

Protective Functions (Details of Alarm Codes)

Protection	Alarm Code No.	Cause	Countermeasures
Control power undervoltage	11	The P-N voltage of the control power converter is lower than the specified value. Or the control voltage is too low due to an instantaneous outage or shortage of power capacity.	Measure the P-N voltage to check whether the voltage is correct or not. Modify the control voltage to an acceptable value, and/or increase the power capacity.
Overvoltage	12	The line voltage is larger than the specified acceptable range, so that the P-N voltage of the converter is larger than the specified value, or the line voltage was raised by a condensive load or UPS (Uninterruptible Power Supply). 1) The internal regenerative discharge resistor is disconnected. 2) The external regenerative discharge resistor is not suitable so that regenerative energy cannot be absorbed. 3) The driver (circuit) failed.	Measure the terminal-to-terminal voltages (between L1, L2 and L3). Remove the causes, and input the correct voltage. 1) Measure the P-B1 resistance of the driver using a circuit tester. If it read ∞ , the connection is broken. Replace the driver. Insert an external regenerative discharge resistor between the P and B2 terminals. 2) Use a resistor having the specified resistance for specified Watt. 3) Replace with a new driver (that is working correctly for another axis).
Main power undervoltage	13	The P-N voltage of the main power converter is lower than the specified value during Servo-ON. 1) The main power line voltage is too low, an instantaneous outage occurred, the power source is too small, the main power is turned off, or the main power is not fed. 2) Shortage of power source: the line voltage dropped due to the inrush current at power on. 3) Lack of phase Power source has been operated at single phase. 4) Servo-on at main power source off. 5) driver damage (circuit damage) 6) With the short line (short bar) between the connector X2 or DL1 – DL2 (B1-B2) disconnected, a user turned the servo ON.	Measure the terminal-to-terminal voltages (between L1, L2 and L3). 1) Increase the capacity supply voltage. Change power source. Remove the source that caused the electromagnetic contractor to drop, and turn the power on again. 2) Increase the capacity of the main power. For the required capacity, see page 30 "List of drivers and Compatible Peripheral Equipment". 3) Correct the phase (L1, L2 and L3) connections of the main power. If the main power is single-phase 100V, use L1 and L3. 4) Check the timing of power-on (for both the main power and control power). After the servo ready signal is output, activates servo-on. See page 40 the "Timing Chart". 5) Replace to a new driver (which is operated at another axis) 6) Ensure that the short line (short bar) between the connector CN X2 or DL-DL2 is not disconnected.
* Overcurrent and ground fault	14	The current flowing in the converter is larger than the specified value. 1) The driver failed (due to defective circuits or IGBT parts). 2) Motor wires (U, V and W) are shorted. 3) Motor wires (U, V and W) are grounded. 4) Motor burned 5) Poor connection of Motor wires 6) The relay for the dynamic brake is melted and stuck due to the frequent Servo-ON/OFF. 7) The motor is not compatible with the driver. 8) The timing of the pulse input and servo-on is the same, or the pulse is faster.	1) Disconnect the motor wires, and enter Servo-ON. If this trouble happens immediately, replace the driver with a new one (that is working correctly). 2) Check if the U, V and W wires are shorted at the connections. Reconnect them, if necessary. 3) Measure the insulation resistance between U/V/W and earth wire. If the resistance is not correct, replace the motor with a new one. 4) Measure the resistance between U, V and W. If they are unbalanced, replace the motor with a new one. 5) Check if the U/V/W connector pins are firmly secured with screws. Loosened pins should be fixed firmly. 6) Replace the driver with a new one. Do not start or stop the motor by entering Servo-ON or OFF. 7) Check the capacity of the motor and driver on the nameplate. If the motor is not compatible with the driver, replace it with a correct one. 8) Input the pulse at least 50 ms after servo-on. See page 41 the "Timing Chart".

Overload Protection: Time Limiting Characteristic

Time(sec)

Torque(%)

Legend:

- Solid line: MAMA 100W, MSMA 30W – 100W, MAMA 200W – 750W, MSMA 200W – 5kW, MDMA 750W – 5kW, MFMA 400W – 4.5kW, MGMA 300W – 4.5kW
- Dashed line: MAMA 100W, MSMA 30W – 100W, MAMA 200W – 750W, MSMA 200W – 5kW, MDMA 750W – 5kW, MFMA 400W – 4.5kW, MGMA 300W – 4.5kW

Protection	Alarm Code No.	Cause	Countermeasures
* Encoder communication error~ ~ ~ ~ ~ ~	21~ ~ ~ ~ ~ ~	Due to communication breakdown between the encoder and driver, the detective function for broken encoder wires is activated.~ ~ ~ <Caution> ~ ~ If the above has occurred before power-on, be careful as the motor automatic recognition of and protection against abnormality (alarm code No.95) will be activated.~	Correct the encoder wiring per the wiring diagram. Correct the connection of the pins.~ ~ ~ ~ ~ ~
* Encoder communication data error~ ~ ~ ~ ~ ~	23~ ~ ~ ~ ~ ~	The encoder sends an erroneous data mainly due to noises. The encoder is connected correctly, though the data is not correct.~ ~ ~ <Caution> ~ ~ If the above has occurred before power-on, be careful as the motor automatic recognition of and protection against abnormality (alarm code No.95) will be activated.~	Make sure that the power of the encoder is 5VDC $\pm 5\%$ (4.75 to 5.25V). Especially when the wire length is long, it is important to meet this requirement. You should not bundle the encoder wires and motor wires together. Connect the shield to FG. See the encoder wiring diagram.~ ~ ~ ~ ~ ~
Position deviation error~ ~ ~ ~ ~ ~	24~ ~ ~ ~ ~ ~	The position error pulse is larger than Pr63 (position error limit). The motor operation does not respond to the commands.~ ~ ~ ~ ~ ~	Check whether the motor operates per the position command pulse or not. See the torque monitor to check if the output torque is saturated. Readjust the gains. Maximize the value of Pr5E (torque limit set-up). Correct the encoder wiring per the wiring diagram. Increase the acceleration and deceleration time. Reduce the load and speed.~
* Hybrid deviation error~ ~ ~ ~ ~ ~	25~ ~ ~ ~ ~ ~	When the driver of the full-closed version is under the full-closed and hybrid control with an external encoder, the load position detected by the external encoder and the motor position detected by the motor encoder are beyond the limit specified by Pr73 (hybrid error limit).~ ~ ~ ~ ~ ~	Check the connection between the motor and load. Check the connection between the external encoder and driver. Correct the values of the external scale numerator and denominator regarding parameters Pr74, Pr75, Pr 76 and Pr77. Increase the value of Pr73 Increase the value of Pr71 (hybrid switching time).~
Overspeed ~ ~ ~ ~ ~ ~	26~ ~ ~ ~ ~ ~	The motor speed exceeds the specified limit.~ ~ ~ ~ ~ ~	Decrease the target speed (command values). Decrease the value of Pr50 (speed command input gain). Adjust the scale ratio so that the frequency of the command pulse is 500 kpps or less. If an overshoot occurs, readjust the gains. Correct the encoder wiring per the wiring diagram.~
Command scaling error~ ~ ~ ~ ~ ~	27~ ~ ~ ~ ~ ~	The command pulse is larger than 500 kpps at the entrance of the position error counter. The scale ratios set by Pr46 through Pr4B (numerator of 1st to 4th command scale) are not correct.~ ~ ~ ~ ~ ~	Reduce the multiplication factor by adjusting the values of Pr46 through Pr4B, and then adjust the scale ratios so that the command pulse frequency is 500 kpps or less.~
* External scale communication data error~ ~ ~ ~ ~ ~	28~ ~ ~ ~ ~ ~	When Pr76 (scale error invalidation) = 0, and the driver is operated under the full-closed and hybrid control with an external encoder, the scale error input is OFF.~ ~ ~ ~ ~ ~	Check the reason why the CN X5 Pin 33 is OFF.~ ~ ~ ~ ~ ~
Deviation counter overflow~ ~ ~ ~ ~ ~	29~ ~ ~ ~ ~ ~	The value of the position error counter is over 2 ²⁷ (134217728).~ ~ ~ ~ ~ ~	Check that the motor operates per the position command pulse. See the torque monitor to check that the output torque does not get saturated. Readjust the gains. Maximize the value of Pr5E (torque limit set-up). Correct the encoder wiring per the wiring diagram.~
* External scale communication error~ ~ ~ ~ ~ ~	35~ ~ ~ ~ ~ ~	The external scale is disconnected, or the scale fails.~ ~ ~ ~ ~ ~	Check the power supply for the external scale. Properly connect the external scale cable and the CN X4 cable according to the wiring diagram.~
* EEPROM parameter error~ ~ ~ ~ ~ ~	36~ ~ ~ ~ ~ ~	The data contained in the parameter storage area of the EEPROM is broken, so erroneous data is retrieved.~ ~ ~ ~ ~ ~	Set all the parameters again. If this error occurs frequently, the driver may have been broken. Replace the driver with a new one. Return the old driver to the sales agent for repair.~
* EEPROM check code error~ ~ ~ ~ ~ ~	37~ ~ ~ ~ ~ ~	The check code of the EEPROM is broken, so erroneous data is retrieved.~ ~ ~ ~ ~ ~	The driver may have been broken. Replace the driver with a new one. Return the old driver to the sales agent for repair.~
Overtravel inhibit input error	38~ ~ ~ ~ ~ ~	Both the CW and CCW over-travel limits are not active.	Check if the switch, cable and power supply for the CW/CCW overtravel inhibit input are normal. Check that the control power (12 to 24VDC) can be established without delay. Check the value of Pr04. Correct the wiring, if necessary.

Identifying Problem

Protection	Alarm Code No.	Cause	Countermeasures
Absolute encoder system down error ~ ~	40~ ~ ~ ~	Voltage of the battery for the absolute encoder has dropped below a specified value. ~ ~ ~	Check the voltage of the battery. Connect to the battery, and then clear the encoder using the absolute encoder clear mode contained in the auxiliary function (see page 231 "Setup of the absolute encoder (initialization)" in Appendix). ~
* Absolute encoder counter overflow ~	41~ ~ ~	The data of the multi-turn counter of the encoder exceeds the specified limit. ~ ~	Limit the movable range to ± 32767 revolutions (15 bits) from the initial position. Adjust the value of Pr0B. ~
Absolute encoder overspeed ~	42~ ~ ~	The encoder rotates faster than the specified rate when it is battery-powered. ~ ~	Connect the power to the encoder and then make sure that the encoder voltage is $5V \pm 5\%$. Correct CN X4 connections, if necessary. ~
* Absolute encoder single-rotation counter error ~	44~ ~ ~	The encoder detects an error of the single-turn counter. ~ ~	Turn off the power and turn it on again. If the error cannot be eliminated, the motor and/or driver may be broken. Disconnect the power supply of these equipment, and replace them with new ones. Return the old equipment to the sales agent for repair. ~
* Absolute encoder multi-rotation counter error ~	45~ ~ ~	2500P/r The encoder has detected abnormality of the single rotation counter. 17 bit The encoder has detected abnormality of the multi-rotation counter. ~	~ ~ ~ ~
Absolute encoder status error ~	47~ ~ ~	The encoder detects an internal status error. After the control power on, the encoder rotates faster than the specified rate. ~ ~	Prevent the motor from rotating before output of servo ready (S-RDY) since control power supply of the driver turned on. ~
* Encoder Z-phase error ~ ~ ~ ~	48~ ~ ~ ~ ~	Pulse dropouts in phase Z of 2500 [P/r] 5 serial encoders have been detected. The encoder is defective. ~ ~ ~	Turn off the power and turn it on again. If the error cannot be eliminated, the motor and/or driver may be broken. Disconnect the power supply of these equipment, and replace them with new ones. Return the old equipment to the sales agent for repair. ~
* Encoder commutation signal error ~ ~ ~ ~	49~ ~ ~ ~ ~	Abnormal logic of CS signal of 2500 [P/r] 5 serial encoders have been detected. The encoder is defective. ~ ~ ~	Turn off the power and turn it on again. If the error cannot be eliminated, the motor and/or driver may be broken. Disconnect the power supply of these equipment, and replace them with new ones. Return the old equipment to the sales agent for repair. ~
* Motor auto recognition error ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	95~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	(1) The motor is not compatible with the servo driver. (2) When power is turned on, the encoder has not been connected. <Cautions> Before power-on, if (1) the encoder line has been disconnected, or (2) data from the encoder has caused abnormal communications, be careful as the motor automatic recognition of and protection against abnormality (alarm code No.95) will be activated, after power is turned on. In the case of (1) or (2) above, execute processing of alarm codes No.21 and 23. ~	(1) Replace the motor with one that matches the servo driver. (2) Check connection of the encoder. ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
* Control mode setting error ~	97	The selected control mode cannot be used in combination with the encoder. The control mode does not support use of the encoder. ~	Set up Pr02 (Control mode setup) properly. ~ ~
* Other errors ~ ~ ~	EEEEEE 333333 FFFFF 333333	The control circuit operates incorrectly due to large noises or any other reasons. ~ ~	Turn off the power and turn it on again. If the error cannot be eliminated, the motor and/or driver may be broken. Disconnect the power supply of these equipment, and replace them with new ones. Return the old equipment to the sales agent for repair. ~
* Other errors	Numbers other than the above	The driver's self-diagnosing function is activated, because an error happens in the driver.	