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Error and Maintenance

This chapter explains the items to check when problems occur, error diagnosis using the alarm LED display and measures, error diagnosis based on the operating condition and measures, and periodic maintenance.

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11-1 Error Processing

Preliminary Checks When a Problem Occurs

This section explains the preliminary checks and analytical softwares required to determine the cause of a problem if one occurs.

Checking the Power Supply Voltage

⬧ Check the voltage at the power supply input terminals.
Main circuit power supply input terminal (L1, L2, L3)

R88D-KTxL	(50 to 400 W)	: Single-phase 100 to 115 VAC (85 to 127 V) 50/60 Hz
R88D-KTxH	(100 W to 1.5 kW)	: Single-phase 200 to 240 VAC (170 to 264 V) 50/60 Hz
	(750 W to 1.5 kW)	: 3-phase 200 to 240 VAC (170 to 264 V) 50/60 Hz
	(2 to 15 kW)	: 3-phase 200 to 230 VAC (170 to 253 V) 50/60 Hz
R88D-KTxF	(750 W to 15 kW)	: 3-phase 380 to 480 VAC (323 to 528 V) 50/60 Hz

Control circuit power supply input terminal (L1C, L2C)

R88D-KTxL	(50 to 400 W)	: Single-phase 100 to 115 VAC (85 to 127 V) 50/60 Hz
R88D-KTxH	(100 W to 1.5 kW)	: Single-phase 200 to 240 VAC (170 to 264 V) 50/60 Hz
	(2 to 15 kW)	: Single-phase 200 to 230 VAC (170 to 253 V) 50/60 Hz
R88D-KTxF	(750 W to 15 kW)	: 24 VDC (21.6 to 26.4 V)

If the voltage is out of this range, there is a risk of operation failure, so be sure that the power supply is correct.

⬧ Check the voltage of the sequence input power supply. (+24 VIN terminal (CN1 pin 7))
    Within the range of 11 to 25 VDC.
If the voltage is out of this range, there is a risk of operation failure. Be sure that the power supply is correct.

Checking Whether an Alarm Has Occurred

⬧ Make an analysis using the 7-segment LED display area in the front of the driver and using the Operation keys.
⬧ When an alarm has occurred
    … Check the alarm display that is displayed (xx) and make an analysis based on the alarm that is indicated.

⬧ When an alarm has not occurred
    … Make an analysis according to the error conditions.

⬧ In either case, refer to "11-4 Troubleshooting" (P.11-11) for details.

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Precautions When a Problem Occurs

When checking and verifying I/O after a problem has occurred, the driver may suddenly start to operate or suddenly stop, so always take the following precautions.

You should assure that anything not described in this manual is not possible with this product.

Precautions

- Disconnect the wire before checking for cable breakage. Even if you test conduction with the cable connected, test results may not be accurate due to conduction via bypassing circuit.
- If the encoder signal is lost, the motor may run away, or an error may occur. Be sure to disconnect the motor from the mechanical system before checking the encoder signal.
- When measuring the encoder output, perform the measurement based on the SENGND (CN1 pin 13).

  When an oscilloscope is used for measurement, it will not be affected by noise if measurements are performed using the differential between CH1 and CH2.
- When performing tests, first check that there are no persons in the vicinity of the equipment, and that the equipment will not be damaged even if the motor runs away.

  Before performing the tests, verify that you can immediately stop the machine using an immediate stop even if it runs away.

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Replacing the Servomotor and Servo Drive

Use the following procedure to replace the Servomotor or Servo Drive.

Replacing the Servomotor

1. Replace the motor.

2. Perform origin adjustment (for position control).

- When the motor is replaced, the motor's origin position (phase Z) may deviate, so origin adjustment must be performed.
- Refer to the Position Controller's manual for details on performing origin adjustment.

3. Set up the absolute encoder.

- If a motor with an absolute encoder is used, the absolute value data in the absolute encoder will be cleared when the motor is replaced, so setup is again required.
  The multi-rotation data will be different from before it was replaced, so reset the initial Motion Control Unit parameters.
- For details, refer to "Absolute Encoder Setup"(P.9-5).

Replacing the Servo Drive

1. Copy the parameters.
Use the Operation keys on the driver to write down all the contents of parameter settings.

2. Replace the driver.

3. Set the parameters.
Use the Operation keys on the driver to set all the parameters.

4. Set up the absolute encoder.

- If a motor with an absolute encoder is used, the absolute value data in the absolute encoder will be cleared when the driver is replaced, so setup is again required.
  The multi-rotation data will be different from before it was replaced, so reset the initial Motion Control Unit parameters.
- For details, refer to "Absolute Encoder Setup"(P.9-5).

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11-2 Warning List

This is a function to output a warning signal before the protective function operates to notify the overload and other statuses in advance. Set the warning output type to Warning Output Selection 1 (Pn440) and Waning Output Selection 2 (Pn441).

Precautions for Correct Use

• Each warning automatically returns to the status before it occurred once the system recovers from the error. However, for the time set in the Warning Latch Hold Time Selection (Pn627), the warning status will be held. To clear the warning during the latch hold time, do so by performing the same procedures as alarm clear.

Warning List

Warning number	Warning name	Latch*1	Warning occurrence condition	Warning Output Selection (Pn440, Pn441) *2	Warning Mask Setting (Pn638)
A0	Overload warning	√	The load ratio is 85% or more of the protection level.	1	bit 7
A1	Excessive regeneration warning	√	The regeneration load ratio is 85% or more of the protection level.	2	bit 5
A2	Battery warning	Always fixed with no time limit	Battery voltage is 3.2 V or less.	3	bit 0
A3	Fan warning	√	The fan stop status continues for 1 s.	4	bit 6
A4	Encoder communications warning	√	The number of continuous occurrences of encoder communications error exceeded the specified value.	5	bit 4
A5	Encoder overheating warning	√	The encoder detects the overheating warning.	6	bit 3
A6	Vibration detection warning	√	Vibration is detected.	7	bit 9
A7	Limit detection warning	Always fixed with no time limit	The limit of the capacitor or the fan is below the specified value.	8	bit 2
A8	External scale error warning	√	The external scale detected a warning.	9	bit 8
A9	External scale communications warning	√	The number of occurrences of external scale communications error exceeded the specified value.	10	bit 10

*1. The "√" fields can be set to 1 to 10 s in the Warning Latch Hold Time Selection (Pn627) or to the no-time limit setting. However, the battery warning is fixed with no time limit.

*2. Select the type of warning to be output in warning output 1 (WARN1) and warning output 2 (WARN2) in the Warning Output Selection 1 (Pn440) and Warning Output Selection 2 (Pn441).If you set this to 0, all warning types will be output.Do not set it to a value other than above.

*3. Each warning detection can be masked using the Warning Mask Setting (Pn638).The table shows the corresponding bits.
The warning detection is masked when the bit = 1.

11-3 Alarm List

If the driver detects an error, the alarm output (ALM) will turn ON, the power drive circuit in the driver will turn OFF, and the alarm code will be displayed.

📝 Precautions for Correct Use

- Refer to "Error Diagnosis Using the Alarm Displays"(P.11-11) for appropriate alarm measures.
- Release the alarm using one of the following methods. Remove the cause of the alarm first.
  - · Input the alarm reset input (RESET) signal.
  - · Turn OFF the power supply, then turn it ON again.
  - · Execute the alarm reset on the Parameter Unit.

  However, some alarms can only be reset by turning the power supply OFF then ON again. Refer to the next item "Alarm List".

- If you release an alarm while the operation command (RUN) is turned ON, the Servo Drive will start operation as soon as the alarm is released, which is dangerous. Be sure to turn OFF the RUN before clearing the alarm.
  If the RUN is always ON, first check safety sufficiently before clearing the alarm.

- When an alarm occurs, the servodrive latches the status of the servodrive just before the alarm occurence. Those latched values can be read with the software tool for diagnostics. Refer to the CX-Drive for details.

- The stop mode in case of an alarm may vary depending on the „Immediate stop" attribute in each alarm.

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Alarm List

Error number		Error detection function	Detection details and probable cause	Attribute		
Main	Sub			History	Can be cleared	Immediate stop *1
11	0	Control power supply undervoltage	The DC voltage of the main circuit fell below the specified value while the operation command (RUN) input was ON.	–	√	–
12	0	Overvoltage	The DC voltage in the main circuit is abnormally high.	√	√	–
13	0	Main power supply undervoltage (Insufficient voltage between P and N)	The DC voltage of the main circuit is low.	–	√	–
	1	Main power supply undervoltage (AC cut-off detection)	A location was detected where the main circuit AC power supply is cut off.	–	√	–
14	0	Overcurrent	Overcurrent flowed to the IGBT.	√	–	–
	1	IPM error	Motor power line ground fault or short circuit.	√	–	–
15	0	Driver overheat	The temperature of the driver radiator exceeded the specified value.	√	–	√
16	0	Overload	Operation was performed with torque significantly exceeding the rating for several seconds to several tens of seconds.	√	√	–
18	0	Regeneration overload	The regenerative energy exceeds the processing capacity of the Regeneration Resistor.	√	–	√
	1	Regeneration Tr error	An error was detected in a driver regeneration drive Tr.	√	–	–
21	0	Encoder communications disconnection error	The encoder wiring is disconnected.	√	–	–
	1	Encoder communications error	An encoder communications error was detected.	√	–	–
23	0	Encoder communications data error	Communications cannot be performed between the encoder and the driver.	√	–	–
24	0	Error counter overflow	The error counter accumulated pulse exceeds the set value for the Error Counter Overflow Level (Pn014).	√	√	√
25	0	Excessive hybrid error	During full closing control, difference between position of load from external scale and position of motor due to encoder was larger than the pulse number set by Excessive Hybrid Error Setting (Pn332).	√	–	√
26	0	Overspeed	The motor rotation speed exceeded the set value of the Overspeed Level set (Pn513).	√	√	√
	1	Overspeed 2	The motor rotation speed exceeded the set value of the Overspeed Level set 2 (Pn615).	√	√	–
27	0	Command pulse	A command pulse frequency error was detected.	√	√	√
28	0	Pulse regeneration error	The pulse regeneration output frequency exceeded the limit.	√	√	√

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Error number		Error detection function	Detection details and probable cause	Attribute		
Main	Sub			History	Can be cleared	Immediate stop *1
29	0	Error counter overflow	Error counter value based on the encoder pulse reference exceeded 2^{29} (536,870,912).	√	√	–
30	0	Safety input error	Safety input signal turned OFF.	–	√	–
33	0	Interface input duplicate allocation error 1	A duplicate setting for the interface input signals was detected.	√	–	–
	1	Interface input duplicate allocation error 2		√	–	–
	2	Interface input function number error 1	An undefined number was detected in the interface input signal allocations.	√	–	–
	3	Interface input function number error 2		√	–	–
	4	Interface output function number error 1	An undefined number was detected in the interface output signal allocations.	√	–	–
	5	Interface output function number error 2		√	–	–
	6	Counter reset allocation error	The counter reset function was allocated to something other than input signal SI7.	√	–	–
	7	Command pulse prohibition input allocation error	The command pulse prohibition input function was allocated to something other than input signal SI10.	√	–	–
34	0	Overrun limit error	The motor exceeded the allowable operating range set in the Overrun Limit Setting (Pn514) with respect to the position command input.	√	√	–
36	0 to 2	Parameter error	Data in the Parameter Save area was corrupted when the power supply was turned ON and data was read from the EEPROM.	–	–	–
37	0 to 2	Parameters destruction	The checksum for the data read from the EEPROM when the power supply was turned ON does not match.	–	–	–
38	0	Drive prohibition input error	The forward drive prohibition and reverse drive prohibition inputs are both turned OFF.	–	√	–
39	0	Excessive analog input 1	A current exceeding the Speed Command/Torque Command Input Overflow Level Setting (Pn424, Pn427 or Pn430) was applied to the analog command input (pin 14).	√	√	√
	1	Excessive analog input 2		√	√	√
	2	Excessive analog input 3		√	√	√
40	0	Absolute encoder system down error ABS	The voltage supplied to the absolute encoder is lower than the specified value.	√	√	–
41	0	Absolute encoder counter overflow error ABS	The multi-rotation counter of the absolute encoder exceeds the specified value.	√	–	–
42	0	Absolute encoder overspeed error ABS	The motor rotation speed exceeds the specified value when only the battery power supply of the absolute encoder is used.	√	√	–

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Error number		Error detection function	Detection details and probable cause	Attribute		
Main	Sub			History	Can be cleared	Immediate stop *1
43	0	Encoder initialization error protection	An encoder initialization error was detected.	√	–	–
44	0	Absolute encoder 1-rotation counter error **ABS**	A 1-turn counter error was detected.	√	–	–
45	0	Absolute encoder multi-rotation counter error **ABS**	A multi-rotation counter error or phase-AB signal error was detected.	√	–	–
47	0	Absolute encoder status error **ABS**	The rotation of the absolute encoder is higher than the specified value.	√	–	–
48	0	Encoder phase-Z error	A serial incremental encoder phase Z pulse irregularity was detected.	√	–	–
49	0	Encoder CS signal error	A logic error was detected in the CS signal for serial incremental encoder.	√	–	–
50	0	External scale connection error	An error was detected in external scale connection.	√	–	–
	1	External scale communications data error	An error was detected in external scale communications data.	√	–	–
51	0	External scale status error 0	An external scale error code was detected.	√	–	–
	1	External scale status error 1		√	–	–
	2	External scale status error 2		√	–	–
	3	External scale status error 3		√	–	–
	4	External scale status error 4		√	–	–
	5	External scale status error 5		√	–	–
55	0	Phase-A connection error	An error was detected in the external scale phase A connection.	√	–	–
	1	Phase-B connection error	An error was detected in the external scale phase B connection.	√	–	–
	2	Phase-Z connection error	An error was detected in the external scale phase Z connection.	√	–	–
87	0	Forced alarm input error	The forced alarm input signal was input.	–	√	–
95	0	Motor non-conformity	The combination of the Servomotor and Servo Drive is not appropriate. The encoder was not connected when the power supply was turned ON.	–	–	–

*1. An immediate stop means an error causing an immediate stop when the Pn510 "Stop Selection for Alarm Generation" is set to 4 to 7. For details, refer to "Stop Selection for Alarm Generation"(P.8-50).

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Extended Alarms

| Error No. | | Error detection function | Detection details and probable cause |
Main	Sub		
46	0	Absolute Error	Absolute encoder status is abnormal
51	6	External Scale Error	External scale status is abnormal
70	0	U-Phase Phase Current Detection Error	U-Phase Current Detection Value is abnormal when objecting servo off to servo on
	1	W-Phase Phase Current Detection Error	W-Phase Current Detection Value is abnormal when objecting servo off to servo on
	2	Current Detection Syste Error	Setting value of Current Detection Systemu is abnormal
71	0	AI2 Input Error	Analog Input Voltage 2 value is abnormal +11 V over is lasting 200 ms
	1	AI3Input Error	Analog Input Voltage 3 value is abnormal +11 V over is lasting 200 ms
72	0	Thermal Error	Hardware is abnormal
73	0	VDC Detection System Error	Hardware is abnormal
76	0	Internal RAM Error	Microcomputer is abnormal
	1	Internal ROM Error	Internal ROM is abnormal
77	0	Stacke Error	Lack of Stack Area
78	0	Encoder EEPROM Error	Encoder EEPROM Check is abnormal
96	0	LSI Initialization Error	Falut of MNM1223 initialization
97	0	Setting Error	Encoder type and control mode are unmatching
99	0	Hardware Error	Power curcuit detects the something hardware error
99	1	Encoder Setting Error	Encoder Setting is not correct

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Error and Maintenance

11-4 Troubleshooting

If an error occurs in the machine, determine the error conditions from the alarm displays and operation status, identify the cause of the error, and take appropriate measures.

Error Diagnosis Using the Alarm Displays

Alarm display	Error conditions	Status when error occurs	Cause	Measures
11	Power supply undervoltage	Occurs when the servo is turned ON.	· The power supply voltage is low. · Momentary power interruption occurred. · Power supply capacity is insufficient. · The power supply voltage is reduced because the main power supply is OFF. · The main power supply is not input.	· Increase the power supply capacity. · Change the power supply. · Turn ON the power supply.
			· Power supply capacity is insufficient.	· Increase the power supply capacity.
			· Phase loss	· Connect the phases (L1, L2, L3) of the power supply voltage correctly. · For single-phase, connect to L1 and L3 correctly.
			· The main circuit power supply is damaged. · Control PCB error.	· Replace the driver.
12	Overvoltage	Occurs when the power supply is turned ON.	· Main circuit power supply voltage is out of allowable range.	· Change the main circuit power supply voltage to within allowable range.
		Occurs when the motor is decelerating.	· Load inertia is too large.	· Calculate the regenerative energy and connect an External Regeneration Resistor with the required regeneration absorption capacity. · Extend the deceleration time.
			· Main circuit power supply voltage is out of allowable range.	· Change the main circuit power supply voltage to within allowable range.
		Occurs during descent (vertical axis).	· Gravitational torque is too large.	· Add a counterbalance to the machine to lower gravitational torque. · Reduce the descent speed. · Calculate the regenerative energy and connect an External Regeneration Resistor with the required regeneration absorption capacity.

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Alarm display	Error conditions	Status when error occurs	Cause	Measures
13	Main circuit power supply undervoltage	Occurs when the servo is turned ON.	· The power supply voltage is low. · Momentary power interruption occurred. · Power supply capacity is insufficient. · The power supply voltage is reduced because the main power supply is OFF. · The main power supply is not input.	· Check the power supply capacity. · Change the power supply. · Turn ON the power supply. · Extend the Momentary Hold Time (Pn509).
		Occurs when the power supply is turned ON.	· Phase loss	· Correctly connect the phases of the power supply voltage.
				· Correctly connect the single-phase.
			· The main circuit power supply is damaged. · Control PCB damage.	· Replace the driver.
14	Overcurrent	Occurs when the servo is turned ON.	· Control PCB error	· Replace the driver.
			· The motor power line is short-circuited or ground-faulted between phases.	· Repair the short-circuited or ground-faulted power line. · Measure the insulation resistance at the motor and, if there is a short circuit, replace the motor.
			· Phase U, phase V, phase W, and the ground are wired incorrectly.	· Wire correctly.
			· Motor winding is burned out.	· Measure the winding resistance, and if the winding is burned out, replace the motor.
			· The relay for the dynamic brake has been deposited.	· Do not frequently input the operation command (RUN) input. · Do not operate the system by turning the servo ON and OFF.
			· Motor non-conformity	· Use a motor that is appropriate for use with the driver.
			· The pulse input timing is too soon.	· Wait at least 100 ms before inputting pulses after turning ON the operation command (RUN).
			· The resistor in the driver is abnormally overheating.	· Reduce the ambient temperature of the driver to 55°C or lower. · If the relay does not click when the power supply is turned ON, replace the driver.

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Alarm display	Error conditions	Status when error occurs	Cause	Measures
15	Driver overheat	Occurs during operation.	· The ambient temperature is too high. · The load is too large.	· Lower the ambient temperature. · Increase the capacity of the driver and motor. · Reduce the load. · Extend the acceleration/ deceleration times.
16	Overload	Occurs when the servo is turned ON.	· There is an error in the motor wiring (the wiring or the connections are faulty).	· Wire the motor power cable correctly.
			· The electromagnetic brake is ON.	· Turn OFF the brake.
			· The Servo Drive is faulty.	· Replace the driver.
		Occurs during operation.	· The effective torque exceeds the rated torque. · The initial torque exceeds the maximum torque.	· Review the load conditions and operating conditions. · Review the motor capacity.
			· Unusual noise or vibration is caused by faulty gain adjustment.	· Adjust the gain correctly.
			· The Servo Drive is faulty.	· Replace the driver.
18	Regeneration overload	Occurs when the motor is decelerating.	· Load inertia is too large.	· Calculate the regenerative energy and connect an External Regeneration Resistor with the required regeneration absorption capacity. · Extend the deceleration time.
			· The deceleration time is too short. · The motor rotation speed is too high.	· Reduce the motor rotation speed. · Extend the deceleration time. · Calculate the regenerative energy and connect an External Regeneration Resistor with the required regeneration absorption capacity.
			· The operating limit of the External Regeneration Resistor is limited to 10% duty.	· Set Pn016 to 2. For details, refer to "Parameters Details".
		Occurs during descent (vertical axis).	· Gravitational torque is too large.	· Add a counterbalance to the machine to lower gravitational torque. · Reduce the descent speed. · Calculate the regenerative energy and connect an External Regeneration Resistor with the required regeneration absorption capacity.
			· The operating limit of the External Regeneration Resistor is limited to 10% duty.	· Set Pn016 to 2. For details, refer to "Parameters Details".

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Alarm display	Error conditions	Status when error occurs	Cause	Measures
21	Encoder communications error	Occurs during operation.	· The encoder is disconnected. · Connector contacts are faulty.	· Fix the locations that are disconnected. · Wire correctly.
			· The encoder is wired incorrectly.	· Wire correctly.
			· The encoder is damaged.	· Replace the motor.
			· The driver is faulty.	· Replace the driver.
			· The motor is mechanically held.	· If the motor shaft is held, release it.
23	Encoder communications data error	Occurs when the power supply is turned ON. Or, occurs during operation.	· The encoder signal line is wired incorrectly.	· Wire correctly.
			· Noise on the encoder wiring causes incorrect operation.	· Take measures against noise on the encoder wiring.
			· The encoder power supply voltage has dropped (especially when the cable is long.)	· Provide the required encoder power supply voltage (5 VDC $\pm$ 5%).
24	Error counter overflow	Occurs when the motor does not rotate even when command pulses are input.	· The motor power line or the encoder wiring is incorrect.	· Wire correctly.
			· The motor is mechanically held.	· If the motor shaft is held, release it. · Release the electromagnetic brake.
			· Control PCB error	· Replace the driver.
		Occurs during high-speed rotation.	· The motor power line or the encoder wiring is incorrect.	· Wire correctly.
		Occurs when a long string of command pulses is given.	· Gain adjustment is insufficient.	· Adjust the gain.
			· The acceleration/ deceleration is too rapid.	· Extend the acceleration/ deceleration times.
			· The load is too large.	· Reduce the load. · Select a suitable motor.
		Occurs during operation.	· The set value for the Error Counter Overflow Level (Pn014) is exceeded.	· Increase the set value of Pn014. · Reduce the rotation speed. · Reduce the load. · Extend the acceleration/ deceleration times.
25	Excessive hybrid deviation error	Occurs for full closing control.	· There is deviation between the load position according to the external scale and the motor position according to the encoder.	· Check the motor and load connection. · Check the external scale and driver connection. · Check the external scale load position and encoder motor position settings.

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Alarm display	Error conditions	Status when error occurs	Cause	Measures
26	Overspeed	Occurs during high-speed rotation.	· The speed command input is too large.	· Set the command pulse frequency to 500 Kpps max.
			· The setting for the Electronic Gear Ratio Numerator (Pn009, Pn500 to Pn502) is not appropriate.	· Set the electronic gear ratio numerator so that the command pulse frequency is 500 Kpps max.
			· The maximum rotation speed is exceeded due to overshooting.	· Adjust the gain. · Reduce the maximum command speed.
			· The encoder is wired incorrectly.	· Wire correctly.
		Occurs when torque limit switching function is used.	· The set value for the Overspeed Detection Level setting (Pn513) is exceeded.	· If torque limit switching function is used, correctly set the allowable operating speed for Pn014.
27	Command pulse error	Occurs when control signal is input or command is input.	· The command pulse input frequency exceeded the limit.	· Check the command pulse input. · Increase the set value of Pn532.
			· The setting for the Electronic Gear Ratio Numerator (Pn009, Pn500 to Pn502) is not appropriate.	· Set the electronic gear ratio numerator so that the command pulse frequency is 500 Kpps max.
28	Pulse regeneration error	Occurs during operation.	· The pulse regeneration output frequency exceeded the limit.	· Check the set value of Pn011 and Pn503. · Set Pn533 to 0 to disable the function.
29	Error counter overflow	Occurs during operation.	· The error counter value for the encoder pulse reference exceeded 2^{29} (536,870,912).	· Check that the motor rotates according to the position command. · Check on the torque monitor that the output torque is not saturated. · Adjust the gain. · Increase the setting for Pn013 or Pn524 to the maximum. · Wire the encoder correctly.
30	Safety input error	Occurs during operation.	· Safety input signal turned OFF.	· Check the statuses of safety inputs 1 and 2.
33	Interface I/O allocation error	Occurs when the power supply is turned ON.	· There is a duplicate setting in the I/O signal function allocation. · Specify the undefined number with the I/O signal function allocation.	· Set the function allocation correctly.
			· There is a mistake in the counter function allocation.	· Allocate to SI7.
			· There is a mistake in the command pulse prohibition input function allocation.	· Allocate to SI10.

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Alarm display	Error conditions	Status when error occurs	Cause	Measures
34	Overrun limit error	Occurs during operation.	· The Overrun Limit Setting (Pn514) was exceeded during operation.	· Adjust the gain. · Increase the set value of Pn514. · Set Pn514 to 0 to disable the function.
36	Parameter error	Occurs when the power supply is turned ON.	· There are data errors in the parameters that were read.	· Reset all parameters.
			· The driver is faulty.	· Replace the driver.
37	Parameters destruction	Occurs when the power supply is turned ON.	· The parameters that were read are corrupt.	· Replace the driver.
38	Drive prohibition input error	Occurs when the servo is turned ON. Or, occurs during operation.	· The forward drive prohibition (POT) input and reverse drive prohibition (NOT) input were both OFF at the same time.	· Wire correctly. · Replace the limit sensor. · Check whether the power supply for control is input correctly. · Check whether the setting for Drive Prohibition Input Selection (Pn504) is correct.
39	Excessive analog input 1	Occurs during operation.	· The voltage input to pin 14 is too high.	· Reduce the input voltage. · Change the value for Pn424, Pn427, and Pn430.
40	Absolute encoder system down error **ABS**	Occurs when the power supply is turned ON. Occurs during operation.	· The voltage supplied to the absolute encoder is low.	· Set up the absolute encoder. · Connect the battery power supply.
41	Absolute encoder counter overflow error **ABS**	Occurs during operation.	· The multi-rotation counter of the absolute encoder exceeds the specified value.	· Properly set the Operation Switch when Using Absolute Encoder (Pn015).
42	Absolute encoder overspeed error **ABS**	Occurs when the power supply is turned ON.	· The motor rotation speed exceeds the specified value when the battery power supply is turned ON. · The wiring is incorrect.	· Reduce the motor rotation speed and supply power. · Check the wiring.
44	Absolute encoder 1-turn counter error **ABS**	Occurs when the power supply is turned ON.	· The encoder is faulty.	· Replace the Servomotor.
45	Absolute encoder multi-rotation counter error **ABS**	Occurs when the power supply is turned ON.	· The encoder is faulty.	· Replace the Servomotor.
47	Absolute encoder status error **ABS**	Occurs when the power supply is turned ON.	· The motor was moving when the power supply was turned ON.	· Do not let the motor move when the power supply is turned ON.
48	Encoder phase-Z error	Occurs during operation.	· A phase Z pulse from the encoder was not detected regularly.	· Replace the motor.
49	Encoder PS signal error	Occurs during operation.	· A logic error was detected in the PS signal from the encoder.	· Replace the motor.

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Alarm display	Error conditions	Status when error occurs	Cause	Measures
50	External scale communications error	Occurs during operation.	· The disconnection detection function was activated because communications between the external scale and driver were interrupted.	· Wire correctly. · Fix the locations that are disconnected.
			· There was a communications error in data from external scale.	· Provide the required external scale power supply voltage. · Wire correctly. · Connect the shield to FG.
51	External scale status error	Occurs during operation.	· An external scale error code was detected.	· Check the external scale specifications. · From the front panel, clear the external scale error, then turn the power supply OFF, then ON again.
55	Phases-A, B and Z connection error	Occurs during operation.	· A disconnection or other error was detected in external scale phase A, phase B, or phase Z connection.	· Check the connection.
87	Forced alarm input error	Occurs during operation.	· The forced alarm input signal was input.	· Turn OFF the EMG-STOP signal.
95	Motor non-conformity	Occurs when the power supply is turned ON.	· The motor and driver combination is incorrect.	· Use a correct combination.
			· The encoder wiring is disconnected.	· Wire the encoder wiring. · Fix the locations that are disconnected.

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Error and Maintenance

Error Diagnosis Using the Operation Status

Symptom	Probable cause	Items to check	Measures
The PWR LED indicator does not light when the power supply is turned ON.	The power supply cable is wired incorrectly.	Check whether the power supply input is within the allowed power supply voltage range.	Supply the correct power supply voltage.
		Check whether the power supply input is wired correctly.	Wire correctly.
The motor does not rotate even if commands are input from the controller. (Continued on next page)	The operation command (RUN) is OFF.	In MONITOR mode, check whether the RUN signal is ON or OFF.	· Turn ON the operation command (RUN). · Wire correctly.
	The forward drive prohibition (POT) and reverse drive prohibition (NOT) are OFF.	In MONITOR mode, check whether the POT signal and NOT signal are ON or OFF.	· Turn ON the POT and NOT signals. · If the POT and NOT inputs are not used, set them to be disabled.
	The CONTROL mode is not correct.	Check the CONTROL mode Selection (Pn001).	Set the CONTROL mode to match the command type.
	The error counter reset (ECRST) is ON.	In MONITOR mode, check whether the ECRST signal is ON or OFF.	· Turn OFF the ECRST signal. · Wire correctly.
	The COMMAND PULSE mode (Pn007) selection is incorrect.	Check the controller's command pulse type and the Servo Drive's command pulse type.	Set the Servo Drive's pulse type to match the controller's command pulse type.
	The zero speed designation (VZERO) is OFF.	In MONITOR mode, check whether the VZERO signal is ON or OFF.	· Turn ON the VZERO signal. · Wire correctly.
	The internally set speeds are not set.	Check the set value of Pn304 to Pn311.	Set the desired speeds.
	The No. 1 Torque Limit (Pn013) or No. 2 Torque Limit (Pn522) is set to 0.	Check the set value of Pn013 and Pn522.	Return the set value to the default setting.
	The motor power cable is wired incorrectly.	Check the wiring.	Wire correctly.
	The encoder cable is wired incorrectly.		
	The control I/O connector (CN1) is wired incorrectly.	Check the command pulse's wiring.	Wire correctly.
		Check the command pulse type.	Set the Servo Drive's pulse type to match the controller's command pulse type.
		Check the command pulse's voltage.	Connect a resistor that matches the voltage.
	The power supply is not ON.	Check whether the power supply is ON and check the PWR LED indicator.	Turn ON the power supply.
		Check the voltage across the power supply terminals.	Wire the power supply's ON circuit correctly.
	The speed command is disabled.	Check if the speed command method is correct.	· Set the external analog command correctly. · Set the internal speed correctly.

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Symptom	Probable cause	Items to check	Measures
The motor does not rotate even if commands are input from the controller. (Continued from previous page)	The torque command is disabled.	Check if the torque command input method is correct.	Set the torque command correctly.
	The CW input and CCW input are ON at the same time.	Check the command pulse's wiring.	· Input the pulse signal either to the CW input or CCW input. · Always turn OFF the terminal that is not input to.
	Servo Drive is faulty.	–	Replace the Servo Drive.
The motor operates momentarily, but then it does not operate after that.	The motor power cable is wired incorrectly.	Check the wiring of the motor power cable's phases U, V, and W.	Wire correctly.
	The encoder cable is wired incorrectly.	Check the encoder cable's wiring.	Wire correctly.
The motor rotates without a command.	The command pulse input is incorrect.	Check the command pulse type.	Set the correct command pulse input.
		Check the command pulse's voltage.	Connect a resistor that matches the voltage.
	Servo Drive is faulty.	–	Replace the Servo Drive.
The motor rotates in the reverse direction from the command.	The CW input and CCW input connections are reversed.	Check the controller's command pulse type and the Servo Drive's command pulse type.	Connect the CW pulse signal to the CW input and the CCW pulse signal to the CCW input.
Motor rotation is unstable.	The motor power cable or encoder cable is wired incorrectly.	Check the wiring of the motor power cable's phases U, V, and W and check the encoder cable's wiring.	Wire correctly.
	The coupling system between the motor shaft and the mechanical system has eccentricity or loose screws, or the load torque is fluctuating due to engagement between pulleys or gears.	Check the mechanical system's coupling section.	Review and adjust the machine.
		Try rotating the motor without a load. (Disconnect it from the mechanical system.)	
	The load's moment of inertia exceeds the Servo Drive's allowable value.	Try rotating the motor without a load. (Disconnect it from the mechanical system.)	· Reduce the load. · Replace the Servomotor and Servo Drive with higher capacity models.
	The pulse signal line's connections are loose.	Check the pulse signal line's wiring at the controller and Servo Drive.	Wire correctly.
		Check the controller's command pulse type and the Servo Drive's command pulse type.	Set the Servo Drive's pulse type to match the controller's command pulse type.
	The gain is wrong.	–	Perform manual tuning.
	The CN1 input signal is chattering.	Check the operation command (RUN), error counter reset (ECRST), zero speed designation (VZERO), internally set speed selection 1 (VSEL1) and internally set speed selection 2 (VSEL2).	Wire correctly so that there is no chattering.
The motor is overheating.	The ambient temperature is too high.	Check that the ambient temperature around the motor is 40°C or less.	Lower the ambient temperature around the motor to 40°C or less. (Use a fan or air conditioner.)
	Ventilation is obstructed.	Check to see whether anything is blocking ventilation.	Improve ventilation.
	The motor is overloaded.	Try rotating the motor without a load. (Disconnect it from the mechanical system.)	· Reduce the load. · Replace the Servomotor and Servo Drive with higher capacity models.
	The motor is vibrating.		

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Symptom	Probable cause	Items to check	Measures
The motor holding brake is ineffective.	Power is supplied to the holding brake.	Check whether power is supplied to the holding brake.	Configure a circuit that cuts power supply to the holding brake when the motor stops and the load is held by the holding brake.
The motor does not stop or is hard to stop even if the operation command (RUN) is turned OFF while the motor is rotating.	The load inertia is too large.	Check the following: ·Is the load too large? ·Is the motor rotation speed too high?	Review the load conditions, and replace the Servomotor and Servo Drive with appropriate models.
	The stop circuit failed.	–	Replace the driver.
The motor is producing unusual noises or the machine is vibrating. (Continued on next page)	There are problems with the machine's installation.	Check whether the Servomotor's mounting screws are loose.	Retighten the mounting screws.
		Check whether the axes are misaligned in the coupling.	Align the coupling.
		Check whether the coupling is unbalanced.	Adjust the coupling's balance.
	There is a problem with the bearings.	Check for noise or vibration around the bearings.	Contact your OMRON dealer or sales office.
	The gain is wrong.	–	Perform manual tuning.
	The Speed Feedback Filter Time Constant (Pn??) is wrong.	Check the set value of Pn??.	Return the set to 0 (default set) or increase the set value.
	Noise is entering the control I/O signal cable because the cable does not meet specifications.	Check that it is a twisted-pair wire or twisted-pair shielded cable with core wires that are at least 0.08 mm^2.	Use control I/O signal cable that meets specifications.
	Noise is entering the control I/O signal cable because the cable is longer than the specified length.	Check the length of the control I/O signal cable.	Shorten the control I/O signal cable to 3 m or less.
	Noise is entering the cable because the encoder cable does not meet specifications.	Check that it is a twisted-pair shielded cable with core wires that are at least 0.12 mm^2.	Use encoder cable that meets specifications.
	Noise is entering the encoder cable because the cable is longer than the specified length.	Check the length of the encoder cable.	Shorten the encoder cable to less than 50 m.
	Noise is entering the signal lines because the encoder cable is stuck or the sheath is damaged.	Check the encoder cable for damage.	Correct the encoder cable's pathway.
	Too much noise is entering the encoder cable.	Check whether the encoder cable is bound together with or too close to high-current lines.	Install the encoder cable where it won't be subjected to surges.
	The FG's potential is fluctuating due to devices near the Servomotor, such as welding machines.	Check for ground problems (loss of ground or incomplete ground) at equipment such as welding machines near the Servomotor.	Ground the equipment properly and prevent currents from flowing to the encoder FG.
	Errors are being caused by excessive vibration or shock on the encoder.	There are problems with mechanical vibration or motor installation (such as the precision of the mounting surface, attachment, or axial offset).	Reduce the mechanical vibration or correct the Servomotor's installation.

Symptom	Probable cause	Items to check	Measures
The motor is producing unusual noises or the machine is vibrating. (Continued from previous page)	The machine and the motor are resonating.	Check whether the machine is resonating.	· Readjust the torque command filter time constant. · If there is resonance, set the Notch Filter 1 Frequency (Pn201), Notch Filter 1 Width (Pn202), and Notch Filter 1 Depth (Pn203).
Vibration is occurring at the same frequency as the power supply.	Inductive noise is occurring.	Check whether the driver control signal lines are too long.	Shorten the control signal lines.
		Check whether the control signal lines and power supply lines are not bound together.	· Separate control signal lines from power supply lines. · Use a low-impedance power supply for control signals.
The position is misaligned. (Position misalignment occurs without an alarm being output.)	There is an error in the coupling of the mechanical system and the Servomotor.	Check whether the coupling of the mechanical system and the Servomotor is misaligned.	Correct the coupling between the mechanical system and the Servomotor.
	Noise is entering the error counter reset (ECRST).	Check whether the control signal lines and power supply lines are not bound together.	Separate the control signal lines from the power lines or take other measures against noise.
	The gain is wrong.	–	Perform manual tuning.
	The load inertia is large.	Inspect the following. · Is the load too large? · Is the motor rotation speed too high?	· Adjust the gain. · Review the load conditions, and replace the Servomotor and Servo Drive with appropriate models.

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Error and Maintenance

11-5 Periodic Maintenance

> ## ⚠ Caution
>
> ⚠ After replacing the unit, transfer to the new unit all data needed to resume operation, before restarting the operation. Equipment damage may result.
>
> 🚫 Never repair the product by disassembling it. Electric shock or injury may result.

Servomotors and Servo Drives contain many components and will operate properly only when each of the individual components is operating properly.

Some of the electrical and mechanical components require maintenance depending on application conditions. Periodic inspection and replacement are necessary to ensure proper long-term operation of Servomotors and Servo Drives. (Quotes from The Recommendation for Periodic Maintenance of a General-purpose Inverter published by JEMA.)

The periodic maintenance cycle depends on the installation environment and application conditions of the Servomotors and Servo Drives.

Recommended maintenance times are listed below for Servomotors and Servo Drives. Use these for reference in periodic maintenance.

Servomotor Limit

- The lifetime for the different motor parts is listed below.

  Bearings: 20,000 hours
  Oil seal: 5,000 hours
  Encoder: 30,000 hours

  These values presume an ambient motor operating temperature of 40°C, within the allowable axial load, rated operation (rated torque and rated rotation speed), and proper installation as described in this manual.

  The oil seal can be replaced.

- The radial load during operation (rotation) on timing pulleys and other components contacting belts is twice or more the still load. Consult with the belt and pulley manufacturers and adjust designs and system settings so that the motor allowable axial load is not exceeded even during operation. If a motor is used under a shaft load exceeding the allowable limit, the motor shaft can break, and the bearings can burn out.

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Error and Maintenance

Servo Drive Limit

- The lifetime for the different drive parts is listed below.
  Aluminum electrolytic capacitors: 28,000 hours
  (at an ambient driver operating temperature of 55°C, constant output of rated torque, constant output of rated rotation speed, and installation as described in this manual)
  Axial-flow fan: 10,000 to 30,000 hours (The limit depends on the operating conditions.)
  Inrush current prevention relay: Approx. 20,000 operations (The limit depends on the operation conditions.)
- When using the driver in continuous operation, use fans or air conditioners to maintain an ambient temperature below 40°C.
- We recommend that ambient temperature and the power supply ON time be reduced as much as possible to lengthen the service life of the driver.
- The limit of aluminum electrolytic capacitors is greatly affected by the ambient operating temperature. Generally, an increase of 10°C in the operating ambient temperature will reduce capacitor limit by 50%. Following equation shows an example for 25°C: .

$$\text{Lifetime}_{25°C} = \text{Lifetime}_{55°C} \times 2^{\frac{55-25}{10}} = 224000 \text{ hours}$$

- The aluminum electrolytic capacitors deteriorate even when the Servo Drive is stored with no power supplied. If the driver is not used for a long time, we recommend a periodic inspection and replacement schedule of 5 years.
- If the Servomotor or Servo Drive is not to be used for a long time, or if they are to be used under conditions worse than those described above, a periodic inspection schedule of 5 years is recommended.
- Upon request, OMRON will examine the Servo Drive and Servomotor and determine if a replacement is required.

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Error and Maintenance

Replacing the Absolute Encoder Battery ABS

Replace the absolute encoder backup battery if it has been used for more than 3 years or if an absolute encoder system down error (alarm display No. 40) has occurred.

Replacement Battery Model and Specifications

Item	Specifications
Name	Absolute Encoder Backup Battery Unit
Model	R88A-BAT01G
Battery model	ER6V (Toshiba)
Battery voltage	3.6 V
Current capacity	2,000 mA/h

Mounting the Backup Battery

Mounting the Battery for the First Time

Connect the absolute encoder battery to the motor, then set up the absolute encoder.Refer to "Absolute Encoder Setup"(P.9-5).
Once the absolute encoder battery is attached, it is recommended that the control power supply be turned ON and OFF once a day to refresh the battery.
If you neglect to refresh the battery, battery errors will occur due to voltage delay in the battery.

Replacing the Battery

If a battery warning occurs, the absolute encoder power supply must be replaced.
Replace the battery with the control power supply of the driver ON. If the battery is replaced with the control power supply of the driver OFF, data held in the encoder will be lost.
Once the absolute encoder battery has been replaced, clear the battery warning by alarm clear from the front panel. Refer to "Alarm Clear"(P.9-26) for information on clearing alarms.

Note. If the absolute encoder is cleared using the front panel or the absolute values are cleared using communications, all error and multi-rotation data will be lost and the absolute encoder must be set up. Refer to "Absolute Encoder Setup"(P.9-5).

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Battery Mounting Method

1. Prepare the replacement battery (R88A-BAT01G).
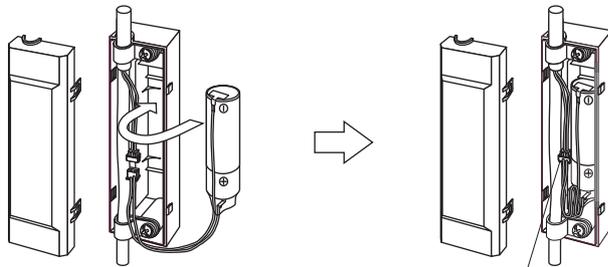
R88A-BAT01G
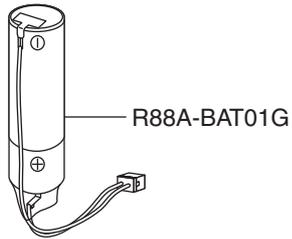
2. Remove the battery box cover.
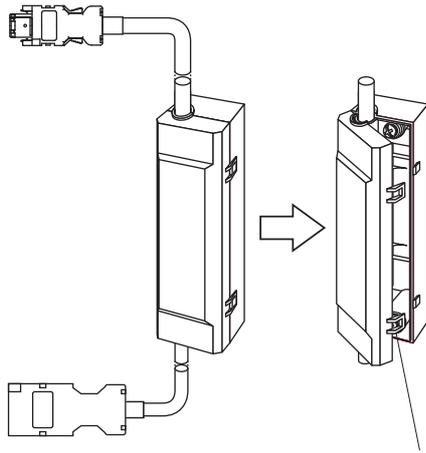
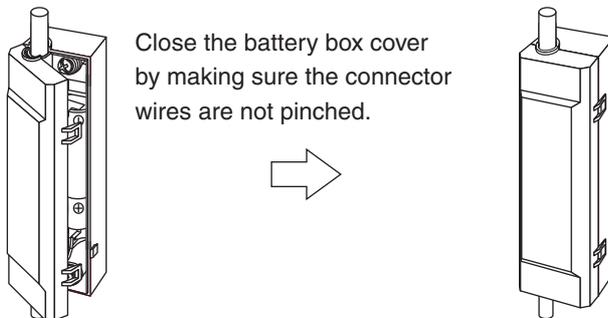Raise the tabs and remove the cover.

3. Put the battery into the battery box.

Insert the battery.   Plug in the connector.

4. Close the cover to the battery box.

Close the battery box cover
by making sure the connector
wires are not pinched.

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