Operation and Quickstar 6-00 Electronic Thermal Overload Relay Setting: 1 Range: 0 - Constant Torque Default Setting: 0 1 - Variable Torque 2 - Inactive •This function is used to limit the output power of the AC drive when powering a "self-cooled"... HAPTER HAPTER HAPTER AC D RIVE ARAMETERS In This Chapter... GS1 Parameter Summary ....4–2 Detailed Parameter Listings ....4–9 Motor Parameters . Chapter 4: AC Drive Parameters GS1 Parameter Summary Motor Parameters Description Range Default Parameter 0-00 Motor Nameplate Voltage 200/208/220/230/240 Drive Rated 0-01 Motor Nameplate Amps Drive Rated Amps X .3 to 1.0 Amps X 1.0 0-02 Motor Base Frequency 50/60/400 0-03 Motor Base RPM 375 to 9999 RPM... Page 42 Chapter 4: AC Drive Parameters Ramps Description Range Default Parameter 0: General Purpose 1: High Starting Torque 2-00 Volts/Hertz Settings 2: Fans and Pumps 3: Custom v v 2-01 Slip Compensation 0.0 to 10.0 v v 2-03 Manual Torque Boost 0 to 10% 2-04 Mid-point Frequency... Page 43 Chapter 4: AC Drive Parameters Digital (cont.) Description Range Default Parameter 0: AC Drive Running 1: AC Drive Fault 2: At Speed 3: Zero Speed 4: Above Desired Frequency (3-16) 3-11 Multi-function Output Terminal 5: Below Desired Frequency (3-16) 6: At Maximum Speed 7: Over torque detected 8: Above Desired Current (3-17) 9: Below Desired Current (3-17) Page 44 Chapter 4: AC Drive Parameters Protection Description Range Default Parameter 0: Constant Torque Electronic Thermal Overload 6-00 1: Variable Torque Relay 2: Inactive 6-01 Auto Restart after Fault 0 to 10 0: Stop operation after momentary power loss 1: Continue operation after momentary power loss, speed search from Speed 6-02 Momentary Power Loss... Page 45 Chapter 4: AC Drive Parameters Protection (cont.) Description Range Default Parameter 0: No Fault occurred 6-31 Present Fault Record 1: Over-current (oc) 2: Over-voltage (ov) 3: Overheat (oH) 6-32 Second Most Recent Fault Record 4: Overload (oL) 5: Overload 1 (oL1) 6: Overload 2 (oL2) 6-33 Third Most Recent Fault Record... Page 46 Chapter 4: AC Drive Parameters Communication Description Range Default Parameter 9-00 Communication Address 1 to 254 0: 4800 baud 9-01 Transmission Speed 1: 9600 baud 2: 19200 baud 0: MODBUS ASCII mode, 7 data bits, no parity,2 stop bits 1: MODBUS ASCII mode, 7 data bits, even parity,1 stop bit 2: MODBUS ASCII mode, 7 data bits, odd parity,1 stop bit... Page 47 1: GS1 2: GS2 9-41 GS Series Number 3: GS3 4: GS4 0: GS1-10P2 (120V, 1ph, 0.25HP) 1: GS1-10P5 (120V, 1ph, 0.5HP) 2: GS1-20P2 (230V, 1ph/3ph, 0.25HP) 9-42 Manufacturer Model Information 3: GS1-20P5 (230V, 1ph/3ph, 0.5HP 4: GS1-21P0 (230V, 1ph/3ph, 1HP) 5: GS1-22P0 (230V, 3ph, 2HP) Parameter can be set during RUN Mode. Chapter 4: AC Drive Parameters Detailed Parameter Listings Parameter Memory Address Number Hexadecimal (Decimal) Parameter Name 0-00 Motor Nameplate Voltage Mem Addr: 0000H (40001) Range: 200V series: 200/208/220/230/240 Default Setting: 240 •This parameter determines the Maximum Output Voltage of the AC drive. The Maximum Output Voltage setting must be less than or equal to the rated voltage of the motor as indicated on the motor nameplate. Page 49 Chapter 4: AC Drive Parameters 0-02 Motor Base Frequency Mem Addr: 0002H(40003) Range: 50/60/400 Default Setting 60 •This value should be set according to rated frequency of the motor as indicated on the motor nameplate. Maximum Voltage Frequency determines the volts per hertz ratio. Chapter 4: AC Drive Parameters Ramp Parameters Stop Methods Mem Addr: 0100H(40257) 1-00 Range: 0 Ramp to Stop Default Setting: 0 1 Coast to stop •This parameter determines how the motor is stopped when the AC drive receives a valid stop command. •... Page 51 Chapter 4: AC Drive Parameters v v Deceleration Time 1 1-02 Mem Addr: 0102H(40259) Range: 0.1 to 600.0 sec Default Setting: 30.0 sec •This parameter is used to determine the time required for the AC drive to decelerate from the Maximum Motor RPM (0-04) down to 0Hz. The rate is linear unless S-Curve is "Enabled."... Page 52 Chapter 4: AC Drive Parameters 1-04 Decel S-Curve Mem Addr 0104H(40261) Range: 0 to 07 Default Setting: 0 This parameter is used whenever the motor and load need to be decelerated more smoothly. The Decel S-Curve may be set from 0 to 7 to select the desired deceleration S-Curve. Page 53 Chapter 4: AC Drive Parameters 1-07 Select method for 2nd Accel/Decel Mem Addr 0107H(40264) Range: 0: Second Accel/Decel from terminal Default Setting: 0 1: Frequency Transition 1-08 & 1-09 • The second set of acceleration and deceleration times 1-05 and 1-06 can be selected either with a multi-function input terminal programmed to Second Accel/Decel or by the values of the transition frequencies 1-08 and 1-09 Second Accel/Decel Times selected with Multi-Function Input Terminal... Page 54 Chapter 4: AC Drive Parameters 1-10 Skip Frequency 1 Mem Addr 010AH(40267) Range: 0.0 to 400.0Hz Default Setting: 0.0 1-11 Skip Frequency 2 Mem Addr 010BH(40268) Range: 0.0 to 400.0Hz Default Setting: 0.0 1-12 Skip Frequency 3 Mem Addr 010CH(40269) Range: 0.0 to 400.0 Hz Default Setting: 0.0 •... Page 55 Chapter 4: AC Drive Parameters 1-19 DC Injection Voltage Level Mem Addr 0113H(40276) Range: 0 to 30% Default Setting: 0 •This parameter determines the amount of DC Braking Voltage applied to the motor during start-up and stopping. When setting DC Braking Voltage, please note that the setting is a percentage of the the rated voltage of the drive. Chapter 4: AC Drive Parameters Volts/Hertz Parameters 2-00 Volts/Hertz Settings Mem Addr 0200H(40513) Range: 0 - General Purpose Default Setting: 0 1 - High Starting Torque 2 - Fans and Pumps 3 - Custom 0: General Purpose 3: Custom Voltage Volts 0-00... Page 57 Chapter 4: AC Drive Parameters v v Slip Compensation 2-01 Mem Addr 0201H(40514) Range: 0.0 to 10.0 Default Setting: 0.0 • When controlling an asynchronous induction motor, load on the AC drive will increase causing an increase in slip. This parameter may be used to compensate the nominal slip within a range of 0 to 10. Page 58 Chapter 4: AC Drive Parameters 2-07 Minimum Output Voltage Mem Addr 0207H(40520) Range: 2.0 to 50.0V Default Setting: 10.0 •This parameter sets the Minimum Output Voltage of the AC drive. This parameter must be equal to or less than Mid-Point Voltage (2-05). 2-08 PWM Carrier Frequency Mem Addr 0208H(40521) Chapter 4: AC Drive Parameters Digital Parameters Source of Operation Command Mem Addr 0300H(40769) 3-00 Default Setting: 0 Settings Operation Determined by Digital Keypad Operation determined by external control terminals. Keypad STOP is enabled. Operation determined by external control terminals. Keypad STOP is disabled. Operation determined by RS485 interface. Page 60 Chapter 4: AC Drive Parameters 3-01: Setting 1 3-01: Setting 2 DI1- RUN command Latching input (N.O.) Runs when closed STOP DI1- RUN/STOP select RUN/STOP "Open" : Stop DI2- FWD/REV select "Close" : Run "Open" : FWD "Close" : REV FWD/REV DI2- FWD/REV select DI3- STOP command... Page 61 Chapter 4: AC Drive Parameters Setting Explanations for parameters 3-02 and 3-03 Setting 0: External Fault (N.O.) When an External Fault input signal is received, the AC drive output will turn off, the drive will display "EF" on the LED Display, and the motor will Coast to Stop.To resume normal operation, the external fault must be cleared, and the drive must be reset. Page 62 Chapter 4: AC Drive Parameters Settings 3 and 4: Multi-Speed Bits 1 and 2 The three Multi-Speed Bits are used to select the multi-speed settings defined by parameters 5-01 to 5-03. Multi-Speed Bits Speed Selection Bit 2 Bit 1 4-00: Source of Frequency 5-01: DI3-DI4 03: Mult-speed Bit 1... Page 63 Chapter 4: AC Drive Parameters Setting 10 and 11: External Base Block (N.O.) and External Base Block (N.C) Value 10 is for a normally open (N.O) input and value 11 is for a normally closed (N.C) input. DI3-DI4: Base Block Input Base Block (N.O.) Base Block (N.C) DI3-DI4... Page 64 Chapter 4: AC Drive Parameters Setting 12: Second Accel/Decel Time Multi-function Input Terminals DI3 and DI4 can be set to select between Accel/Decel times 1 and 2. Parameters 1-01 and 1-02 set Accel 1 and Decel 1 times. Parameters 1-05 and 1-06 set Accel 2 and Decel 2 times. Accel/Decel 2 DI3-DI4 DI3-DI4: Accel/Decel Time 2 Command... Page 65 Chapter 4: AC Drive Parameters Settings 14 and 15: Increase and Decrease Speed (Electronic Motor Operated Potentiometer) Settings 14 and 15 allow the Multi-function terminals to be used to increase or decrease speed incrementally. Each time an increase/decrease speed input is received the Master Frequency will increase/decrease by one unit. Page 66 Chapter 4: AC Drive Parameters 3-11 Multi-function Output Terminal Mem Addr 030BH(40780) Default Setting: 0 Settings: AC Drive Running AC Drive Fault At Speed Zero Speed Above Desired Frequency (3-16) Below Desired Frequency (3-16) At Maximum Speed (0-02) Over Torque Detected Above Desired Current (3-17) Below Desired Current (3-17) Function Explanations:... Page 67 Chapter 4: AC Drive Parameters v v Desired Frequency 3-16 Mem Addr 0310H(40785) Range: 0.0 to 400.0 Hz Default Setting: 0.0 •If the Multi-function output terminal is set to function as Desired Frequency Attained (3-11 =04 or 05), then the output will be activated when the programmed frequency is attained. Chapter 4: AC Drive Parameters Analog Parameters Source of Frequency Command Mem Addr 0400H(41025) 4-00 Default: 0 Settings: Frequency determined by keypad potentiometer Frequency determined by digital keypad up/down Frequency determined by 0 to +10V input on AI terminal. Analog input switch must be set to "V"... Page 69 Chapter 4: AC Drive Parameters v v Analog Input Offset P4.02 Mem Addr 0402H(41027) Range:0.0 to 100% Default Setting: 0.0 This parameter can be set during the operation • This parameter provides a frequency offset for an analog input. • Use the equation below to determine the Analog Input Offset. For this equation, you will need to know the necessary Minimum and Maximum Frequency References needed for your application. Chapter 4: AC Drive Parameters Analog Input Examples Use the equations below when calculating the values for the Maximum Output Frequency, Analog Input Offset, Analog Input Gain, and the Mid-point Frequency. Motor Max. RPM (0-04) Max. Output Frequency = x Base Frequency (0-02) Motor Base RPM (0-03) Note: The Maximum Output Frequency is not a parameter setting but is needed in order to calculate the Analog Gain. Page 71 Chapter 4: AC Drive Parameters Example 1: Standard Operation This example illustrates the default operation of the drive. The example is given to further illustrate the use of the analog calculations. The full range of the analog input signal corresponds to the full forward frequency range of the AC drive. •... Page 72 Chapter 4: AC Drive Parameters Example 2: Positive Offset In this example, the Analog Input will have a positive offset while still using the full scale of the potentiometer. When the potentiometer is at its lowest value (0V, 0mA, or 4mA), the set-point frequency will be at 10Hz. When the potentiometer is at its maximum value (10V or 20mA), the set-point frequency will be at 60Hz. Page 73 Chapter 4: AC Drive Parameters Example 3: Forward and Reverse Operation In this example, the potentiometer is programmed to run a motor full-speed in both forward and reverse direction. The frequency reference will be 0Hz when the potentiometer is positioned at mid-point of its scale. Parameter 4-04 must be set to enable reverse motion. Page 74 Chapter 4: AC Drive Parameters Example 4: Forward Run/Reverse Jog This example shows an application in which the drive runs full-speed forward and jogs in reverse. The full scale of the potentiometer will be used. Note: When calculating the values for the Analog Input using reverse motion, the frequency reference should be shown using a negative (-) number. Page 75 Chapter 4: AC Drive Parameters 4-05 Loss of ACI Signal (4-20mA) Mem Addr 0405H(41030) Range: 0 - Decelerate to 0Hz Default Setting: 0 1 - Stop immediately and display "EF". 2 - Continue operation by the last frequency command • This parameter determines the operation of the drive when the ACI frequency command is lost. Chapter 4: AC Drive Parameters Preset Parameters v v Jog Mem Addr 0500H(41281) 5-00 Range: 0.0 to 400.0 Hz Default Setting: 6.0 • The Jog Command is selected by a Multi-Function Input Terminal (3-02 and 3-03) set to the Jog Function (9). Frequency Jog Frequency 5-00... Chapter 4: AC Drive Parameters Protection Parameters Electronic Thermal Overload Relay Mem Addr 0600H(41537) 6-00 Range: 0 - Constant Torque Default Setting: 0 1 - Variable Torque 2 - Inactive •This function is used to limit the output power of the AC drive when powering a "self-cooled"... Page 78 Chapter 4: AC Drive Parameters 6-04 Auto Voltage Regulation Mem Addr 0604H(41541) Default Setting: 0 Settings: AVR enabled AVR disabled AVR disabled during decel AVR disabled during Stop • AVR function automatically regulates the AC drive output voltage to the Maximum Output Voltage (0-00). Page 79 Chapter 4: AC Drive Parameters 6-06 Auto Adjustable Accel/Decel Mem Addr 0606H(41543) Default Setting: 0 Settings: Linear Accel/Decel Auto Accel, Linear Decel Linear Accel, Auto Decel Auto Accel/Decel Auto Accel/Decel Stall Prevention If the auto accel/decel is selected, the AC drive will accel/decel in the fastest and smoothest means possible by automatically adjusting the time of accel/decel. Page 80 Chapter 4: AC Drive Parameters 6-10 Over-current Stall Prevention during Acceleration Mem Addr 060AH(41547) Range: 20 to 200% Default Setting: 150 A setting of 100% is equal to the Rated Output Current of the drive. • Under certain conditions, the AC drive output current may increase abruptly, and exceed the value specified by 6-10 This is commonly caused by rapid acceleration or excessive load on the motor. Page 81 Chapter 4: AC Drive Parameters 6-12 Maximum Allowable Power Loss Time Mem Addr: 060CH(41549) Range: 0.3 to 5.0 sec Default Setting: 2.0 • During a power loss, if the power loss time is less than the time defined by this parameter, the AC drive will resume operation. Page 82 Chapter 4: AC Drive Parameters 6-15 Upper Bound of Output Frequency Mem Addr 060FH(41552) Range: 0.1 to 400 Hz Default Setting: 400.0 This parameter must be equal to or greater than the Lower Bound of Output Frequency (6-16). Lower Bound of Output Frequency Mem Addr 0610H(41553) 6-16 Range: 0.0 to 400 Hz... Page 83 Chapter 4: AC Drive Parameters 6-31 Present Fault Record Mem Addr 061FH(41568) 6-32 Second Most Recent Fault Record Mem Addr 0620H(41569) 6-33 Third Most Recent Fault Record Mem Addr 0621H(41570) Fourth Most Recent Fault Record Mem Addr 0622H(41571) 6-34 Fifth Most Recent Fault Record Mem Addr 0623H(41572) 6-35 Sixth Most Recent Fault Record... Chapter 4: AC Drive Parameters Display Parameters v v User Defined Display Function Mem Addr 0800H(42049) 8-00 Default Setting: 0 Settings: Output Frequency (Hz) Motor Speed (RPM) Output Frequency x 8-01 Output Current (A) Motor Output Current (%) Output Voltage(V) DC Bus Voltage (V) Frequency Setpoint v v Frequency Scale Factor... Chapter 4: AC Drive Parameters Communication Parameters 9-00 Communication Address Mem Addr 0900H(42305) Range: 1 to 254 Default Setting: 1 • If the AC drive is controlled by RS-485 serial communication, the communication address must be set via this parameter. RS-485 ... Page 86 Chapter 4: AC Drive Parameters 9-03 Transmission Fault Treatment Mem Addr 0903H(42308) Default Setting: 0 Setting: 0 - Display fault and continue operating 1 - Display fault and RAMP to stop 2 - Display fault and COAST to stop 3 - No fault displayed and continue operating Time Out Detection Mem Addr 0904H(42309) 9-04... Page 87 Chapter 4: AC Drive Parameters v v Block Transfer Parameter 3 Mem Addr 090DH(42318) Range: 0-00 to 8-01, and 9-99 Default Setting: 9-99 • Setting 9-99 disables the parameter. v v Block Transfer Parameter 4 Mem Addr 090EH(42319) 9-14 Range: 0-00 to 8-01, and 9-99 Default Setting: 9-99 •... Page 88 Chapter 4: AC Drive Parameters v v RS485 Speed Reference 9-26 Mem Addr 091AH(42331) Range: 0.0 to 400.0 Hz Default Setting: 60.0 • This parameter is used to set the Master Frequency when the AC drive is controlled by communication interface. v v RUN Command Mem Addr 091BH(42332) 9-27... Page 89 Default Setting: ## Settings: 9-42 Manufacturer Model Information Mem Addr 092AH(42347) Default Setting: ## Settings: GS1-10P2 (120V, 1ph, 0.25HP) GS1-10P5 (120V, 1ph, 0.5HP) GS1-20P2 (230V, 1ph/3ph, 0.25HP) GS1-20P5 (230V, 1ph/3ph, 0.5HP GS1-21P0 (230V, 1ph/3ph, 1HP) GS1-22P0 (230V, 3ph, 2HP) 4–50... HAPTER HAPTER HAPTER GS1 MODBUS OMMUNICATIONS In This Chapter... Communication Parameters Summary ..5–2 GS1 Status Addresses (Read Only) ... . .5–4 Communicating with DirectLogic PLCs . Chapter 5: GS1 MODBUS Communications Communication Parameters Summary A summary of the GS1 Communications Parameters is listed below. For a complete listing of the GS1 Parameter, refer to C HAPTER Communications Description Range Default Parameter 9-00 Communication Address 1 to 254 0: 4800 baud 9-01 Transmission Speed... Page 92 1: GS1 2: GS2 9-41 GS Series Number 3: GS3 4: GS4 0: GS1-10P2 (120V, 1ph, 0.25HP) 1: GS1-10P5 (120V, 1ph, 0.5HP) 2: GS1-20P2 (230V, 1ph/3ph, 0.25HP) 9-42 Manufacturer Model Information 3: GS1-20P5 (230V, 1ph/3ph, 0.5HP 4: GS1-21P0 (230V, 1ph/3ph, 1HP) 5: GS1-22P0 (230V, 3ph, 2HP) Parameter can be set during RUN Mode. Chapter 5: GS1 MODBUS Communications GS1 Status Addresses (Read Only) The GS1 Series AC drive has status memory addresses that are used to monitor the AC drive. The status addresses and value definitions are listed below. Status Monitor 1 Memory Address 2100H(48449) Error Codes: 11: Hardware Protection Failure (HPF) 0: No fault occurred... Page 94 Chapter 5: GS1 MODBUS Communications Frequency Command F (XXX.X) Memory Address 2102H(48451) Status location for the frequency setting of the AC drive. Output Frequency H (XXX.X) Memory Address 2103H(48452) Status location for the actual operating frequency present at the T1, T2, and T3 terminals. Output Current A (XXX.X) Memory Address 2104H(48453) Status location for the output current present at the T1, T2, and T3 terminals. Chapter 5: GS1 MODBUS Communications Communicating with DirectLOGIC PLCs The following steps explain how to connect and communicate with the GS1 Series AC drives using DirectLOGIC PLCs. Step 1: Choose the Appropriate CPU. The GS1 Series AC drives will communicate with the following DirectLOGIC CPUs using MODBUS communications. Page 96 Chapter 5: GS1 MODBUS Communications DL350/DL450: RS-485 Connection Wiring DL350/DL450 PORT 1 Comm Port 2 GND 2 TXD 3 RXD 4 SG + TXD+ 3 RXD 4 TXD 3 SG - TXD - - 5 CTS RXD - - 4 RTS 2 CTS 7 GND 6 GND... Page 97 Chapter 5: GS1 MODBUS Communications DirectLOGIC MODBUS Port Configuration The following configuration example is specific to the DL250 CPU. Refer to the appropriate CPU User Manual for the specifics on your DirectLOGIC CPU. • In DirectSOFT, choose the PLC menu, then Setup, then "Secondary Comm Port". •... Page 98 Chapter 5: GS1 MODBUS Communications DirectLOGIC MODBUS Ladder Programming The set up for all of the DirectLOGIC CPUs is very similar. However, there may be some subtle differences between CPUs. Refer to the appropriate CPU User Manual for the specifics on your DirectLOGIC CPU. The following ladder program shows some examples of how to control the GS1 AC drive through MODBUS RTU. Page 99 Chapter 5: GS1 MODBUS Communications DirectLOGIC MODBUS Ladder Programming (cont.) Rungs 2 through 4 monitor the number of times the PLC fails in communicating with the AC drive. These instructions set the C50 bit (to be used for alarm or shut-down) based on the number of times the SP117 bit is active in one minute. Page 100 Chapter 5: GS1 MODBUS Communications DirectLOGIC MODBUS Ladder Programming (cont.) If you only want to control the start/stop and speed reference of the drive, simply change the second LD command of this rung to K4 and WX command to V4432. Then V2000 would be your start/stop location and V2001 would be your speed reference location. Page 101 Chapter 5: GS1 MODBUS Communications Alternate MODBUS Ladder Programming The Read and Write commands for the DL260 and DL06 CPUs are different from other DirectLOGIC CPUs. Rungs 5 and 6 are shown below as they relate to DL260 and DL06 CPUs. Rung 5 writes the values from V2000 to V2023 to the drive parameters 9.11 to 9.30. Page 102 Chapter 5: GS1 MODBUS Communications DirectLOGIC MODBUS Ladder Programming (cont.) Rung 7 is used to set bit C55 if the AC drive has an error. Rung 8 will reset bit C55. Error code word 2100 Drive error in the drive V3000 Clear errors Drive error... Page 103 Chapter 5: GS1 MODBUS Communications DirectLOGIC MODBUS Ladder Programming (cont.) Rung 13 loads a decimal value of 150 into drive parameter 9-26. The BIN instruction converts BCD/HEX to decimal. This tells the drive to run at 15.0Hz. K150 V2017 Rung 14 loads a decimal value of 300 into drive parameter 9-26. The BIN instruction converts BCD/HEX to decimal. Page 104 Chapter 5: GS1 MODBUS Communications DirectLOGIC MODBUS Ladder Programming (cont.) Rung 16 loads a decimal value of 600 into drive parameter 9-26. The BIN instruction converts BCD/HEX to decimal. This tells the drive to run at 60.0Hz. K600 V2017 Rung 17 sets the motion of the drive to forward by loading a value of 0 into parameter 9-28. Chapter 5: GS1 MODBUS Communications Communicating with Third-party Devices The GS1 Comm Port can accommodate an RS485 network connection. The GS1 Comm Port pin-out RJ-11 Serial Comm Port can be found to the right. An RS-485 network cable RS-485 Interface can span up to 1000 meters (4000 feet). Page 106 Chapter 5: GS1 MODBUS Communications Data Format ASCII Mode: 10-bit character frame (For 7-bit character): 9-02 = 0 (7 data bits, no parity, 2 stop bits) Start Start Stop Stop 7-bit character 10-bit character frame 9.02 = 01 (7 data bits, even parity, 1 stop bit) Start Even Stop... Page 107 Chapter 5: GS1 MODBUS Communications 9-02 = 5 (8 data bits, odd parity, 1 stop bit) Start Stop parity 8-bit character 11-bit character frame Communication Protocol ASCII Mode: Start Character: (3AH) ADR 1 ADR 0 Communication Address: 8-bit address consists of 2 ASCII codes CMD 1 CMD 0 DATA (n-1) Page 108 Chapter 5: GS1 MODBUS Communications CMD (Command code) and DATA (data characters) The format of data characters depends on the command code. The available command codes are described as followed: Command code: 03H, read N words. The maximum value of N is 20. For example, reading continuous 2 words from starting address 2102H of AMD with address 01H. Page 109 Chapter 5: GS1 MODBUS Communications Command code: 06H, write 1 word For example, writing 6000(1770H) to address 0100H of AMD with address 01H. ASCII mode: Command Message Response Message STX ':' ADR 1 ADR 1 ADR 0 ADR 0 CMD 1 CMD 1 CMD 0 CMD 0... Page 110 Chapter 5: GS1 MODBUS Communications CHK (check sum) ASCII Mode: LRC (Longitudinal Redundancy Check) is calculated by summing up, module 256, the values of the bytes from ADR1 to last data character then calculating the hexadecimal representation of the 2's-complement negation of the sum. For example, reading 1 word from address 0401H of the AC drive with address 01H. Page 111 Chapter 5: GS1 MODBUS Communications CRC (Cyclical Redundancy Check) is calculated by the following steps: Step 1: Load a 16-bit register (called CRC register) with FFFFH. Step 2: Exclusive OR the first 8-bit byte of the command message with the low order byte of the 16-bit CRC register, putting the result in the CRC register. HAPTER HAPTER HAPTER AINTENANCE AND ROUBLESHOOTING In This Chapter... Maintenance and Inspection ....6–2 Troubleshooting ......6–3... Chapter 6: Maintenance and Troubleshooting Maintenance and Inspection Modern AC drives are based on solid state electronics technology. Preventive maintenance is required to operate the AC drive in its optimal condition, and to ensure a long life. It is recommended that a qualified technician perform a regular inspection of the AC drive. Chapter 6: Maintenance and Troubleshooting Troubleshooting Fault Codes The AC drive has a comprehensive fault diagnostic system that includes several different alarms and fault messages. Once a fault is detected, the corresponding protective functions will be activated. The fault codes are then displayed on the digital keypad display. Page 115 Chapter 6: Maintenance and Troubleshooting Fault Codes Fault Name Fault Descriptions Corrective Actions 1. Check for possible motor overload. 2. Check electronic thermal overload setting. 3. Increase motor capacity. Internal electronic overload trip 4. Reduce the current level so that the AC drive output current does not exceed the value set by the Motor Rated Current 0-01. Page 116 Chapter 6: Maintenance and Troubleshooting Fault Codes Fault Name Fault Descriptions Corrective Actions 1. When the external input terminal (base-block) is active, the AC drive output will be turned off. External Base Block: AC drive output is turned off. 2. Disable this connection and the AC drive will begin to work again. Page 118 PPENDIX PPENDIX PPENDIX CCESSORIES In This Appendix... Circuit Protection Devices ....A–2 Fuse Kits .... .A–2 Ethernet Interface . Appendix A: Accessories Circuit Protection Devices Circuit protection devices are essential to prevent costly damage to your AC Drive application equipment. Fuse kits are available from Automation Direct for the GS1 Series AC Drives, and their specifications are found below. Specifications for other circuit protection devices used in conjunction with the GS1 AC Drives can be found on the next few pages. Page 120 2. For 3-phase AC Drives with output currents of 100A or less, the current rating of the breaker shall be four times the maximum of output current rating. Non-fuse Circuit Breaker Chart Part Number Input Current Output Current Recommended Breaker Size GS1-10P2 1.6A GS1-10P5 2.5A GS1-20P2 (1 Ø/3 Ø)* 4.9A... Appendix A: Accessories Ethernet Interface GS-EDRV The GS-EDRV provides a high-performance Ethernet link between a control system and a GS1 Series AC drive. It mounts on DIN rail and connects a drive to an Ethernet hub or PC. The GS-EDRV processes input signals from the drive, formats the signals to conform with the Ethernet standard, and transmits the signals to the controller. Appendix A: Accessories Miscellaneous Accessories Communication Distribution Blocks GS-RS485-4 GS-RS485-4 GS-RS485-8 4 port RS485 Communication Distribution Block GS-RS485-8 8 port RS485 Communication Distribution Block A–5 GS1 Series AC Drive User Manual... Page 124 PPENDIX PPENDIX PPENDIX GS1 AC SING RIVES WITH LOGIC PLC IRECT In This Appendix... Compatible DirectLOGIC PLCs and Modules ..B–2 Typical Connections to the GS1 Series AC Drive . .B–6... Appendix B: Using GS1 AC Drives with DirectLOGIC PLCs Compatible DirectLOGIC PLCs and Modules The following tables show which DirectLOGIC PLCs and modules can be used with the GS1 Series AC Drive. DirectLOGIC PLC Modules for Use with GS1 AC Drives DL05 PLCs DL05 CPU, 8 AC in / 6 Relay out, 110/220VAC Power Supply. Page 126 Appendix B: Using GS1 AC Drives with DirectLOGIC PLCs DirectLOGIC PLC Modules for Use with GS1 AC Drives (cont.) DL05/DL06 Analog Module F0-2AD2DA-2 2 channel in, 2 channel out voltage analog option card; 0-5V, 0-10V F0-4AD2DA-2 4 channel in, 2 channel out voltage analog option card; 0-5V, 0-10V F0-4AD2DA-1 4 channel in, 2 channel sourcing out current analog option card;... Page 127 Appendix B: Using GS1 AC Drives with DirectLOGIC PLCs DirectLOGIC PLC Modules for Use with GS1 AC Drives (cont.) DL305 AC/DC Output Modules 8 pt. 5-30 VDC or 5-220 VAC output module, 5A/point DC or 4A/point AC, 8 Form A relays D3-08TR (SPST), 2 commons (isolated), non-removable terminal, 2 user replaceable fuses 16 pt. Page 128 Appendix B: Using GS1 AC Drives with DirectLOGIC PLCs DirectLOGIC PLC Modules for Use with GS1 AC Drives (cont.) Terminator I/O DC Output Modules 8 pt. 12-24 VDC current sinking output module, 4 points per common, 1.0A/point, 2 T1K-08TD1 replaceable fuses (T1K-FUSE-1). (use with T1K-08B or T1K-08B-1 terminal base) 16 pt. Appendix B: Using GS1 AC Drives with DirectLOGIC PLCs Typical Connections to the GS1 Series AC Drive The following drawings show some typical connections between the GS1 Series AC Drive and DirectLOGIC PLCs and modules. DC Output Modules • D0-05DD •... Page 130 Appendix B: Using GS1 AC Drives with DirectLOGIC PLCs Isolated Analog Output Modules • F2-02DAS-1 • F4-04DAS-1 • F2-02DAS-2 • F4-04DAS-2 GS1-xxxx Isolated Analog Output Module +10V 10mA (max) I(+) 0 – + 10V I(-) 4 – 20mA Main circuit (power) terminals Control circuit terminal Shielded leads B–7... Page 131 Appendix B: Using GS1 AC Drives with DirectLOGIC PLCs Non-Isolated Voltage or Sourcing Current Analog Output Modules • F0-02AD2DA-2 • F2-08DA-1 • T1F-08DA-2 • F0-04AD2DA-1 • F2-02DA-2 • T1F-16DA-2 • F0-04AD2DA-2 • F2-08DA-2 • T1F-8AD4DA-1 • F2-02DAS-1 • F4-08DA-2 • T1F-8AD4DA-2 •... Page 132 NDEX Accel 1 to Accel 2 Frequency Transition, 4–14 Circuit Breaker, A–3 Accel S-Curve, 4–12 Circuit Connections, 2–5 Acceleration Time 1, 4–11 Circuit Protection Devices, A–2 Acceleration Time 2, 4–13 Communicating with Third-party Devices, 5–16 Circuit Protection Devices, A–2 Communication Address, 4–46 Fuse Kits, A–2... Page 133 Index DirectLOGIC MODBUS Ladder Programming, quickstart, 3–5 5–9 specifications, 1–5 DirectLOGIC PLCs, B–2 wiring, 2–5 thru 2–12 Display, 3–2 Display Function, 4–45 Display Parameters, 4–45 Input Terminals, 4–20 Inspection, 6–2 Annual, 6–2 Monthly, 6–2 Electronic Thermal Overload Relay, 4–38 Installation, 2–3 Error Codes, 6–3 Introduction, 1–3 External Fault, 4–49... Page 134 Index Model Information, 4–50 Analog Input Offset, 4–30 Analog Input Offset Polarity, 4–29 Model Number, 1–3 Analog Input Reverse Motion Enable, 4–30 Momentary Power Loss, 4–38 Auto Adjustable Accel/Decel, 4–40 Motor Base Frequency, 4–10 Auto Restart after Fault, 4–38 Motor Base RPM, 4–10 Auto Voltage Regulation, 4–39 Motor Maximum RPM, 4–10 Auto-torque Boost, 4–18... Page 135 Index Motor Base RPM, 4–10 Programming, 3–4 Motor Maximum RPM, 4–10 Protection Parameters, 4–38 Motor Nameplate Amps, 4–9 PWM Carrier Frequency, 4–19 Motor Nameplate Voltage, 4–9 Multi-function Input Terminals, 4–20 Multi-function Output Terminals, 4–27 Quickstart, 3–5 Multi-speed bits, 4–37 Over-current Stall Prevention during Acceleration Ramp Parameters, 4–11... Index Unpacking, 1–3 Upper Bound of Output Frequency, 4–43 Voltz/Hertz Parameters, 4–17 Warnings, 4–49 Wiring, 2–5 thru 2–12 i–5 GS1 Series AC Drive User Manual... Page 137 *GS1-M*...

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