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Esda servo motor manual

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Technical Support FAQ: ESDA Series Driver User's Manual This document provides an overview of products from Panasonic, Dongyuan, Weikong, EVIEW, Shilin, and Xiankong, including PLC, inverter, touch screen, door controller, servo motor. It also covers installation methods, dimension diagrams, matching tables for drivers and motors, and wiring precautions. The manual is divided into two main sections: System Wiring and Panel operation. System Wiring provides information on the driver's components, including CN1 connector, CN2 encoder connector, connection diagram, power and motor connection diagram, RS232 communication protocol, and memory map. Panel operation covers mode selection and auxiliary functions such as historical alarm. 1. Introduction You've chosen ESDA series AC servo Drivers for your needs. These drivers utilize digital servo technology to deliver precise and versatile functions for driving servo motors. Due to the safety features built into the driver design, it's crucial that users familiarize themselves with this manual and perform all setup and operations with caution. 1.1. Unpacking Upon receiving the shipment from your supplier, verify: - The motor(s) and driver(s) match what was ordered. - The capacity of the driver matches the motor to be driven (refer to Driver Specification for correct matching). - No damage occurred to packaging materials during transportation. 1.2. Relocation Use original packaging for driver relocation, handling it with care. 1.3. Safety Precautions - Wait at least 10 minutes after shutting off power before touching terminals or opening the driver chassis due to high volume capacitors that remain charged. - Keep a safe distance from the unit while power is on to prevent personal injury from erroneous operation. - Disconnect power if the Driver/Motor unit is not used for a prolonged period. - Connect motor ground to the FG terminal of the Driver and Class 3 grounding to prevent electric leakage. 2. Procedures This manual provides information for installing and configuring ESDA series Drivers, assuming a basic understanding of AC Servo Motors. It includes: - Chapter 1: Installation-related information (Dimensions and Specifications). - Chapter 2: Wiring information. - Chapter 3: Procedures for Panel Operation. - Chapter 4: Alarm Codes. Chapter 2: Procedures 2. Clear the historical alarm codes -----27 2.1. Jog -----28 2.2. Firmware version -----28 2.3. Reset - Warm start -----29 2.4. Input ports status -----29 2.5. Output ports status -----30 2.6. Reload the default values -----31 Chapter 3: Procedures for Panel Operation -----31 2.9. -----32 2.10. -----32 2.11. Alarm code -----40 **Installation Requirements** * The driver must be single-point grounded. * When installed in a confined space, ensure proper ventilation to keep the environment temperature below 55°C. Use rubber pads or shock absorbers to insulate vibrations from nearby equipment. * Avoid installing the driver in areas with corrosive gases, excessive dust, or metal powder. * Insulate against water, mist, or cutting fluids. * If near a large magnet switch or welding equipment that may generate electronic noise, use a line filter (recommended: DELTA 06DPCW5). Alternatively, use an insulating transformer at the input of the driver if a line filter is not allowed due to excessive leakage current. **Installation Orientation and Mounting** * The driver must be installed vertically. * Use four M5 screws to securely mount the driver. * Maintain at least 2 cm spacing around the driver unit. * Prevent foreign objects such as cutting chips, small screws, or washers from falling into the opening of the driver unit. **Dimensions and Specifications** * The driver comes in several models (ESDA15, ESDA20, ESDA30, and ESDA40), each with its own specifications: + Maximum peak current, maximum rated current, environmental temperature, humidity, vibration, manual operation error message, over-travel inhibit, encoder output display, digital input/output communication, input type, maximum input frequency, electronic gear ratio, input ripple filtering, in-position range. + General specifications include operating and storage temperatures, relative humidity, and vibration limits. **System Wiring** * The driver has various connectors, including: + Display panel and push buttons + RS-232 connector + Power terminal + CN1 connector (with pins for servo on/off, clear error counter, pulse inhibit, internal speed setting, and input power) + Motor terminal + Encoder input The encoder phase and output port connections are explained in detail. The ALM connects to the DG normally but becomes open when an abnormal condition is detected. When the difference between command pulses and feedback pulses is less than a set value, the INP signal turns ON. The encoder input pulses after frequency division (PN0) are output by the line driver. The motor rotation direction is determined based on the phase A lead by 90 degrees. The Z phase of the encoder input signal is transferred to PZ. The input and output ports have specific connections, including internal circuits for command pulse input ports and differential devices, as well as connection diagrams for photo couplers and relay coils. The CN2 encoder connector pinout is also explained, with specifications for wire length and shielding. The power and motor connections are described, including line filters and regenerative resistors required for heavy inertia motors. Finally, the RS232 DB-9 driver PC communication port settings are outlined, including baud rate, parity, data bit, stop bit, flow control, and read commands to retrieve system data and set operation parameters. is "R530EA": R(52H), 5(35H), 3(33H), 0(30H), E(45H), A(41H). @Drive's response: %XxYySs Where: %: This is a response. Xx = High word of data Yy = Low word of data Ss = Check Sum = '% + 'X' + 'x' + 'Y' + 'y' ... @To read a DOUBLE-WORD from driver Syntax : L5NnSs The read command must be started with "L5" and the Where: command string length must be "6". L5: This is a double word read command. Nn = the address of the data to be read. Ss = Check Sum = 'L' + '5' + 'N' + 'n' ... @To write a SINGLE-WORD to driver Syntax : W5XxYyZzSs The write command must be started with "W5" and the command string length must be "8". Where: W5: This is a single-word write command. Xx = the address of the data to be written. Yy = the high word of the data Zz = the low word of the data Ss = 'W' + '5' + 'X' + 'x' + 'Y' + 'y' + 'Z' + 'z' ... @ Driver's response: %XxYyAaBbSs Where: %: This is a response. XxYy = data stored in Nn+1 AaBb = data stored in Nn Ss=%'X'+ 'x'+ 'Y'+ 'y'+ 'A'+ 'a'+ 'B'+ 'b' ... @To write a DOUBLE-WORD to driver Syntax : M5NnXxYyAaBbSs The write command must be started with "M5" and the command string length must be "14". M5: This is a double-word write command. Nn = the address of the data to be written. Xx = the high word of the data to stored in Nn+1 Yy = the Low word of the data to stored in Nn+1 Aa = the high word of the data to stored in Nn Bb = The Low word of the data to stored in Nn Ss='M'+ '5'+ 'N'+ 'n'+ 'X'+ 'x'+ 'Y'+ 'y'+ 'A'+ 'a'+ 'B'+ 'b' ... @ Driver's response: % (25H) If there is a Check Sum error in the read command, then the driver returns "!" (21H) Memory map Address 0~9,10,11,12~63,64~79,80~93,94,95~127 Descriptions Historical Alarm Codes (NO.0~NO.9), Address of the last Alarm (0~9), User Parameter Check Sum (NO.0~NO.51, XOR), User Parameter (NO.0~NO.51), Read/Write, unsigned. Reserved for USER as the motor model Motor Parameter Backup copy of Addr11 Default values for User Parameters (NO.32~NO.0) 24 128~147 148~157 158~191 192(C0H) 193(C1H) 194(C2H) 195(C3H) 196(C4H) 197(C5H) 198(C6H) 199(C7H) Monitor Mode (NO.0~NO.19), Read only, signed. Monitor Mode Data Area. See Section 2.8.3 for detailed information. Reserved 1. Address 11 is the check sum of Address 12~63. 1. Select the jog function 'Fn002' by pressing the ▲ or ▼ key. 2. Hold the DATA key for more than 1 second to activate the jog function in either direction. 3. To return to auxiliary mode, hold the DATA key for more than 1 second. **User Interface and Settings** To access settings, press the MODE key repeatedly until PN000 is displayed. Then use the ▲ and ▼ keys to select the desired parameter number. 1. To view or edit a setting: * Press the DATA key for more than 1 second to retrieve the current value. * Use the ▲ and ▼ keys to increase or decrease the value. * Press the DATA key again to store the new value in the EEPROM. 2. To unlock the function execution lock (for functions 7, 8, and 9): * Press the MODE key repeatedly until PN000 is displayed. * Select parameter number 0 (which unlocks function execution). **Parameter Table** The user parameter table lists settings for various functions and features. Here's a summary of each setting: | Parameter # | Definition | Range | | --- | --- | --- | | 1-4, 11-1, 12-1 | Speed loop gain, integration time, etc. | Various | | 5-9 | Torque limits (positive and negative) | Various | | 10-1 to 13-2 | Filter settings for position and speed | Various | | 14-21 | Settings for jog mode, acceleration/deceleration times, etc. | Various | | 22-4 | Denominator of electronic gear ratio | 0-32767 pulses | | 23-3 | Acceleration time (for jog mode) | 1-10000 ms | **Notes** * Some settings have a default value or can be reset to their initial state. * Certain parameters may only be accessed through specific functions or modes. Please let me know if you'd like me to clarify any of these points! **Motor Configuration Parameters** The motor configuration parameters are used to optimize the performance of the motor. The parameters include: * Encoder settings: + Pulse per revolution (PPR) + Position gain + Smoothing time * Error counter length * Feed-forward gain * Deceleration and acceleration times * Jog speed * Regeneration duty cycle * Current loop smoothing time **Regeneration Settings** The regeneration settings prevent the motor from drawing power back into the system when it's braking. The recommended regeneration resistor is 50Ω, 50W for drivers with a capacity of 20A or less, and 40Ω, 70W for drivers with a capacity of 40A. **Current Loop Settings** The current loop settings control how the motor responds to torque commands. The parameters include: * Proportional gain * Integral gain * Torque command value for cancelling 1 control **Encoder Settings** The encoder settings control how the motor uses feedback from the encoder to adjust its position and speed. The parameters include: * Pulse shift: the angle of the encoder index and current phase * Encoder power on delay * Encoder brand/type **Motor Type and Configuration** The motor type and configuration settings specify the characteristics of the motor, including: * Rated speed * Maximum speed pole * Inductance * Rated current * Inertia * Voltage constant * Torque constant **Monitoring Mode** The monitoring mode allows users to view the contents of the DN registers. The parameters can be viewed and modified using a series of keystrokes on the panel. Note: I've removed some of the more technical details and focused on providing a clear summary of the main points. Let me know if you have any specific questions about these settings! Torque: Value represents 129 percentage of motor rated torque. Example: value 120 means current torque output is 120% of rated torque. Actual Load: Average torque output in 26 seconds, value represents 130 percentage. Maximum Load: The maximum value appeared in DN2 Error: difference between command pulses and encoder feedback pulses. Command Pulses: Input pulse number multiplied by electronic gear ratio. Driver Capacity: 150 means 15A, 200 means 20A, 300 means 30A. Speed Command: 4 means 1 rpm, 12000 means 3000 rpm. DN Number Definition: 38 DN number definition: PC r/w address. Motor Type: Refer to table at the end of this section. Servo Status: 0 means 'servo on', 1 means 'servo off'. Overload Counter: Incremented if transient overload detected, counter reaches 1250 'Overload' warning issued. Accumulated Pulses Count: Lower word (32 bits), higher word not displayed. Encoder Feedback Pulses Count: Lower word (32 bits), higher word not displayed. Error: difference between command pulses and encoder feedback pulses. Command Pulses: input pulse number multiplied by electronic gear ratio. Accumulated Input Pulses. Accumulated Encoder Feedback Pulses: X RPM. 4 means 1 RPM. Example: 480 means current motor speed is 120 rpm (sampled value in 50 samples, 10 milliseconds). X Torque: Output percentage of rated torque. Value represents 120% of rated torque (sampled value in 50 samples, 10 milliseconds). DN Number X: Values can only be read/written via RS232 communication port. Alarm Code: A message indicating error occurs, will stay until any key is pressed. Error Removal Method: 1. Reset 2. Reset 3. Reset 4. Power off 5. reset 6. reset 7. reset 8. reset 9. 10. reset Definition: Low Voltage (DC voltage below 250V, or AC voltage below 180V), Over Voltage (DC voltage over 390V), most cases happened on large inertia. Please watch DN9 while running. Regeneration Rate: 100 represents 1%. Maximum Regeneration Rate: 100 represents 1%. Maximum Torque: Maximum torque output since power on. Driver Capacity: 150 means 15A, 200 means 20A, 300 means 30A. Speed Command: 4 means 1 rpm, 12000 means 3000 rpm. Overload Error: 200% rated load can last for about 10 seconds, 300% load can last for about 4 seconds. IPM Error: due to high temperature, short-circuit, over current or low control voltage in IPM. Encoder Error: signal from encoder is erroneous, please check connection or encoder. CPU Error: watch dog time out. CPU already lost control. Parameter Error: Electronic gear rate not in range (0.02~50). Parameter Checksum Error. Data stored in EEPROM may be corrupted. Emergency Stop: 1. Over current (300% rated current), please check the motor connection. Or, 2. Specify a longer acceleration/deceleration The error counter has overflowed due to a significant difference between command pulses and feedback pulses, exceeding the defined range in PN25. Additionally, the speed has exceeded the value specified in PN46, while the peak input pulse has reached 600kpps. During power on, an abnormal reading was detected from the current sensors, indicating potential issues. Code 18 indicates a voltage-related error, which can be resolved by resetting the definition of voltage levels. Specifically: - High DC voltage above 360V or high AC voltage above 255V may trigger this code. - The voltage monitor device's accuracy is limited to a maximum error of 2.02%. - For motors with a rated voltage of 100V, the alarm threshold will be half of the listed value (e.g., DC112V for low voltage). There are three methods to reset the driver: power cycling, using Fn004, or sending an input signal from pin2 of CN1. However, addressing the underlying cause of the alarm is essential before attempting a reset.