11. TROUBLESHOOTING

11.1 Trouble at start-up

> **CAUTION**
> - Excessive adjustment or change of parameter setting must not be made as it will make operation instable.

> **POINT**
> - Using the MR Configurator (servo configuration software), you can refer to unrotated servo motor reasons, etc.

The following faults may occur at start-up. If any of such faults occurs, take the corresponding action.

No.	Start-up sequence	Fault	Investigation	Possible cause	Reference
1	Power on	・LED is not lit. ・LED flickers.	Not improved if connectors CN1A, CN1B, CN2 and CN3 are disconnected.	1. Power supply voltage fault 2. Servo amplifier is faulty.	
			Improved when connectors CN1A and CN1B are disconnected.	Power supply of CNP1 cabling is shorted.	
			Improved when connector CN2 is disconnected.	1. Power supply of encoder cabling is shorted. 2. Encoder is faulty.	
			Improved when connector CN3 is disconnected.	Power supply of CN3 cabling is shorted.	
		Alarm occurs.	Refer to section 11.2 and remove cause.		Section 11.2
2	Switch on servo-on signal.	Alarm occurs.	Refer to section 11.2 and remove cause.		Section 11.2
		Servo motor shaft is not servo-locked (is free).	1. Check the display to see if the servo amplifier is ready to operate. 2. Check the external I/O signal indication to see if the servo-on (SON) signal is ON.	1. Servo-on signal is not input. (Wiring mistake) 2. 24VDC power is not supplied to COM.	Section 7.3.2
3	Gain adjustment	Rotation ripples (speed fluctuations) are large at low speed.	Make gain adjustment in the following procedure. 1. Increase the auto tuning response level. 2. Repeat acceleration and deceleration several times to complete auto tuning.	Gain adjustment fault	Chapter 7
		Large load inertia moment causes the servo motor shaft to oscillate side to side.	If the servo motor may be run with safety, repeat acceleration and deceleration several times to complete auto tuning.	Gain adjustment fault	Chapter 7
4	Cyclic operation	Position shift occurs	Confirm the cumulative command pulses, cumulative feedback pulses and actual servo motor position.	Pulse counting error, etc. due to noise.	

11.2 When alarm or warning has occurred

> **POINT**
>
> ▪ Configure up a circuit which will detect the trouble (ALM) signal and turn off the servo-on (SON) signal at occurrence of an alarm.

11.2.1 Alarms and warning list

When a fault occurs during operation, the corresponding alarm or warning is displayed. If any alarm or warning has occurred, refer to section 11.2.2 or 11.2.3 and take the appropriate action.
Set "1□ □ □ " in parameter No. 59 to output the alarm code in ON/OFF status across the corresponding pin and SG. Warnings (AL.90 to AL.E9) have no alarm codes. Any alarm code is output at occurrence of the corresponding alarm. In the normal status, the signals available before alarm code setting (CN1B-19, CN1A-18, CN1A-19) are output.
After its cause has been removed, the alarm can be deactivated in any of the methods marked ○ in the alarm deactivation column.

	Display	(Note 2) Alarm code			Name	Alarm deactivation		
		CN1B-19 pin	CN1A-18 pin	CN1A-19 pin		Power OFF→ON	Press "SET" on current alarm screen.	Alarm reset (RES) signal
Alarms	AL.10	0	1	0	Undervoltage	○	○	○
	AL.12	0	0	0	Memory error 1	○		
	AL.13	0	0	0	Clock error	○		
	AL.15	0	0	0	Memory error 2	○		
	AL.16	1	1	0	Encoder error 1	○		
	AL.17	0	0	0	Board error	○		
	AL.19	0	0	0	Memory error 3	○		
	AL.1A	1	1	0	Motor combination error	○		
	AL.20	1	1	0	Encoder error 2	○		
	AL.24	1	0	0	Main circuit error	○		
	AL.25	1	1	0	Absolute position erase	○		
	AL.30	0	0	1	Regenerative error	○ (Note 1)	○ (Note 1)	○ (Note 1)
	AL.31	1	0	1	Overspeed	○	○	○
	AL.32	1	0	0	Overcurrent	○	○	○
	AL.33	0	0	1	Overvoltage	○		
	AL.35	1	0	1	Command pulse frequency error	○	○	○
	AL.37	0	0	0	Parameter error	○		
	AL.39	0	0	0	Program error	○		
	AL.45	0	1	1	Main circuit device overheat	○ (Note 1)	○ (Note 1)	○ (Note 1)
	AL.46	0	1	1	Servo motor overheat	○ (Note 1)	○ (Note 1)	○ (Note 1)
	AL.50	0	1	1	Overload 1	○ (Note 1)	○ (Note 1)	○ (Note 1)
	AL.51	0	1	1	Overload 2	○ (Note 1)	○ (Note 1)	○ (Note 1)
	AL.52	1	0	1	Error excessive	○	○	○
	AL.63	1	0	1	Home position return incomplete	○	○	○
	AL.64	1	0	1	Home position setting error	○	○	○
	AL.8A	0	0	0	Serial communication time-out error	○	○	○
	AL.8E	0	0	0	Serial communication error	○	○	○
	88888	0	0	0	Watchdog	○		
Warnings	AL.92				Open battery cable warning	Removing the cause of occurrence deactivates the alarm automatically.		
	AL.97				Program operation disable			
	AL.98				Software limit warning			
	AL.9F				Battery warning			
	AL.E0				Excessive regenerative warning			
	AL.E1				Overload warning			
	AL.E3				Absolute position counter warning			
	AL.E6				Servo emergency stop warning			
	AL.E9				Main circuit off warning			

Note 1. Deactivate the alarm about 30 minutes of cooling time after removing the cause of occurrence.
2. 0: Pin-SG off (open)
1: Pin-SG on (short)

11.2.2 Remedies for alarms

CAUTION

- When any alarm has occurred, eliminate its cause, ensure safety, then reset the alarm, and restart operation. Otherwise, injury may occur.
- If an absolute position erase alarm (AL.25) occurred, always make home position setting again. Otherwise, misoperation may occur.
- As soon as an alarm occurs, turn off Servo-on (SON) and power off.

POINT

- When any of the following alarms has occurred, always remove its cause and allow about 30 minutes for cooling before resuming operation. If operation is resumed by switching control circuit power off, then on to reset the alarm, the servo amplifier and servo motor may become faulty.
- Regenerative error (AL.30)
- Overload 1 (AL.50)
- Overload 2 (AL.51)
- The alarm can be deactivated by switching power off, then on press the "SET" button on the current alarm screen or by turning on the reset (RES). For details, refer to section 11.2.1.

When an alarm occurs, the trouble (ALM) switches off and the dynamic brake is operated to stop the servo motor. At this time, the display indicates the alarm No.
The servo motor comes to a stop. Remove the cause of the alarm in accordance with this section. The optional MR Configurator (servo configuration software) may be used to refer to the cause.

Display	Name	Definition	Cause	Action
AL.10	Undervoltage	Power supply voltage dropped. MR-J2S-□CL: 160VAC or less MR-J2S-□CL1: 83VAC or less	1. Power supply voltage is low.	Review the power supply.
			2. There was an instantaneous control power failure of 60ms or longer.	
			3. Shortage of power supply capacity caused the power supply voltage to drop at start, etc.	
			4. Power was restored after the bus voltage had dropped to 200VDC. (Main circuit power switched on within 5s after it had switched off.)	
			5. Faulty parts in the servo amplifier Checking method Alarm (AL.10) occurs if power is switched on after disconnection of all cables but the control circuit power supply cables.	Change the servo amplifier.
AL.12	Memory error 1	RAM, memory fault	Faulty parts in the servo amplifier Checking method Alarm (any of AL.12 and 13) occurs if power is switched on after disconnection of all cables but the control circuit power supply cables.	Change the servo amplifier.
AL.13	Clock error	Printed board fault		

Display	Name	Definition	Cause	Action
AL.15	Memory error 2	EEP-ROM fault	1. Faulty parts in the servo amplifier Checking method Alarm (AL.15) occurs if power is switched on after disconnection of all cables but the control circuit power supply cables.	Change the servo amplifier.
			2. The number of write times to EEP-ROM exceeded 100,000.	
AL.16	Encoder error 1	Communication error occurred between encoder and servo amplifier.	1. Encode connector (CN2) disconnected.	Connect correctly.
			2. Encoder fault	Change the servo motor.
			3. Encoder cable faulty (wire breakage or short)	Repair or change the cable.
AL.17	Board error	CPU/parts fault	Faulty parts in the servo amplifier Checking method Alarm (AL.17) occurs if power is switched on after disconnection of all cable but the control circuit power supply cable.	Change the servo amplifier.
		The output terminals U, V, W of the servo amplifier and the input terminals U, V, W of the servo motor are not connected.	2. The wiring of U, V, W is disconnected or not connected.	Correctly connect the output terminals U, V, W of the servo amplifier and the input terminals U, V, W of the servo motor.
AL.19	Memory error 3	ROM memory fault	Faulty parts in the servo amplifier Checking method Alarm (AL.19) occurs if power is switched on after disconnection of all cable but the control circuit power supply cable.	Change the servo amplifier.
AL.1A	Motor combination error	Wrong combination of servo amplifier and servo motor.	Wrong combination of servo amplifier and servo motor connected.	Use correct combination.
AL.20	Encoder error 2	Communication error occurred between encoder and servo amplifier.	1. Encoder connector (CN2) disconnected.	Connect correctly.
			2. Encoder fault	Change the servo motor.
			3. Encoder cable faulty (wire breakage or shorted)	Repair or change the cable.
		Encoder detected acceleration error.	4. Excessive acceleration is occurred due to oscillation and others.	1. Decrease the speed control gain 2. 2. Decrease the auto tuning response level.

Display	Name	Definition	Cause	Action
AL.24	Main circuit error	Ground fault occurred at the servo motor outputs (U,V and W phases) of the servo amplifier.	1. Power input wires and servo motor output wires are in contact at main circuit terminal block (TE1).	Connect correctly.
			2. Sheathes of servo motor power cables deteriorated, resulting in ground fault.	Change the cable.
			3. Main circuit of servo amplifier failed. Checking method AL.24 occurs if the servo is switched on after disconnecting the U, V, W power cables from the servo amplifier.	Change the servo amplifier.
AL.25	Absolute position erase	Absolute position data in error	1. Reduced voltage of super capacitor in encoder	After leaving the alarm occurring for a few minutes, switch power off, then on again. Always make home position setting again.
			2. Battery voltage low	Change battery. Always make home position setting again.
			3. Battery cable or battery is faulty.	
		Power was switched on for the first time in the absolute position detection system.	4. Super capacitor of the absolute position encoder is not charged	After leaving the alarm occurring for a few minutes, switch power off, then on again. Always make home position setting again.
AL.30	Regenerative error	Permissible regenerative power of the built-in regenerative resistor or regenerative option is exceeded.	1. Wrong setting of parameter No. 0	Set correctly.
			2. Built-in regenerative resistor or regenerative option is not connected.	Connect correctly
			3. High-duty operation or continuous regenerative operation caused the permissible regenerative power of the regenerative option to be exceeded. Checking method Call the status display and check the regenerative load ratio.	1. Reduce the frequency of positioning. 2. Use the regenerative option of larger capacity. 3. Reduce the load.
			4. Power supply voltage is abnormal. MR-J2S-□CL:260VAC or more MR-J2S-□CL1:135VAC or more	Review power supply
			5. Built-in regenerative resistor or regenerative option faulty.	Change servo amplifier or regenerative option.
		Regenerative transistor fault	6. Regenerative transistor faulty. Checking method 1) The regenerative option has overheated abnormally. 2) The alarm occurs even after removal of the built-in regenerative resistor or regenerative option.	Change the servo amplifier.

Display	Name	Definition	Cause	Action
AL.31	Overspeed	Speed has exceeded the instantaneous permissible speed.	1. Input command pulse frequency exceeded the permissible instantaneous speed frequency.	Set command pulses correctly.
			2. Small acceleration/deceleration time constant caused overshoot to be large.	Increase acceleration/deceleration time constant.
			3. Servo system is instable to cause overshoot.	1. Re-set servo gain to proper value. 2. If servo gain cannot be set to proper value. 1) Reduce load inertia moment ratio; or 2) Reexamine acceleration/ deceleration time constant.
			4. Electronic gear ratio is large (parameters No. 4, 5)	Set correctly.
			5. Encoder faulty.	Change the servo motor.
AL.32	Overcurrent	Current that flew is higher than the permissible current of the servo amplifier. (If the alarm (AL.32) occurs again when turning ON the servo after resetting the alarm by turning OFF/ON the power when the alarm (AL.32) first occurred, the transistor (IPM, IGBT) of the servo amplifier may be at fault. In the case, do not repeat to turn OFF/ON the power. Check the transistor with the checking method of "Cause 2".)	1. Short occurred in servo amplifier output phases U, V and W.	Correct the wiring.
			2. Transistor (IPM) of the servo amplifier faulty. Checking method Alarm (AL.32) occurs if power is switched on after U,V and W are disconnected.	Change the servo amplifier.
			3. Ground fault occurred in servo amplifier output phases U, V and W.	Correct the wiring.
			4. External noise caused the overcurrent detection circuit to misoperate.	Take noise suppression measures.

Display	Name	Definition	Cause	Action
AL.33	Overvoltage	Converter bus voltage exceeded 400VDC.	1. Regenerative option is not used.	Use the regenerative option.
			2. Though the regenerative option is used, the parameter No. 0 setting is "□0□□ (not used)".	Make correct setting.
			3. Lead of built-in regenerative resistor or regenerative option is open or disconnected.	1. Change lead. 2. Connect correctly.
			4. Regenerative transistor faulty.	Change servo amplifier
			5. Wire breakage of built-in regenerative resistor or regenerative option	1. For wire breakage of built-in regenerative resistor, change servo amplifier. 2. For wire breakage of regenerative option, change regenerative option.
			6. Capacity of built-in regenerative resistor or regenerative option is insufficient.	Add regenerative option or increase capacity.
			7. Power supply voltage high.	Review the power supply.
			8. The jumper across BUE-SD of the FR-BU2 brake unit is removed.	Fit the jumper across BUE-SD.
AL.35	Command pulse frequency error	Input pulse frequency of the command pulse is too high.	1. Pulse frequency of the manual pulse generator is too high.	Change the pulse frequency to a proper value.
			2. Noise entered the pulses of the manual pulse generator.	Take action against noise.
			3. Manual pulse generator failure	Change the manual pulse generator.
AL.37	Parameter error	Parameter setting is wrong.	1. Servo amplifier fault caused the parameter setting to be rewritten.	Change the servo amplifier.
			2. Regenerative option not used with servo amplifier was selected in parameter No.0.	Set parameter No.0 correctly.
			3. Value outside setting range has been set in some parameter.	Set the parameter correctly.
			4. Value outside setting range has been set in electronic gear.	Set parameters No. 4, 5 correctly.
			5. Opposite sign has been set in software limit increasing side (parameters No. 46, 47). Similarly, opposite sign has been set in software limit decreasing side (parameters No. 48, 49).	Set parameters No. 46 to 49 correctly.
			6. Opposite sign has been set in position range output address increasing side (parameters No. 50, 51). Similarly, opposite sign has been set in position range output address decreasing side (parameters No. 52, 53).	Set parameters No. 50 to 53 correctly.
			7. The number of write times to EEP-ROM exceeded 100,000 due to parameter write, program write, etc.	Change the servo amplifier.

Display	Name	Definition	Cause	Action
AL.39	Program error	Program data is abnormal	1. Servo amplifier fault caused the program data to be rewritten.	Change the servo amplifier.
			2. Command argument is out of the setting range.	Programming correctly.
			3. The number of write times to EEP-ROM exceeded 100,000 due to parameter write, program write, etc.	Change the servo amplifier.
AL.45	Main circuit device overheat	Main circuit device overheat	1. Servo amplifier faulty.	Change the servo amplifier.
			2. The power supply was turned on and off continuously by overloaded status.	The drive method is reviewed.
			3. Air cooling fan of servo amplifier stops.	1. Exchange the cooling fan or the servo amplifier. 2. Reduce ambient temperature.
AL.46	Servo motor overheat	Servo motor temperature rise actuated the thermal sensor.	1. Ambient temperature of servo motor is over 40°C (104°F).	Review environment so that ambient temperature is 0 to 40°C (32 to 104°F).
			2. Servo motor is overloaded.	1. Reduce load. 2. Review operation pattern. 3. Use servo motor that provides larger output.
			3. Thermal sensor in encoder is faulty.	Change servo motor.
AL.50	Overload 1	Load exceeded overload protection characteristic of servo amplifier.	1. Servo amplifier is used in excess of its continuous output current.	1. Reduce load. 2. Review operation pattern. 3. Use servo motor that provides larger output.
			2. Servo system is instable and hunting.	1. Repeat acceleration/ deceleration to execute auto tuning. 2. Change auto tuning response setting. 3. Set auto tuning to OFF and make gain adjustment manually.
			3. Machine struck something.	1. Review operation pattern. 2. Install limit switches.
			4. Wrong connection of servo motor. Servo amplifier's output terminals U, V, W do not match servo motor's input terminals U, V, W.	Connect correctly.
			5. Encoder faulty. Checking method When the servo motor shaft is rotated with the servo off, the cumulative feedback pulses do not vary in proportion to the rotary angle of the shaft but the indication skips or returns midway.	Change the servo motor.

Display	Name	Definition	Cause	Action
AL.51	Overload 2	Machine collision or the like caused max. For the time of the alarm occurrence, refer to the section 13.1.	1. Machine struck something.	1. Review operation pattern. 2. Install limit switches.
			2. Wrong connection of servo motor. Servo amplifier's output terminals U, V, W do not match servo motor's input terminals U, V, W.	Connect correctly.
			3. Servo system is instable and hunting.	1. Repeat acceleration/deceleration to execute auto tuning. 2. Change auto tuning response setting. 3. Set auto tuning to OFF and make gain adjustment manually.
			4. Encoder faulty. Checking method When the servo motor shaft is rotated with the servo off, the cumulative feedback pulses do not vary in proportion to the rotary angle of the shaft but the indication skips or returns midway.	Change the servo motor.
AL.52	Error excessive	The difference between the model position and the actual servo motor position exceeds 2.5 rotations. (Refer to the function block diagram in section 1.1.1)	1. Acceleration/deceleration time constant is too small.	Increase the acceleration/deceleration time constant.
			2. Internal torque limit 1 (parameter No.28) is too small.	Increase the torque limit value.
			3. Motor cannot be started due to torque shortage caused by power supply voltage drop.	1. Review the power supply capacity. 2. Use servo motor which provides larger output.
			4. Position control gain 1 (parameter No.7) value is small.	Increase set value and adjust to ensure proper operation.
			5. Servo motor shaft was rotated by external force.	1. When torque is limited, increase the limit value. 2. Reduce load. 3. Use servo motor that provides larger output.
			6. Machine struck something.	1. Review operation pattern. 2. Install limit switches.
			7. Encoder faulty	Change the servo motor.
			8. Wrong connection of servo motor. Servo amplifier's output terminals U, V, W do not match servo motor's input terminals U, V, W.	Connect correctly.

Display	Name	Definition	Cause	Action
AL.63	Home position return incomplete	In incremental system. 1. Positioning operation was performed without home position return. 2. Home position return ended abnormally.	1. Positioning operation was performed without home position return. 2. Home position return speed could not be decreased to creep speed. 3. Limit switch was actuated during home position return starting at other than position beyond dog.	1. Perform home position return. 2. Review home position return speed/creep speed/moving distance after proximity dog.
		In absolute position detection system. 1. Positioning operation was performed without home position setting. 2. Home position setting ended abnormally.	1. Positioning operation was performed without home position setting. 2. Home position setting speed could not be decreased to creep speed. 3. Limit switch was actuated during home position setting starting at other than position beyond dog.	1. Perform home position setting. 2. Review home position setting speed/creep speed/moving distance after proximity dog.
AL.64	Home position setting error	Home position setting could not be made.	1. Droop pulses remaining are greater than the in-position range setting.	Remove the cause of droop pulse occurrence
			2. Command pulse entered after clearing of droop pulses.	Do not enter command pulse after clearing of droop pulses.
			3. Creep speed high.	Reduce creep speed.
AL.8A	Serial communication time-out error	RS-232C or RS-422 communication stopped for longer than the time set in parameter No.23.	1. Communication cable breakage.	Repair or change communication cable
			2. Communication cycle longer than parameter No. 23 setting.	Set correct value in parameter.
			3. Wrong protocol.	Correct protocol.
AL.8E	Serial communication error	Serial communication error occurred between servo amplifier and communication device (e.g. personal computer).	1. Communication cable fault (Open cable or short circuit)	Repair or change the cable.
			2. Communication device (e.g. personal computer) faulty	Change the communication device (e.g. personal computer).
88888	Watchdog	CPU, parts faulty	Fault of parts in servo amplifier Checking method Alarm (88888) occurs if power is switched on after disconnection of all cables but the control circuit power supply cables.	Change servo amplifier.

11.2.3 Remedies for warnings

> **CAUTION**
> ・If an absolute position counter warning (AL.E3) occurred, always make home position setting again. Otherwise, misoperation may occur.

> **POINT**
> ・When any of the following alarms has occurred, do not resume operation by switching power of the servo amplifier OFF/ON repeatedly. The servo amplifier and servo motor may become faulty. If the power of the servo amplifier is switched OFF/ON during the alarms, allow more than 30 minutes for cooling before resuming operation.
> ・Excessive regenerative warning (AL.E0)
> ・Overload warning 1 (AL.E1)

If AL.E6 occurs, the servo off status is established. If any other warning occurs, operation can be continued but an alarm may take place or proper operation may not be performed. Use the optional MR Configurator (servo configuration software) to refer to the cause of warning.

Display	Name	Definition	Cause	Action
AL.92	Open battery cable warning	Absolute position detection system battery voltage is low.	1. Battery cable is open.	Repair cable or changed.
			2. Battery voltage supplied from the servo amplifier to the encoder fell to about 3.2V or less. (Detected with the encoder)	Change battery.
AL.97	Program operation disable	Program was started in a program operation disable status.	After a program change, the program was started without the servo amplifier being powered off/on.	Power off/on the servo amplifier.
AL.98	Software limit warning	Software limit set in parameter is reached.	1. Software limit was set within actual operation range.	Set parameter No. 48 to 51 correctly.
			2. Program of position data in excess of software limit was executed.	Set program correctly.
			3. Software limit was reached during JOG operation or manual pulse generator operation.	Perform operation within software limit range.
AL.9F	Battery warning	Voltage of battery for absolute position detection system reduced.	Battery voltage fell to 3.2V or less. (Detected with the servo amplifier)	Change the battery.
AL.E0	Excessive regenerative warning	There is a possibility that regenerative power may exceed permissible regenerative power of built-in regenerative resistor or regenerative option.	Regenerative power increased to 85% or more of permissible regenerative power of built-in regenerative resistor or regenerative option. Checking method: Call the status display and check regenerative load ratio.	1. Reduce frequency of positioning. 2. Change regenerative option for the one with larger capacity. 3. Reduce load.
AL.E1	Overload warning	There is a possibility that overload alarm 1 or 2 may occur.	Load increased to 85% or more of overload alarm 1 or 2 occurrence level. Cause, checking method: Refer to AL.50,51.	Refer to AL.50, AL.51.

Display	Name	Definition	Cause	Action
AL.E3	Absolute position counter warning	Absolute position encoder pulses faulty.	1. Noise entered the encoder.	Take noise suppression measures.
			2. Encoder faulty.	Change servo motor.
		The multi-revolution counter value of the absolute position encoder exceeded the maximum revolution range.	3. The movement amount from the home position exceeded a 32767 rotation or −37268 rotation in succession.	Make home position setting again.
AL.E6	Servo forced stop warning	EMG-SG are open.	External forced stop was made valid. (EMG-SG opened.)	Ensure safety and deactivate forced stop.
AL.E9	Main circuit off warning	Servo was switched on with main circuit power off.		Switch on main circuit power.

11.3 MR-DP60 external digital display error

When MR-DP60 external digital display detects an error, the following alarms are displayed. The alarms are displayed only on the MR-DP60, but not on the servo amplifier display.

Display	Name	Definition	Cause	Action
AL. CPU	CPU error	CPU error	Faulty parts in the MR-D60.	Exchange the MR-D60.
AL. C0	Communication error	Communication error occurred between MR-DP60 and MR-J2S-CL.	1. CN3 connector disconnected.	Connect correctly.
			2. Wire breakage of the cable.	Repair or exchange the cable.