

SANMOTION

AC SERVO SYSTEMS

G

USER'S MANUAL

For analog/pulse and EtherCAT interface

100 VAC	30-200 W,	200 VAC	30 W-1.5 kW
	48 VDC	30-400 W	

9. Troubleshooting

SANYODENKI

AC servo system

SANMOTION G

G series

User's manual

Troubleshooting

For Analog/Pulse and EtherCAT Interface Model

This manual describes how to deal with problems that may occur during operation with the servo system.

Safety Precautions

Please read this User's Manual and its appendix carefully prior to installation, operation, maintenance or inspection and perform all tasks according to the instructions provided here. Wiring work shall be done by specialized engineer, due to this manual, user's manual-3 (Hardware) and such as domestic regulations (Electrical Equipment Technical Standards). A good understanding of this equipment, its safety information as well as all Warnings / Cautions is also necessary before using.

Matters that require attention are ranked as "Danger", "Warning", "Caution" and "Notice" in this document.

■ Warning Symbols

 Danger	Denotes immediate hazards that will cause severe bodily injury or death if not avoided.
 Warning	Denotes immediate hazards which will probably cause severe bodily injury or death if not avoided.
 Caution	Denotes hazards which could cause bodily injury and product or property damage if not avoided.
Notice	Denotes hazards which could cause product or property damage without bodily injury if not avoided.

Even the hazards denoted by this symbol  **Caution** could lead to a serious accident due to conditions.

Make sure to strictly follow these safety precautions.

■ Prohibited/Mandatory Symbols

	Denotes actions that must not be allowed to occur / prohibited actions.
	Denotes actions that must be carried out / mandatory actions.

User's Manual (Troubleshooting)

■ Storage

Notice

- ◆ Do not store this product in areas subject to rain or drops of water, or in the presence of harmful or corrosive gases or liquids.
Damage to this product could otherwise result.
- ◆ Store this product where it is not exposed to direct sunlight, and within the specified temperature and humidity ranges “- 20 to + 65°C, below 95% RH (non-condensing)”.
Damage to this product could otherwise result.
- ◆ Please contact our sales representative if the amplifier has been stored for a period of 3 years or longer. Electrolytic capacitor needs to be checked for a drop in capacitance.
- ◆ Please contact our sales representative if the motor has been stored for a period of 3 years or longer. Confirmations such as bearings and the brakes are necessary.

■ Transportation



Warning

- ◆ Do not hold cables, connectors, servo motor output shafts, encoders, or terminal boxes during transportation.
Failure to do so may result in injury, malfunction, or damage.
- ◆ Keep in mind that it is dangerous at the time of transportation if it falls or overturns.
Bodily injury could otherwise result.
- ◆ Follow the directions written on the outside box. Excess stacking could result in collapse.
Damage to this product or bodily injury could otherwise result.
- ◆ Use eyebolt of the motor only for transporting itself. Do not use for transportation of machinery combined with the motor.
Damage to this product or bodily injury could otherwise result.

■ Installation



Warning

- ◆ Do not install this product where combustible or explosive gas is present.
Fire could otherwise result.
- ◆ Install this product on a metal or other non-flammable support.
Fire could otherwise result.
- ◆ Use the servo motor in an environment that meets the protection class of the servo motor.
Failure to do so may result in electric shock, fire, or malfunction.
- ◆ Install the servo motor so that it is not exposed to water, grinding fluid, oil mist, iron powder, chips, etc.
Failure to do so may result in electric shock, fire, or malfunction.
- ◆ Do not allow oil or other flammable foreign objects, or foreign objects such as wires or metal pieces to enter.
Fire could otherwise result.
- ◆ Install an external emergency stop circuit that can stop operations instantaneously and cut off the power.
Bodily injury and fire could otherwise result.
- ◆ To protect from overcurrent, wiring breaker (MCCB) or fuse shall be installed between power source and servo amplifier.
Fire or electric shock could otherwise result.



Caution

- ◆ Install safety device such as breaker in preparation to external wiring short circuit.
Fire could otherwise result.
- ◆ Check the top and bottom of the box before unpacking it.
Bodily injury could otherwise result.
- ◆ Do not stand on this product or place heavy objects on top of it.
Bodily injury could otherwise result.
- ◆ Take care of falling or overturning of the device during installation. Use eyebolts of the motor if supplied.
Bodily injury could otherwise result.

User's Manual (Troubleshooting)



Caution

- ◆ The servo motor must be securely fastened to the equipment. Insufficient fastening may cause the servomotor to come off during operation.
- ◆ Do not touch the output shaft of the servo motor (key groove, tooth cut part) with bare hands.
Bodily injury could otherwise result.
- ◆ Make sure that the output shaft of the servo motor and the mating machine are well aligned.
Failure to do so may result in injury or malfunction.
- ◆ Motor holding brake is not to be used as a safety stop for the mechanism.
Install a safety stop device on mechanism side.
Bodily injury could otherwise result.
- ◆ When using the servo motor in vertical axis, provide safety devices (external brake etc.) in combination to prevent a moving part falling due to alarm issuing.
Bodily injury could otherwise result.
- ◆ Safety system with safe-torque-off function shall be designed by the person with expertise of related safety standards and through understanding of the descriptions specified in the section "Safe Torque Off" of user's manual-4 (Laws/Regulations Conformity Guidelines).
Bodily injury could otherwise result.

Notice

- ◆ Keep ambient environment of installed servo motor/amplifier within the specified temperature/humidity range.
Damage to this product could otherwise result.
- ◆ Make sure to install specified mounting orientation.
Damage to this product could otherwise result.
- ◆ The load applied to the output shaft of the servo motor must be less than the allowable load.
Damage to this product could otherwise result.
- ◆ When installing or removing the coupling to the output shaft of the servo motor, do not apply impact to the shaft with a hammer or the like.
Damage to this product could otherwise result.
- ◆ Do not drop this product or subject it to excessive shock of any kind.
Damage to this product could otherwise result.
- ◆ Do not obstruct the air intake and exhaust vents.
Damage to this product could otherwise result.
- ◆ Keep a distance with specified value between servo amplifier and inside cabinet or the other device.
Damage to this product could otherwise result.
- ◆ Install an external protective circuit to the amplifier to cut off the power from the main circuit in the case of an alarm.
Secondary damages could otherwise result.
- ◆ Make the devices for collision safety strong enough to resist the maximum output of the system.
Damage to this product could otherwise result.
- ◆ Do not use in environments exposed to corrosive gases or liquids.
Damage to this product could otherwise result.

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■ Wiring



Warning

- ◆ The protective ground terminal () should always be grounded to the device or control board.
The ground terminal of the motor should always be connected to the protective ground terminal () of the amplifier.
Doing so may cause electric shock or fire.
The functional ground terminal () should also be connected to the motor and control board to prevent equipment malfunction.
- ◆ Do not perform any work of wiring, maintenance or inspection when this product is powered on. Be sure to shut off the power supply and wait until the time indicated on the servo amplifier's main nameplate has elapsed and the main circuit power CHARGE LED (red) has turned off before performing any work.
Electric shock could otherwise result.
- ◆ Do not connect a commercial power supply or ground to the U, V or W terminals of the servo motor.
Fire could otherwise result.
- ◆ Install a breaker or other safety device in case of a short circuit in the external wiring.
Fire could otherwise result.
- ◆ Do not damage cables, apply excessive stress, place heavy objects on them, or pinch them.
Doing so may cause electric shock or fire.
- ◆ Use with power specification (phase, voltage, frequency, AC/DC) fit to this product.
Fire could otherwise result.

Notice

- ◆ Use the amplifier and motor together in the specified combination.
Damage to this product could otherwise result.
- ◆ Wiring shall be correct and sure.
Damage to this product could otherwise result.
- ◆ Do not bind a main circuit/servo motor power cable and a signal cable together or pass through the same duct. Also, do not tie the servo motor power cable and encoder cable together or pass them through the same duct.
Malfunction to this product could otherwise result.
- ◆ Must add the surge absorbing diode if inductive load such as relay connect to the control signal output of servo amplifier. Also, do not mistake a polarity of that diode.
Damage to this product could otherwise result.
- ◆ Use a power source with power specification (phase, voltage, frequency, AC/DC) fit to holding brake and cooling fan of servo motor.
Damage to this product could otherwise result.

■ Operation



Warning

- ◆ Do not touch the inside of the amplifier.
Electric shock could otherwise result.
- ◆ Do not touch the rotating part of servo motor during operation.
Bodily injury could otherwise result.
- ◆ Test operation should be performed with servo motor in a fixed position and separated from a mechanical system. After verifying successful operation, install a motor to the mechanical system.
Bodily injury could otherwise result.
- ◆ Do not touch terminals/connectors while this product is powered up.
Electric shock could otherwise result.



Caution

- ◆ Do not apply a magnetic field to the encoder cover part of the servo motor. (Do not attach magnets such as magnet stands to the encoder cover section.)
Doing so may cause failure or malfunction.
- ◆ It will be high temperature that servo amplifier heatsink/regenerative resistor/external resistor for dynamic brake/servo motor etc., while turning power on or for a while after power shutdown. Prepare safety measures such as putting cover to avoid touching accidentally, if required. When safety measures cannot prepare, put a high temperature caution label.
Burn injury could otherwise result.
- ◆ Do not change servo parameters drastic because motion becomes unstable.
Bodily injury could otherwise result.
- ◆ Do not approach machines at the time return from blackout or instantaneous power failure because it may start up again suddenly.
(Design systems to keep safety even if machine start up again.)
Bodily injury could otherwise result.
- ◆ In case alarm or other abnormality occurring, first stop operation. Remove the cause of alarm, and then verify safety. Finally, reset the alarm and restart systems.
Bodily injury could otherwise result.
- ◆ Do not connect/disconnect of connectors while this product is powered on because generated surge voltage may damage to electronic parts.
Electric shock or damage could otherwise result.
- ◆ Prepare a dedicated power supply for the motor holding brake.
Doing so may cause failure or malfunction.
- ◆ Insulate the power supply for the motor holding brake and the motor power lines (U, V, W, and ground).
Doing so may cause failure or malfunction.

Notice

- ◆ The built-in brake of servo motor is intended to secure the motor; do not use it for regular deceleration.
Damage to the brake could otherwise result.
- ◆ Do not apply static electricity or high voltage to servo motor encoder cable.
Damage to this product could otherwise result.
- ◆ When inertia moment or velocity rotation is high, do not use this product under the condition that the instantaneous regenerative power exceeds the allowable instantaneous withstand capacity of the strand of the regenerative resistor.
Damage to this product could otherwise result.
- ◆ When dynamic brake worked at power shutdown or alarm occurring, do not drive servo motor with external force.
Damage to this product could otherwise result.
- ◆ Do not perform turning power ON/OFF frequently, such as repeating power supply ON/OFF 30 times or more per day, otherwise 5 times or more per hour.
Damage to this product could otherwise result.
- ◆ It shall be designed the sequence that include braking delay time because the surge-absorbing component for the relay of the servo motor holding brake generates braking delay time.
Damage to this product could otherwise result.
Refer to the section "Holding brake" in user's manual-2 (Servo Motor) for holding delay time.

■ Maintenance/Inspection



Warning

- ◆ Do not disassembly, repair and modify this product.
Fire or electric shock could otherwise result.



Caution

- ◆ Do not use the servo motor/amplifier which is failed, damaged or burned.
Fire could otherwise result.

Notice

- ◆ Some parts of servo amplifier (electrolytic capacitor, cooling fan, lithium battery for encoder, fuse and relay kinds) have aging with long-term use. It shall be replaced new for preventive maintenance, regarding with standard replacement period as a guide.
Damage to this product could otherwise result.
If you need a replacement, please contact our sales representative.
- ◆ Do not perform insulation resistance test (Megger test) or withstand voltage test to servo amplifiers.
Damage to this product could otherwise result.



Prohibited

- ◆ Do not remove a nameplate from this product.

About process of disposal item

■ Disposal



Mandatory

- ◆ If the amplifier or the motor is no longer in use, it should be discarded as industrial waste.

User's Manual (Troubleshooting)

About manuals

For the first use of our servo system, check related manuals below if required and use our servo system safe.

No.	User's manual name	Manual No.	Contents
1	Introduction	M0020411	Basic information to use servo system is shown, such as specifications, functions, structures, startup, maintenance, inspection. Check before use of this product.
2	Servo Motor	M0020412	Describes the specifications, selection, installation, wiring, external dimensions, and options for servo motors.
3	Hardware	M0020413	Describes servo amplifier specifications, installation, wiring, outline dimensions and options etc.
4	Laws/Regulations Conformity Guidelines	M0020414	Describes how to apply to Laws/Regulations Conformity of servo amplifier.
5	Functions	M0020415	Describes about servo amplifier control and functions.
6	Adjustment	M0020416	Describes how to adjust of servo system.
7	Parameters	M0020417	Describes servo parameters and monitoring contents.
8	EtherCAT Communication	M0020418	Describes details of EtherCAT communication parameters.
9	Troubleshooting	M0020419	Describes troubleshooting against problems to be issue with servo system operations.
10	Linear Servo Motor	M0020420	Describes the specifications, selection, installation, wiring, external dimensions, and options for linear servo motors.
-	SANMOTION MOTOR SETUP SOFTWARE	M0010842	Describes how to use of SANMOTION MOTOR SETUP SOFTWARE.



This manual

Paragraph Construction of User's Manual

This manual is structured with paragraph as below.

9.1 Large paragraph

9.1.1 Medium paragraph

(1) Small paragraph

- Description
 - ✓ Note of description
- ◆ Description detail
 - ✓ Note of description detail

About a term

In this manual, convert a term as shown below if servo motor type to be used is linear servo motor.

Rotary Motor or Direct Drive Motor	→	Linear Servo Motor
Torque	→	Thrust Force
Load Inertia Moment	→	Load Mass
Motor Inertia Moment	→	Mover Mass
Rotating Direction	→	Move Direction
Positive Rotation	→	Positive Direction
Negative Rotation	→	Negative Direction
min^{-1}	→	mm/s

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9.1 Precautions for manuals

To ensure full functionality of the product, please read the manual to the end before using the product and use it correctly. Keep the read manual in a place where it can be used when necessary.

Always follow the safety instructions provided in the manual.

Safety is not guaranteed for use of the product in any manner other than that specified in the manual.

Some figures in the manual may be omitted or abstracted.

The contents of this manual are subject to change without notice as a result of product upgrades or additional information on usage. Changes will be made by revising the edition of this manual.

Although every effort has been made to ensure the accuracy of the contents of this manual, in the unlikely event that you notice a questionable point, error, or omission, please contact the nearest branch office or the head office listed on the back cover.

The Japanese version of this manual is the original. In the event of any discrepancy between the original and any translation into other languages, the information in the original shall take precedence.

9.2 Troubleshooting

9.2.1 Overview

This manual describes the contents and remedies for troubles that may occur during operation of the servo system including the SANMOTION G servo amplifier, divided into "troubles that do not generate alarms or warnings", "troubles when warnings occur" and "troubles when alarms occur".

9.3 Troubles without alarms or warnings

If the motor cannot be operated properly without an alarm, refer to the following items to investigate the cause and take corrective actions. If an alarm occurs, take the measures described in the section "9.5.2 Troubleshooting when an alarm occurs.

- ✓ For details of each wiring, refer to "Wiring" in user's manual-3 (Hardware).
Be sure to shut off the power supply when investigating the wiring and taking corrective actions.
- ✓ For details on servo tuning, refer to "Types of Servo Tuning Functions" in user's manual-6 (Adjustment) and execute appropriate servo tuning.
- ✓ If the following corrective actions do not solve the problem, replace the servo amplifier and servo motor.

■ POWER: Control power establishment LED (blue) is off.

	Investigation	Assumed causes and corrective actions
1	L1C and L2C of control power connector XC are not connected.	● Connect the connector.
2	Control power supply voltage is low.	● Input a power supply that matches the input specifications of the control power supply. Refer to "Servo amplifier standard specifications" in user's manual-1.
3	Unplugging the encoder connector cable improves the situation.	● The wiring of the encoder connector cable may be short-circuited, so replace it with a normal one or correct the wiring.
4	Internal circuit failure	● Contact us.

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- POWER: Control power establishment LED (blue) is on, 7-segment LED is off.

	Investigation	Assumed causes and corrective actions
1	Affected by noise.	● Confirm proper grounding of the amplifier. ● Add ferrite core or similar countermeasures to against noise.
2	Internal circuit failure	● Amplifier internal CPU is in reset or not working properly. Please contact us.

- The motor does not move even though the command is input.

	Investigation	Assumed causes and corrective actions
1	Power connector XB are not connected.	● Connect the connector.
2	Motor capacity is insufficient for the load.	● Review the motor capacity and amplifier capacity.
3	The machine is interfering.	● Remove machine interference.
4	Motor holding brake not released.	● Review the motor holding brake wiring, power supply, and motor holding brake output settings. Refer to "Servo motor wiring" in user's manual-2 (Servo motor) and "Holding brake timing output function" in user's manual-5 (Functions).
5	The over-travel condition is present.	● Review the wiring. ● Review the settings. Refer to Positive overtravel (F-OT) or Negative overtravel (R-OT) in user's manual-7 (Parameters). ● Correct the motor position.
6	Servo condition is not ON.	● Review the wiring. ● Review the settings. Refer to "Servo ON function" in user's manual-7 (Parameters). ● Turn the servo condition ON.
7	Control mode and command do not match.	● Match the control mode and command. Refer to "Control Mode and Control Mode Switching" in user's manual-5 (Functions).
8	The number of divisions in the encoder is set incorrectly.	● Set the appropriate number of encoder divisions. Refer to "Encoder Division Number Code" in user's manual-7 (Parameters).
9	Command is not received. Command input connector (analog/pulse) is not connected.	● Review the wiring and settings. ● Input speed command or position command. ● Connect X1 connector (analog/pulse).

■ Servo motor speed does not increase or increases too much.

	Investigation	Assumed causes and corrective actions
1	Electronic gear setting is incorrect.	● Make sure the electronic gears are appropriate. Refer to "Electronic Gear" in user's manual-7 (Parameters).
2	Control mode and command do not match.	● Match the control mode and command. Refer to "Control Mode and Control Mode Switching" in user's manual-5 (Functions).
3	The number of divisions in the encoder is set incorrectly.	● Set the appropriate number of encoder divisions. Refer to "Encoder Division Number Code" in user's manual-7 (Parameters).
4	Motor capacity is insufficient for the load.	● Review the motor capacity and amplifier capacity.
5	Main circuit power supply voltage is low.	● Keep the power supply voltage within the specification range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction). ● Increase the input power capacity to the servo amplifier.
6	Motor holding brake not released.	● Review the motor holding brake wiring, power supply, and motor holding brake output settings. Refer to "Servo motor wiring" in user's manual-2 (Servo motor) and "Holding brake timing output function" in user's manual-5 (Functions).

■ Servo motor vibrates.

	Investigation	Assumed causes and corrective actions
1	Servo gain and load inertia moment ratio are incorrect.	● Perform servo tuning.
2	Machine rigidity is low.	● Review machine rigidity. ● Use the vibration suppression function of the machine. Refer to "Vibration Suppression Function" in user's manual-6 (Adjustment).
3	Incorrect setting of acceleration and deceleration time constants.	● Set the acceleration and deceleration time constants correctly. Refer to "Acceleration time constant" or "Deceleration time constant" in user's manual-7 (Parameters).

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■ Servo motor speed is not stable.

	Investigation	Assumed causes and corrective actions
1	Servo gain and load inertia moment ratio are incorrect.	● Perform servo tuning.
2	Motor capacity is insufficient for the load.	● Review the motor capacity and amplifier capacity.
3	Main circuit power supply voltage is low.	● Keep the power supply voltage within the specification range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction). ● Increase the input power capacity to the servo amplifier.
4	Motor holding brake not released.	● Review the motor holding brake wiring, power supply, and motor holding brake output settings. Refer to "Servo motor wiring" in user's manual-2 (Servo motor) and "Holding brake timing output function" in user's manual-5 (Functions).
5	Torque limitation is applied.	● Cancel the torque limit or change the setting to an appropriate one. Refer to "Torque Limit Function" in user's manual-5 (Functions).

■ Machine wobbles when stopped.

	Investigation	Assumed causes and corrective actions
1	Servo gain and load inertia moment ratio are incorrect.	● Perform servo tuning.
2	Motor capacity is insufficient for the load.	● Review the motor capacity and amplifier capacity.
3	Machine rigidity is low.	● Review machine rigidity.

■ Overshoot/undershoot occurs.

	Investigation	Assumed causes and corrective actions
1	Servo gain and load inertia moment ratio are incorrect.	● Perform servo tuning.
2	Motor capacity is insufficient for the load.	● Review the motor capacity and amplifier capacity.
3	Torque limitation is applied.	● Cancel the torque limit or change the setting to an appropriate one. Refer to "Torque Limit Function" in user's manual-5 (Functions).
4	There is a large backlash of the machine.	● Please inspect and review the machine.

- The servo motor starts moving as soon as the servo amplifier power is turned on or the servo condition is turned on.

	Investigation	Assumed causes and corrective actions
1	The servo is set and wired to turn on when the power is turned on.	● Modify the servo ON condition settings. Refer to "Servo ON Function" in user's manual-7 (Parameters).
2	The system is set to input commands when the power is turned on.	● Modify the condition settings for command input such as internal velocity commands. Refer to "Internal Velocity Setting Selection Input" in user's manual-7 (Parameters).
3	In the case of a motor with holding brake, the timing for releasing the motor holding brake is too early.	● Review the timing of the motor holding brake release. Refer to "Holding brake timing output function" in user's manual-5 (Functions).
4	Commands are input to even before the servo is turned on.	● Review the timing of command input.
5	In the case of an analog/pulse servo amplifier, the zero adjustment point of the velocity command is off.	● Adjust the offset by referring to "Analog velocity/torque command offset" in user's manual-1 (Introduction) or "Analog velocity command/velocity compensation command/torque (thrust) command offset adjustment" in the user's manual "SANMOTION MOTOR SETUP SOFTWARE".

- The origin position is shifted during homing.

	Investigation	Assumed causes and corrective actions
1	Parameter settings related to homing are incorrect.	● Review the parameter settings. Refer to "Home Position Offset" in user's manual-7 (Parameters).

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- The position shifts during operation after homing.

	Investigation	Assumed causes and corrective actions
1	Electronic gear settings are incorrect.	● Review the electronic gear settings. Refer to "Electronic gear" in user's manual-7 (Parameters).
2	The setting value of the positioning completion range is too wide.	● Review the setting value of in-position range. Refer to "Positioning completion range" in user's manual-7 (Parameters).
3	Servo gain is low.	● Perform servo tuning.
4	In case of full-closed system, backlash of the machine is large.	● Please inspect and review the machine.
5	In case of analog/pulse interface servo amplifier, command pulses do not enter correctly due to noise.	● Check that the command position monitor is the same as the input command. If they do not match, shield the cable or take noise suppression measures. Refer to "Noise Suppression" in user's manual-3 (Hardware).
6	Wiring used for command input is long.	● Review the wiring length.
7	Servo condition turned off during operation.	● Review the servo amplifier settings. Refer to "Servo ON Function" in user's manual-7 (Parameters). ● Review the program and wiring of the host controller.
8	The over-travel condition is present.	● Review the wiring. ● Review the settings. Refer to Positive overtravel (F-OT) or Negative overtravel (R-OT) in user's manual-7 (Parameters). ● Correct the motor position to within the range of motion (within the limit switch).

- When used in absolute position detection systems, the position shift occurs after power failure and restoration.

	Investigation	Assumed causes and corrective actions
1	Power failure and restoration has performed after an operation that exceeds the modulo range, with modulo use.	● Enables modulo initial processing (at 0x20F7 bit2). Refer to "Special Function Selection" in user's manual-7 (Parameters).
2	The data transferred to the controller is incorrect.	● Check the absolute encoder PS data in user's manual "SANMOTION MOTOR SETUP SOFTWARE".

- Cannot communicate with the servo amplifier using "SANMOTION MOTOR SETUP SOFTWARE".

	Investigation	Assumed causes and corrective actions
1	The version of "SANMOTION MOTOR SETUP SOFTWARE" in use is incorrect.	● For details, refer to "Version Information" in user's manual "SANMOTION MOTOR SETUP SOFTWARE". If the version is old, download "SANMOTION MOTOR SETUP SOFTWARE" from our website for the latest version.
2	There is a problem with the communication cable.	● Replace the communication cable.
3	Servo amplifier power is turned off.	● Review the servo amplifier wiring. ● Turn on the servo amplifier power.
4	The computer being used does not meet the recommended specifications for "SANMOTION MOTOR SETUP SOFTWARE".	● Use a PC that satisfies the recommended specifications. For details, refer to "System Environment" in user's manual "SANMOTION MOTOR SETUP SOFTWARE".
5	Communication cable is too long.	● Replace with a shorter communication cable (3 m or less). Refer to "Outline drawings of setup cable" in user's manual-3 (Hardware).
6	Affected by noise.	● Replace with a shorter communication cable (3 m or less). ● Add ferrite core or similar countermeasures to against noise. ● Confirm proper grounding of the amplifier.

- The motor holding brake no longer works.

	Investigation	Assumed causes and corrective actions
1	The motor holding brake is released.	● Review the wiring. Refer to "Servo motor wiring" in user's manual-2 (Servo Motor). ● Review the release timing of the motor holding brake. Refer to "Holding brake timing output function" in user's manual-5 (Functions).
2	The relay for the motor holding brake has failed and the contacts are welded.	● Inspect the relay for the motor holding brake for malfunction.
3	Torque has decreased due to external liquid (water, oil, coolant, etc.) infiltration into the motor holding brake.	● Replace the servo motor. ● Review the equipment side so that the motor is not directly exposed to liquid.
4	Torque has decreased because the motor holding brake was used for braking.	● Replace the servo motor. ● The motor holding brake is for holding. Do not use it for braking applications, as excessive braking may cause a drop-in torque.

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- The motor holding brake cannot be released.

	Investigation	Assumed causes and corrective actions
1	The cable used for the signal to release the motor holding brake has problem.	● Review and replace the cable.
2	The motor holding brake release signal is not output correctly.	● Check that the device outputting the signal and the load satisfy the specifications. Refer to "Holding Brake" in user's manual-2 (Servo Motor).
3	The power supply voltage for the motor holding brake release is incorrect.	● Enter a power supply voltage that meets the specifications for the motor holding brake. Refer to "Holding Brake" in user's manual-2 (Servo Motor).

- Coasting distance of the servo motor became larger when the dynamic brake was stopped and when the motor was braked by the holding brake.

	Investigation	Assumed causes and corrective actions
1	After frequent repetition of dynamic brake operation stop at the maximum rpm, the dynamic brake no longer works.	● Replace the servo amplifier. ● The frequency of dynamic brake operation should be within the allowable load inertia moment and should be "10 times or less per hour, 30 times or less per day" at the maximum rotation speed.
2	The load increased and exceeded the allowable load inertia moment ratio of the dynamic brake.	● Replace the servo amplifier. ● Review the load.
3	Motor holding brake braking is used in normal operation.	● Replace the servo motor. ● Do not use the motor holding brake for braking in normal operation except in an emergency.

- ✓ Do not use the dynamic brake for any purpose other than emergency stop.
- ✓ Always use the allowable load inertia moment ratio within the allowable value.

- The 7-segment LED does not light up "≡" when the main circuit power is turned on.

	Investigation	Assumed causes and corrective actions
1	Power input connector XA is not connected or not locked.	● Connect the XA connector and confirm that the lock is engaged.
2	Check the voltage of L1, L2, and L3 of the power input connector XA.	● If the voltage is low, review the power supply. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction). ● If the voltage is normal, check for poor contact at the power input connector XA. ● If a terminal block is used, review the wiring and tightening of screws on the terminal block.
3	The machine is in overtravel or emergency stop status.	● Release the overtravel status. Refer to "Positive overtravel (F-OT)" or "Negative overtravel (R-OT)" in user's manual-7 (Parameters). ● Release the emergency stop status. Refer to the "Emergency Stop Function" in user's manual-7 (Parameters).
4	Safe Torque Off state.	● Turn on the safety input 1 (HWGOFF1) and safety input 2 (HWGOFF2) signals. Refer to "Connector wiring for connecting safety devices" in user's manual-4 (Laws/Regulations Conformity Guidelines).

- The 7-segment LED is drawing the letter "8", but the servo motor does not rotate.

	Investigation	Assumed causes and corrective actions
1	Check with the digital operator or the monitor of the "SANMOTION MOTOR SETUP SOFTWARE" to see if the command is entered.	● If the monitor value is zero, input the command. Refer to "Monitor Data Details" in user's manual-7 (Parameters) or "Monitor" in the user's manual "SANMOTION MOTOR SETUP SOFTWARE".
2	Check that the servo is locked.	● Check if "Velocity feedback error detection" of Group8 ID13 is disabled and the servo motor power line is connected.
3	Check the torque limit input signal status.	● If the torque limit is input and the set value of the torque limit is lower than the load torque, the servo motor cannot output torque higher than the load torque. Refer to "Torque Limit Function" in user's manual-5 (Functions).
4	Check the deviation clear input signal status.	● If deviation clear is input, release the deviation clear input. Refer to "Deviation clear function enable condition" in user's manual-5 (Functions).

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- The 7-segment LED is drawing the letter "8", but the servo motor does not rotate.

	Investigation	Assumed causes and corrective actions
5	Check the encoder clear input signal status.	● If encoder clear is input, release the encoder clear input. Refer to "Encoder clear function" in user's manual-5 (Functions).
6	Check the control mode.	● Check if there is any difference between the control mode and command input. Refer to "Control Mode and Control Mode Switching" in user's manual-5 (Functions).

- The servo motor operation is unstable, or the speed is lower than the command.

	Investigation	Assumed causes and corrective actions
1	Check the input signal status of proportional control.	● If proportional control is input, cancel the proportional control input. Refer to "Position loop proportional control switching function" or "Velocity loop proportional control switching function" in user's manual-7 (Parameters).
2	Check the torque limit input signal status.	● If the torque limit is input, release the torque limit input. Refer to "Torque limit function" in user's manual-5 (Functions).

- The servo motor moves for a moment but does not move after that.

	Investigation	Assumed causes and corrective actions
1	One of the servo motor power lines is not connected.	● Check the wiring of the servo motor power lines.
2	The combination motor setting is incorrect.	● Check the combination motor setting. ● Change the setting and reconnect the power.
3	Encoder division setting is incorrect.	● Check the encoder resolution setting. Refer to "Encoder resolution code" in user's manual-7 (Parameters). ● Change the setting and reconnect the power.

- ✓ Be sure to disconnect the power supply when investigating wiring and taking corrective action.

- Servo motor runs out of control.

	Investigation	Assumed causes and corrective actions
1	The phase order of the servo motor power lines is incorrect.	● Check the wiring of the servo motor power lines.
2	Encoder wiring is incorrect.	● Check the encoder cable wiring.

- ✓ Be sure to disconnect the power supply when investigating wiring and taking corrective action.

■ Abnormal sound is generated from the servo motor.

	Investigation	Assumed causes and corrective actions
1	Check the installation of the machine or other equipment.	● Try to run the servo motor alone. ● Check if the coupling is not off-center or unbalanced.
2	Run the motor at low speed and check if the abnormal sound is periodic.	● Check if the motor encoder signal line is twisted pair and shielded. ● Check if the motor encoder signal line and the servo motor power line are not wired in the same duct. ● Do not tie the motor encoder signal line and the servo motor power line together or do not route them in the same duct. ● Check that the power supply voltage is not low.
3	Motor holding brake is not released.	● Review the motor holding brake wiring, power supply, and motor holding brake output settings. Refer to "Wiring of the servo motor" in user's manual-2 (Servo Motor) and "Holding brake timing output function" in user's manual-5 (Functions).
4	Servo gain and load inertia moment ratio are incorrect.	● Execute servo tuning.
5	Abnormal noise from motor bearings.	● Abnormal noise is heard when the motor bearing reaches the end of its service life. In this case, replace the servo motor.

■ When an absolute encoder with a multi-turn part is used, the multi-turn part of the absolute encoder is not cleared even if encoder clear is performed.

	Investigation	Assumed causes and corrective actions
1	Check the set values of the system parameters.	● Check if "Encoder type code" in user's manual-7 (Parameters) is "Full ABS (P-ABS, R-ABS)". ● Check if "Encoder clear function selection" in user's manual-7 (Parameters) is not set to "Status (encoder status (error/warning)) clear only".
2	Motor is rotating more than 50 min ⁻¹ .	● Encoder clear cannot be executed if the motor is being rotated externally. Please stop the motor.

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9.4 Troubles when warnings occur

The name of the warning, its description, and how to respond to it when it occurs.

9.4.1 Warning List

The table lists the names of the warnings, the bits that appear in the EtherCAT object and SANMOTION MOTOR SETUP SOFTWARE, the function availability, and the contents of the warnings.

(1) Warnings to notify before an alarm occurs

Type	EtherCAT 0x2103 Sub-Idx	Bits	Warning name	Support		Warning contents
				Ether CAT	Analog/ pulse	
Warning monitor	-01	Bit0	Amplifier temperature	✓	✓	- Ambient temperature of the servo amplifier is outside the specification range. - Temperature sensor failure.
		Bit1	Modulo initialization	✓	—	- Output only when detection is enabled setting. - The motor shaft rotated by more than the pulse calculated by the modulo initialization warning detection setting (0x20FC) during power off.
		Bit2	Overload	✓	✓	Effective torque exceeded the "Overload Warning Level".
		Bit3	Regenerative overload	✓	✓	Regenerative resistor is overloaded.
		Bit4	While torque command limitation	✓	✓	Torque command is being limited by the torque limit value.
		Bit5	While velocity command limitation	✓	✓	Velocity command is being limited by the velocity limit value.
		Bit6	Reserved	—	—	—
		Bit7	Position deviation excess	✓	✓	Position deviation is exceeding the warning setpoint.
		Bit8	While main circuit charging	✓	✓	Main circuit power established.
		Bit9	Pitch error table setting	✓	—	- The number of entries in the collection table was set to 1. - Correction positions are not ordered in decreasing order.
		Bit10	Positive overtravel (F-OT)	✓	✓	While positive overtravel (F-OT) input.
		Bit11	Negative overtravel (R-OT)	✓	✓	While negative overtravel (R-OT) input.
		Bit12	Reserved	—	—	—
		Bit13	Reserved	—	—	—
		Bit14	Absolute encoder warning	✓	✓	- Battery voltage is less than 3.2 V (typ.). (For battery backup type) - LED degradation detection status (For battery-less, serial incremental type)
		Bit15	Control power supply voltage drop	✓	✓	- When the control power supply is lower than 161 VAC (for 200 VAC input) or 80 VAC (for 100 VAC input). - No warning is notified for DC power input.

(2) Warnings notified by extensions

Type	EtherCAT 0x2103 Sub-Idx	Bits	Warning name	Support		Warning contents
				Ether CAT	Analog/ pulse	
Warning monitor-2	-03	Bit0	Sync error excess	✓	✓	● The position deviation error between the home axis and the mating axis exceeds the warning set value.
		Bit1	Dual position error excess	✓	—	● The difference between the motor position and load position exceeds the warning set value.
		Bit2	Reserved	—	—	—
		Bit3	Reserved	—	—	—
		Bit4	Linear EnDat encoder	✓	✓	● Warning occurs for EnDat absolute encoder for linear servo motor.
		Bit5	External EnDat encoder	✓	✓	● Warning occurs for EnDat absolute encoder for external encoder.
		Bit6	Position deviation difference excess	✓	✓	● Exceeding warning level of the position deviation difference.
		Bit7,8	Reserved	—	—	—
		Bit9	Velocity feedback warning	✓	✓	● Motor is vibrating (oscillating).
		Bit10 to 15	Reserved	—	—	—

(3) Warnings to notify settings and status

Type	EtherCAT 0x2103 Sub-Idx	Bits	Warning name	Support		Warning contents
				Ether CAT	Analog /pulse	
Warning monitor-3	-05	Bit0	Control power supply frequency	✓	✓	● Control power supply frequency is lower than 45 Hz.
		Bit1	Control power supply overvoltage	✓	✓	● Control power supply voltage (L1C, L2C) is higher than the input specification range of the servo amplifier.
		Bit2	Inrush prevention time excess	✓	✓	● Slow charging time from main circuit power-on to electrolytic capacitor.
		Bit3	Software position limit min.	✓	—	● Software position limit minimum value or less.
		Bit4	Software position limit max.	✓	—	● Software position limit maximum value or more.
		Bit5 to 15	Reserved	—	—	—

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(4) Warnings Enable Parameters

The warning monitor display can be set or not according to the setting values of Group8 ID0A "Warning enable 1", Group8 ID0B "Warning enable 2", and Group9 ID0C "Warning enable 3". When the corresponding bit of the warning enable parameter is set to 1, the corresponding bit of the warning monitor is set (=1). Bits other than the enable bit are fixed at 0.

General Parameter Group9 "Alarm/Warning Related Settings"

ID	Symbol	Name	Standard set value	Unit	Setting range
0A	2103-02: WAREN1	Warning enable 1	4E8D	—	0000 to FFFF
0B	2103-04: WAREN2	Warning enable 2	0000	—	0000 to FFFF
0C	2103-06: WAREN3	Warning enable 3	001F	—	0000 to FFFF

9.4.2 What to do when warnings occur

(1) Warnings to notify before an alarm occurs

Refer to "9.4.1 Warning List " for I/Fs to be supported for each content.

■ Warning "bit0" Amplifier temperature

Summary: Notifies that the ambient temperature of the servo amplifier is outside the specification range.

◆ What to do

	Cause	Investigation and corrective actions
1	Ambient temperature of the servo amplifier is high.	● Use the servo amplifier in an environment where the ambient temperature of the servo amplifier is within the specification range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	Ambient temperature of the servo amplifier is low.	● Use the servo amplifier in an environment where the ambient temperature of the servo amplifier is within the specification range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).

■ Warning "bit1" Modulo initialization

Summary: When modulo special initialization is enabled and the amount of movement during control power off is large, a modulo initialization warning is output.

◆ What to do

	Cause	Investigation and corrective actions
1	The amount of movement at power-off exceeded 0x20FC: Modulo initialization warning set value.	● Do not move more than 0x20FC Group4 ID08 "Modulo initialization warning set value" when power is shut off.
2	0x20FC: Modulo initialization warning set value is low.	● Set 0x20FC Group4 ID08 "Modulo initialization warning set value" to a value greater than the travel amount.

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■ Warning "bit2" Overload

Summary: Notifies that the effective torque exceeds Group8 ID12 "Overload Warning Level".

◆ What to do

	Cause	Investigation and corrective actions
1	The machine was operated with a large torque command immediately after power-on.	● Reduce the command value immediately after power-on. ● Allow a delay time between power-on and command input.
2	The effective torque exceeds the rated torque.	● Use monitor ID41 "Effective Torque Monitor [TRMS]" to monitor the load condition and check if the effective torque exceeds the rated torque. Or, calculate the effective torque of the servomotor based on the load and operating conditions, and if it exceeds the rated torque, review the operation or load conditions, or replace with a larger capacity servo motor.
3	Wrong combination of servo amplifier and servo motor.	● Check if the motor model number setting in the servo amplifier and the servo motor in use match, and correct the setting if it is incorrect.
4	The motor holding brake of the servo motor is not released.	● Check that the wiring and applied voltage of the motor holding brake are correct, and correct any abnormality. If the above is correct, replace the servo motor. Refer to "Holding Brake" and "Wiring of Servo Motor" in user's manual-2 (Servo Motor).
5	Machine has collided.	● Review operating conditions and limit switches.
6	The motor encoder is not set to the correct number of resolutions.	● Set the proper number of encoder resolution. Refer to "Encoder resolution code" in user's manual-7 (Parameters).
7	The overload warning level is too small.	● Increase the setting of Group8 ID12 "Overload Warning Level".

■ Warning "bit3" regenerative overload

Summary: It notifies that the operating state of the regenerative resistor exceeds 66% of the regenerative overload error detection criteria.

◆ What to do

	Cause	Investigation and corrective actions
1	The regenerative power allowance was exceeded by the built-in regenerative resistor specification. Load inertia moment is too large. Or, the takt time is too short.	● Review the load conditions and operating conditions. ● Use an external regenerative resistor. ● Keep the load inertia moment within the specification range. ● Increase the deceleration time. ● Increase the takt time. Refer to "Regenerative processing" in user's manual-3 (Hardware).
2	The regenerative resistor is disconnected.	● If the servo amplifier is of the built-in regenerative resistor type, replace the servo amplifier. ● If an external regenerative resistor is used, replace the regenerative resistor.
3	The resistance value of the external regenerative resistor is too large.	● Replace to the resistor which has resistance value meets the specifications.
4	Input power supply voltage exceeds the specification range.	● Review the input power supply voltage. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).

■ Warning "bit4" While torque command limitation.

Summary: Notifies that the torque command is being limited by the torque limit value.

◆ What to do

	Cause	Investigation and corrective actions
1	The torque limit value is low.	● Review the torque limit value according to "Torque Limit Function" in user's manual-5 (Functions).
2	The torque limit value is appropriate, but a warning occurs.	● The torque command may be excessive. Review the controller commands and machine operation pattern. ● The load on the machine may be excessive. Check and review the machine.

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■ Warning "bit5" While velocity command limitation.

Summary: Notifies that a velocity command is being limited by a velocity limit value.

◆ What to do

	Cause	Investigation and corrective actions
1	The velocity limit value is low.	● For torque control with velocity limit function and push-push control, refer to "Torque control with velocity limit function" and "Push-push control function" in user's manual-5 (Functions). For other control modes, review the speed limit value according to "Velocity Limit Function" in user's manual-5 (Functions).
2	The velocity limit value is appropriate, but a warning occurs.	● The velocity command may be excessive. Review the controller commands and machine operation pattern. ● The load on the machine may be excessive. Check and review the machine.

■ Warning "bit7" Position deviation excess

Summary: Notifies that the position deviation exceeds the warning level set by the Excessive Deviation Warning Level.

◆ What to do

	Cause	Investigation and corrective actions
1	Excessive deviation warning level is low.	● Refer to "Excessive Deviation Warning Level" in user's manual-7 (Parameters).
2	Excessive deviation Warning level is appropriate, but a warning is issued.	● The electronic gear may be set too high. Review the electronic gear setting. Refer to "Electronic gear" in user's manual-7 (Parameters). ● The position command may be excessive. Review the controller commands and machine operation pattern. ● The load on the machine may be excessive. Check and review the machine.

■ Warning "bit8" While main circuit charging

Summary: Notifies that the main circuit power is charging.

◆ What to do

	Cause	Investigation and corrective actions
1	Main circuit power is being input.	Confirm that it is an intentional power input. If it is an unintended power input, review the wiring of the main circuit power supply circuit.
2	The electrolytic capacitor is not fully discharged after the main circuit power is shut off.	Allow time for natural discharge.
3	Main circuit power discharge selection is set to "Do not discharge".	Set the main circuit power discharge selection to "Discharge". Refer to "Main Circuit Power Discharge Selection" in user's manual-7 (Parameters).

■ Warning "bit 9" Pitch error table setting

Summary: Notifies when 1 is set for the number of entries or when the correction positions are not lined up in decreasing order.

◆ What to do

	Cause	Investigation and corrective actions
1	1 is set for the number of entries.	Please set a value other than 1.
2	Correction positions are not arranged in order of decreasing size.	Please arrange them in order of decreasing size.

■ Warning "bit10" Positive overtravel (F-OT), "bit11" Negative overtravel (R-OT)

Summary: Notifies that positive overtravel (F-OT) input is in progress or negative overtravel (R-OT) input is in progress.

◆ What to do

	Cause	Investigation and corrective actions
1	External positive or negative overtravel input is present.	Check if the input signal is valid. Refer to "Positive overtravel (F-OT)" or "Negative overtravel (R-OT)" in user's manual-7 (Parameters).

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■ Warning "bit14" Absolute encoder warning

Summary: Battery backup absolute encoder: Battery voltage is less than 3.2 V (typ.).

(For battery backup type)

Battery-less absolute encoder: Notify LED degradation detection status.

(For battery-less and serial incremental type)

◆ What to do

	Cause	Investigation and corrective actions
1	Battery voltage is low. (For battery backup type)	● Check the battery wiring and wire correctly if it is incorrect. Refer to "Terminal Connection Example" in user's manual-3 (Hardware). ● Check the battery voltage. If it is 3.6 V or lower, replace the battery.
2	LED degradation detection status. (For battery-less and serial incremental type)	● If the condition persists, replace the servo motor.

■ Warning "bit15" Control power supply voltage drop

Summary: A warning is issued when the control power supply is lower than 161 VAC for 200 VAC input or 80 VAC for 100 VAC input.

No warning is issued when power is supplied from a DC power supply.

◆ What to do

	Cause	Investigation and corrective actions
1	Input power supply voltage is below the specification range.	● Review the power supply and bring it within the specification range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	The input power supply voltage has fluctuated, or a momentary power failure has occurred.	● Check the power supply and review to ensure that there are no momentary power failures or power supply drops.

(2) Warnings notified by extensions

■ Warning "bit 0" Sync error excess

Summary: Notifies that the position deviation error between the self-axis and the mating axis is greater than or equal to the Warning Level setting.

◆ What to do

	Cause	Investigation and corrective actions
1	The parameter settings for the two axes are different.	● Please set the parameters according to the section "Tandem Operation/Inter-axis sync compensation function" in user's manual-5 (Functions).
2	A common position command is not input to the 2 axes.	● Check the wiring and if it is incorrect, wire correctly.
3	The set value of the inter-axis sync error warning is too small.	● Increase the setting of Group8 ID30 "Inter-axis sync error warning level."

■ Warning "bit1" Dual position error excess

Summary: Notifies that the difference between the motor position and load position exceeds the warning set value.

◆ What to do

	Cause	Investigation and corrective actions
1	The motor encoder pulse count setting does not match the servo motor.	● Set the appropriate number of encoder resolution. Refer to "Encoder division number code" in user's manual-7 (Parameters).
2	The external encoder resolution does not match the motor encoder resolution after the feedback electronic gear.	● Review the setting values of System2 ID41 "External Encoder Resolution", ID21 "Feedback Pulse Electronic Gear Numerator" and ID22 "Feedback Pulse Electronic Gear Denominator" according to the contents of "Full-closed Control" in user's manual-5 (Functions).
3	Rounded off the remainder when setting System2 ID21, ID22 "Feedback Pulse Electronic Gear Numerator/Denominator".	● Set 0 Pulse to Group8 ID1A "Dual Position Error Excess Value" to disable the alarm.
4	Dual Position Error Warning set value is too small.	● Increase the setting of Group8 ID1A "Dual Position Error Excess Value".

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■ Warning "bit5" External EnDat encoder

Summary: External absolute encoder (EnDat) warnings are occurring.

◆ What to do

	Cause	Investigation and corrective actions
1	External absolute encoder (EnDat) warnings are occurring.	● Check the external absolute encoder (EnDat) warning.

■ Warning "bit6" Position deviation difference excess

Summary: Notifies that the position deviation difference exceeds the set value of the position deviation difference excess warning level.

◆ What to do

	Cause	Investigation and corrective actions
1	Position deviation difference excess warning level is low.	● Review Group8 ID1B "Position deviation difference excess warning level".
2	If the position deviation difference excess warning level is appropriate but a warning occurs.	● The electronic gear may be set too high. Review the electronic gear setting. Refer to "Electronic gear" in user's manual-7 (Parameters). ● The position command may be excessive. Review the controller commands and machine operation pattern. ● The load on the machine may be excessive. Check and review the machine.

■ Warning "bit9" Velocity feedback error

Summary: Notifies the status that the motor is vibrating (oscillating).

◆ What to do

	Cause	Investigation and corrective actions
1	Machine rigidity is low.	● Review the rigidity of the machine. ● Use the vibration suppression function of the machine. Refer to "Vibration suppression function" in user's manual-6 (Adjustment).
2	The alarm of velocity feedback error is issued.	● Refer to the section "AL_C3 Velocity feedback error".
3	A high frequency command is being input.	● Review the command. ● Disable Group8 ID13 "Speed feedback error (ALM_C3) detection".

(3) Warnings to notify settings and status

- Warning "bit0" Control power supply frequency
Summary: The input power supply frequency is lower than the specification range (Min. 45 Hz).

◆ What to do

	Cause	Investigation and corrective actions
1	Input power supply frequency is lower than the specification range (Min. 45 Hz).	● Review the power supply and bring it within the specification range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).

- Warning "bit1" Control power supply overvoltage
Summary: Notifies that the control power supply voltage (L1C, L2C) is higher than the input specification range of the servo amplifier.

◆ What to do

	Cause	Investigation and corrective actions
1	The control power supply voltage does not match the servo amplifier specifications. Or, due to voltage fluctuations, the voltage is higher than the average of 264 VAC for the 200 VAC input type or 132 VAC for the 100 VAC input type.	● Check the control power supply voltage and set the power supply voltage within the input specification range of the servo amplifier. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	When a single-phase power supply is supplied using the neutral point of a three-phase 4-wire power supply, the load is unbalanced.	● Ensure that the load balance of the power supply is even and that power supply fluctuations (overvoltage) do not occur.
3	Malfunction due to noise.	● Check if the ground wire of the servo amplifier is properly grounded. ● Add noise suppression components such as noise filters and ferrite cores to prevent extraneous noise from entering the servo amplifier. Refer to "Noise Suppression" in user's manual-3 (Hardware).

- Warning "bit2" Inrush prevention time excess
Summary: Notifies that the charge time to the electrolytic capacitor is slow from main circuit power-on.

◆ What to do

	Cause	Investigation and corrective actions
1	The power supply rises slowly.	● The power capacity of the power receiving transformer may be insufficient. Increase the power supply capacity.
2	Power supply voltage is not stable.	● Power supply voltage fluctuation may be occurring. Please check the power supply status again.
3	An abnormality is occurring in the rectifier circuit (rectifier element, fuse, and inrush prevention resistor) inside the servo amplifier.	● Check the status periodically. If the warning condition persists, consult us.

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- Warning "bit3" Software position limit minimum, "bit4" Software position limit maximum

Summary: Notifies that a command that exceeds the 0x607D software position limit has been set.

◆ What to do

	Cause	Investigation and corrective actions
1	A position command exceeding the 0x607D software position limit setting has been set.	● Check whether 0x607D-01 Group4 ID0E "Minimum software position limit" and 0x607D-02 Group4 ID0F "Maximum software position limit" are valid. ● Set a position command that does not exceed 0x607D-01 Group4 ID0E "Minimum software position limit" and 0x607D-02 Group4 ID0F "Maximum software position limit".

9.5 Troubles when alarms occur

Below shows the name of the alarm, its content, and the action to be taken when it occurs.

9.5.1 Alarm List

The table below lists alarm names, their contents, stop actions upon detection, and alarm reset methods.

Action at detection: "DB" decelerates the servo motor to stop by dynamic braking (short-circuiting between phases of the motor power line) when an alarm occurs.

(However, if alarm 53H (DB resistor overheat) is detected during dynamic brake stop, free-run operation is performed.)

Action at detection: "SB" applies current to the servo motor at the sequence current limit value to decelerate to stop.

When dynamic brake is selected for forced stop operation selection, the servo motor is decelerated to stop by dynamic brake operation regardless of the operation at the time of detection.

(However, if alarm 53H (DB resistor overheat) is detected during dynamic brake stop, free-run operation is performed.)

Action at detection: FR" stops the motor in free-run operation.

(However, if a motor with a holding brake is used, the motor stops in the holding brake operation.)

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	Display		EtherCAT interface		Analog/Pulse	Alarm name	Alarm contents	Action at detection	Alarm reset
	Alarm code 0x2101 0x2102	Sub code 0x2146	Error register 0x1001	Error code 0x603F	Bit4 to 0: Indefinite. Alarm code: 3 bits output, Bit 7, 6, 5.				
Communication Related Error	10	0	Bit4	0x7510	—, —, — Note) Alarm dedicated to EtherCAT interface	IN Rx Invalid Frame Error	● Invalid frame received continuously in port 0	SB	Yes
	11	0	Bit4	0x7510		OUT Rx Invalid Frame Error	● Invalid frame received continuously in port 1	SB	Yes
	12	0	Bit4	0x7510		IN Rx CRC Error	● Rx error occurred continuously in port 0	SB	Yes
	13	0	Bit4	0x7510		OUT Rx CRC Error	● Rx error occurred continuously in port 1	SB	Yes
	14	0	Bit4	0x7510		IN Tx Error	● Tx error occurred continuously in port 0	SB	Yes
	15	0	Bit4	0x7510		OUT Tx Error	● Tx error occurred continuously in port 1	SB	Yes
	18	0	Bit4	0x7520		IN Lost Link	● Port 0/1 cable was broken or disconnected in servo on state. Power supply of controller was shut down.	SB	Yes
	19	0	Bit4	0x7520		OUT Lost Link		SB	Yes
	1A	0	Bit4	0x7510		Communication Timeout	● Output data was not received during specified cycle time.	SB	Yes
Driving Related Error	21	0	Bit1	0x5400	0, 0, 1	Output Power Device Error	● Overcurrent of power device ● Abnormality in power device ● Overheating of power device	DB	Yes
		1	Bit1	0x5400			● Overcurrent of power device	DB	Yes
		2	Bit1	0x5400			● Abnormality in power device	DB	Yes
		3	Bit1	0x5400			● Overheating of power device	DB	Yes
		4	Bit1	0x5400			● Other error of power device	DB	Yes
	22	0	Bit1	0x5210		Current Detection Error 0	● Abnormality of electric current detection value	DB	Yes
	23	0	Bit1	0x5210		Current Detection Error 1	● Abnormality of electric current detection circuit	DB	Yes
	24	0	Bit1	0x5210		Current Detection Error 2	● Abnormality in communication with electric current detection circuit	DB	Yes
	25	0	Bit1	0x8312		Safe Torque Off Error 1	● Logic unmatched in Safe Torque Off input	DB	No
	26	0	Bit1	0x8312		Safe Torque Off Error 2	● Failure of Safe Torque Off circuit	DB	No
	27	0	Bit0	0x5200		Fan Stop	● Rotation number drop of cooling fan	DB	No

	Display		EtherCAT interface		Analog/Pulse	Alarm name	Alarm contents	Action at detection	Alarm reset
	Alarm code 0x2101 0x2102	Sub code 0x2146	Error register 0x1001	Error code 0x603F	Bit4 to 0: Indefinite. Alarm code: 3 bits output, Bit 7, 6, 5.				
Load Related Error	41	0	Bit1	0x8311	0, 1, 0	Overload 1	● Excessive effective torque	SB	Yes
	42	0	Bit1	0x2220		Overload 2	● Stall overload	DB	Yes
	43	0	Bit1	0x3212		Regeneration overload	● Regeneration load ratio excess	DB	Yes
	44	1	Bit1	0x7300		Magnetic pole position estimation error	● Magnetic pole position estimation operation failed.	DB	Yes
		2	Bit1	0x7300			● Amplifier control cycle setting error	DB	Yes
	45	0	Bit1	0x8400		Continuous rotation velocity excess	● Averaged rotation velocity exceeds the maximum rotation speed in the continuous area	SB	Yes
	52	1	Bit3	0x4210		In-rush prevention resistor overheat	● Detection of inrush prevention resistor overheating	SB	Yes
		2	Bit3	0x4210			● Decrease in servo amplifier ambient temperature or temperature sensor disconnection detection	SB	Yes
	53	1	Bit3	0x4210		Dynamic Brake Resistor Overheat	● Detection of dynamic brake resistor overheating	FR	Yes
		2	Bit3	0x4210			● Decrease in servo amplifier ambient temperature or temperature sensor disconnection detection	FR	Yes
		3	Bit3	0x4210			● Dynamic brake operation frequency exceeds the allowable value	FR	Yes
	54	1	Bit3	0x4310		Internal Regenerative Resistor Overheat	● Detection of internal regenerative resistor overheating	DB	Yes
		2	Bit3	0x4310			● Decrease in servo amplifier ambient temperature or temperature sensor disconnection detection	DB	Yes
		3	Bit3	0x4310			● Allowable regenerative power excess	DB	Yes
	55	0	Bit3	0x4310		External Error	● Detection of external regenerative resistor overheating	DB	Yes
	56	1	Bit3	0x4210		Servo Amplifier Temperature Error	● Detection of amplifier internal overheating	DB	Yes
		2	Bit3	0x4210			● Decrease in servo amplifier ambient temperature or temperature sensor disconnection detection	DB	Yes
	59	1	Bit3	0x4210		Inrush Prevention/Regenerative Integrated Resistor Temperature Error	● Inrush prevention resistor overheating	DB	Yes
		2	Bit3	0x4210			● Regenerative resistor overheating	DB	Yes
		3	Bit3	0x4210			● Decrease in servo amplifier ambient temperature or temperature sensor disconnection detection	DB	Yes

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	Display		EtherCAT interface		Analog/Pulse	Alarm name	Alarm contents	Action at detection	Alarm reset
	Alarm code 0x2101 0x2102	Sub code 0x2146	Error register 0x1001	Error code 0x603F	Bit4 to 0: Indefinite. Alarm code: 3 bits output, Bit 7, 6, 5.				
Power Supply Related Error	61	0	Bit2	0x3211	0, 1, 1	Overvoltage	● Main circuit DC voltage excess	DB	Yes
	62	0	Bit2	0x3220		Main Circuit Undervoltage Note 1)	● Main circuit DC voltage drop	DB	Yes
	63	0	Bit2	0x3130		Main Circuit Power Supply Phase Loss Note 1)	● 1 phase of the 3-phase main circuit power supply disconnected	SB	Yes
	68	0	Bit2	0x3220		Main Circuit Voltage Detection Error	● Failure of VBUS detection circuit	DB	No
	69	1	Bit2	0x5116		Inrush Prevention Time Error	● Main circuit charge does not complete	DB	No
		2					● Inrush prevention circuit error	DB	No
	6A	0	Bit2	0x3110		Main Circuit Power Input Overvoltage	● Main circuit power supply input voltage is higher than the specification upper limit	SB	Yes
	6B	0	Bit2	0x3230		Discharge Error	● Discharge of the main circuit DC voltage is not completed after 2 seconds in the state of discharge by the regenerative resistor.	DB	Yes
	71	0	Bit2	0x5114		Control Power Voltage Error Note 2)	● Control power voltage is out of spec	DB	Yes Note 3)
	72	0	Bit2	0x5115		Control Circuit Undervoltage 1	● Undervoltage of ±12 V power supply	SB	Yes
	73	0	Bit2	0x5113		Control Circuit Undervoltage 2	● Undervoltage of +5 V power supply	DB	No

	Display		EtherCAT interface		Analog/Pulse	Alarm name	Alarm contents	Action at detection	Alarm reset
	Alarm code 0x2101 0x2102	Sub code 0x2146	Error register 0x1001	Error code 0x603F	Bit4 to 0: Indefinite. Alarm code: 3 bits output, Bit 7, 6, 5.				
Encoder Wiring Related Error	81	1	Bit0	0x7305	1, 0, 0	Encoder Connector 1 Disconnection	● Incremental encoder A-signal line or power line disconnection	DB	No
		2					● Incremental encoder B-signal line or power line disconnection		
		3					● Incremental encoder Z-signal line or power line disconnection		
	83	1	Bit0	0x7306		Encoder Connector 2 Disconnection Note 7)	● Incremental encoder A-signal line or power line disconnection	DB	No/Yes
		2					● Incremental encoder B-signal line or power line disconnection		
		3					● Incremental encoder Z-signal line or power line disconnection		
	84	0	Bit0	0x7300		Absolute Encoder Communication Error	● Encoder serial communication time out ● Serial communication data error	DB	No
	85	0	Bit0	0x7300		Encoder Initial Process Error	● Failed to read incremental encoder CS data ● Initial process error of absolute encoder	—	No
	86	0	Bit0	0x7300		CS error	● Position jumping on CS data	DB	No
	87	0	Bit0	0x7300		CS disconnection	● CS signal line disconnection	DB	No
	88	0	Bit0	0x7300		External Absolute Encoder Communication Error	● External encoder serial communication time out ● Serial communication data error	DB	No
	89	0	Bit0	0x7300		External Encoder Initial Process Error	● Initial process error of external encoder	—	No
	8C	0	Bit0	0x7300		Motor Encoder (EnDat) Combination Error	● Outrange motor encoder (EnDat) connected	—	No
	8D	0	Bit0	0x7300		External Encoder (EnDat) Combination Error	● Outrange external encoder (EnDat) connected	—	No

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	Display		EtherCAT interface		Analog/Pulse	Alarm name	Alarm contents	Action at detection	Alarm reset
	Alarm code 0x2101 0x2102	Sub code 0x2146	Error register 0x1001	Error code 0x603F	Bit4 to 0: Indefinite. Alarm code: 3 bits output, Bit 7, 6, 5.				
Encoder Related Error	A0	0	Bit0	0x7300	1, 0, 1	Absolute Encoder Internal Error 0	● Encoder failure	DB	No
	A1	0	Bit0	0x7300		Absolute Encoder Internal Error 1	● MT error Error of multi-turn data	DB	Note 4)
	A3	0	Bit0	0x7310		Absolute Encoder Internal Error 3	● Overspeed error	DB	Note 4)
	A4	0	Bit0	0x7300		Absolute Encoder Internal Error 4	● MEM error Error of non-volatile memory data	DB	Note 4)
	A5	0	Bit0	0x7300		Absolute Encoder Internal Error 5	● ST error Error of single-turn data	DB	Note 4)
	A6	0	Bit0	0x7300		Absolute Encoder Internal Error 6	● PS error Matching error between multi-turn and single-turn data	DB	Note 4)
	A9	0	Bit0	0x7300		Absolute Encoder Internal Error 9	● Temperature error	DB	Note 4)
	AA	0	Bit0	0x7320		Absolute Encoder Internal Error 10	● INC error Error of incremental signal	DB	Note 4)
	AF	0	Bit0	0x7304		Absolute Encoder Internal Error 15	● M code error Error of M code track signal	DB	Note 4)

✓ Alarms A1 to AF are the alarm contents when using our GAE series encoders.

	Display		EtherCAT interface		Analog/Pulse	Alarm name	Alarm contents	Action at detection	Alarm reset
	Alarm code 0x2101 0x2102	Sub code 0x2146	Error register 0x1001	Error code 0x603F	Bit4 to 0: Indefinite. Alarm code: 3 bits output, Bit 7, 6, 5.				
External Encoder Related Error	B0	0	Bit0	0x7300	1, 1, 0	External Absolute Encoder Internal Error 0	● Encoder failure	DB	No
	B1	0	Bit0	0x7300		External Absolute Encoder Internal Error 1	● Encoder internal error	DB	Note 4)
	B2	0	Bit0	0x7300		External Absolute Encoder Internal Error 2	● Encoder internal error	DB	Note 4)
	B3	0	Bit0	0x7300		External Absolute Encoder Internal Error 3	● Encoder internal error	DB	Note 4)
	B4	0	Bit0	0x7300		External Absolute Encoder Internal Error 4	● Encoder internal error	DB	Note 4)
	B5	0	Bit0	0x7300		External Absolute Encoder Internal Error 5	● Encoder internal error	DB	Note 4)
	B6	0	Bit0	0x7300		External Absolute Encoder Internal Error 6	● Encoder internal error	DB	Note 4)
	B7	0	Bit0	0x7300		External Absolute Encoder Internal Error 7	● Encoder internal error	DB	Note 4)
	B8	0	Bit0	0x7300		External Absolute Encoder Internal Error 8	● Encoder internal error	DB	Note 4)
	B9	0	Bit0	0x7300		External Absolute Encoder Internal Error 9	● Encoder internal error	DB	Note 4)
	BA	0	Bit0	0x7300		External Absolute Encoder Internal Error 10	● Encoder internal error	DB	Note 4)
	BB	0	Bit0	0x7300		External Absolute Encoder Internal Error 11	● Encoder internal error	DB	Note 4)
	BC	0	Bit0	0x7300		External Absolute Encoder Internal Error 12	● Encoder internal error	DB	Note 4)
	BD	0	Bit0	0x7300		External Absolute Encoder Internal Error 13	● Encoder internal error	DB	Note 4)
	BE	0	Bit0	0x7300		External Absolute Encoder Internal Error 14	● Encoder internal error	DB	Note 4)
	BF	0	Bit0	0x7300		External Absolute Encoder Internal Error 15	● Encoder internal error	DB	Note 4)

✓ Above is a list when the EnDAT encoder is used as an external encoder. For details, please refer to the detailed description pages for alarm codes B0 to BF_0.

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	Display		EtherCAT interface		Analog/Pulse	Alarm name	Alarm contents	Action at detection	Alarm reset
	Alarm code 0x2101 0x2102	Sub code 0x2146	Error register 0x1001	Error code 0x603F	Bit4 to 0: Indefinite. Alarm code: 3 bits output, Bit 7, 6, 5.				
Control Related Error	C1	1	Bit0	0x8400	1, 1, 0	Overspeed	● Servo motor rotation speed exceeded 120 % of maximum rotation speed	DB	Yes
		2					● The output frequency of servo amplifier exceeded 600 Hz	DB	Yes
	C2	0	Bit0	0x8400		Velocity Control Error	● Torque command and acceleration direction are not matching.	DB	Yes
	C3	0	Bit0	0x7122		Velocity Feedback Error	● Servo motor power line disconnection Note 5)	DB	Yes
	C5	0	Bit0	0x8500		Model Following Vibration Suppression Control Error	● Operation pattern is not optimum with model following vibration suppression control	DB	Yes
	D1	1	Bit0	0x8611		Position Deviation Excess	● Position deviation counter exceeds set value	DB	Yes
		2				Excessive Position Deviation at Servo On	● Servo on signal was turned on at the condition of the position deviation counter exceeds the set value	DB	Yes
	D2	0	Bit0	0x8500		Position Command Error 1	● Frequency of inputted position command pulse is excessive	SB	Yes
	D3	1	Bit0	0x8500		Position Command Error 2	● Overflow occurred on calculation process of electronic gear	SB	Yes
		2					● Position command frequency is high, after electronic gear	SB	Yes
		3					● Overflow occurred at calculation result of electronic gear	SB	Yes
	D4	0	Bit0	0x8611		Axes-Sync Error Excess	● Position deviation error between own axis and counterpart axis exceeds setting value	DB	Yes
	D5	0	Bit0	0x8611		Dual Position Error Excess	● The difference of motor position and load position exceeds the setting value	DB	Yes
	D6	0	Bit0	0x8500		Dual Position Feedback Error	● The motor encoder frequency after feedback electronic gear is too high	DB	Yes
	D7	0	Bit4	0x7500		Amplifiers Communication Error	● Amplifiers communication error during axes-sync operation	DB	No
	D8	0	Bit4	0x8611		Excessive Position Deviation Difference	● Position Deviation difference exceeds set value	DB	Yes
	DE	0	Bit0	0xFF01		Parameter Change Completion	● Motor/encoder code parameter change is completed	—	No
	DF	0	Bit0	0xFF00		Test Run Close Note 6)	● Detects at "Test mode end"	DB	Yes

	Display		EtherCAT interface		Analog/Pulse	Alarm name	Alarm contents	Action at detection	Alarm reset
	Alarm code 0x2101 0x2102	Sub code 0x2146	Error register 0x1001	Error code 0x603F	Bit4 to 0: Indefinite. Alarm code: 3 bits output, Bit 7, 6, 5.				
Control element/Memory Related Error	E1	0	Bit7	0x5530	1, 1, 1	Memory Error 1	● Error of non-volatile memory within servo amplifier	DB	No
	E2	1	Bit7	0x6310		Memory Error 2	● Error in check sum area data of non-volatile memory	—	No
		2					● FoE download error		
	E3	0	Bit7	0x5510		CPU Error 1	● Error of memory within CPU	—	No
	E4	1	Bit7	0x5520		CPU Error 2	● Program checksum error	—	No
		2					● Program error		
	E5	1	Bit7	0x6320		System Parameter Error 1	● System parameter is out of setting range	—	No
		2					● Linear coordinates excess		
		3					● EtherCAT communication config error		
		4					● Scale setting error		
		5					● Pushing control combination error		
		6					● Encoder resolution shift setting error		
		7					● External encoder division number setting error		
	E6	1	Bit7	0x6320		System Parameter Error 2	● Motor combination error	—	No
		2					● Motor encoder selection setting error		
		3					● ENC-0 setting error		
		4					● ENC-1 setting error		
		5					● Amplifier capacity error		
		6					● Power supply voltage error		
		7					● Motor encoder baud rate error		
		8					● External encoder baud rate error		
		9					● Model control combination error		
		A					● Position loop encoder selection error		
		B					● CS decision method selection error		
		C					● CS normalization method selection error		
		D					● Sync system error		

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	Display		EtherCAT interface		Analog/Pulse	Alarm name	Alarm contents	Action at detection	Alarm reset
	Alarm code 0x2101 0x2102	Sub code 0x2146	Error register 0x1001	Error code 0x603F	Bit4 to 0: Indefinite. Alarm code: 3 bits output, Bit 7, 6, 5.				
Control element/Memory Related Error	E7	1	Bit7	0x6320	1, 1, 1	Motor Parameter Error	● Motor parameter checksum error	—	No
		2					● Flash ROM table total checksum error		
	E8	1	Bit7	0x5220		Control Circuit Error 1	● External pass access error	—	No
	E9	1	Bit7	0x5220		Control Circuit Error 2	● Power board code error	—	No
		2					● Incremental encoder selection code error		
		3					● Encoder selection code error		
		4					● STO selection error		
		5					● Control board code error		
	EA	0	Bit7	0x6320		Memory Error 3	● Flash ROM device error	SB	No
	EE	1	Bit7	0x6320		Motor Parameter Automatic Setting Error 1	● Control board code 2 error	—	No
		2					● Control board code AB error		
		3					● Automatic set motor error		
		4					● Encoder information error		
	EF	1	Bit7	0x6320		Motor Parameter Automatic Setting Error 2	● Motor information error	—	No
		2					● Motor parameter table error		
	F1	1	Bit7	0x8700		Task Process Error	● CPU1 interrupt process error	DB	No
2		● CPU2 interrupt process error							
F2	1	Bit7	0x6010	Initialization Process Timeout	● Initialization process does not end within specified time	—	No		
	2				● Initialization process of control LSI does not end				

-
- Note 1) Main circuit undervoltage or main circuit power supply missing phase may be detected when the main circuit power supply voltage rises or falls with a gradual slope or when there is an instantaneous voltage breakdown.
- Note 2) Control power supply undervoltage detection or servo ready OFF is performed during instantaneous break of 1.5 to 2 cycles.
Control power supply undervoltage detection and servo ready OFF can be delayed by setting larger value of 0x2027 Group8 ID06 "Power Failure Detection Delay Time [PFDDLTY]".
- Note 3) When instantaneous break of a control power source is long, it is regarded to power supply interception and re-input, and does not leave detected control power supply undervoltage to an alarm history.
(If instantaneous break exceeds 1 second, it will be certainly judged as power supply interception.)
- Note 4) Due to abnormality in encoder main body, encoder clear may sometimes be needed.
"An encoder clear and the alarm reset method" change with motor encoders in use.
Please refer to "Encoder clear function", written in user's manual-5, for detail.
- Note 5) If the load connected to the motor shaft falls at the same time the servo is turned on, the system may not be able to detect a break in the servo motor power cable.
- Note 6) Alarm that occurs in "Test mode end" status is not recorded in the alarm history.
- Note 7) When encoder connector X4 is used as motor encoder input, "Alarm reset" is "No". When encoder connector X4 is used as external encoder input, "Alarm reset" is "Yes".

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9.5.2 Troubleshooting when alarms occur

(1) Alarm display

When an alarm occurs, the display shows the alarm code and sub code.

Display	Description
	In the event of an alarm, follow the procedures described in "What to do when warnings occur".
	Sub code: 0, 1, 2, ..., F. If there is no sub code, 0 is displayed.
	Alarm code

In the case of 2-axis integrated AC servo amplifier, "AL." is not displayed, and only the alarm code and subcode are displayed.

Display	Description
	In the event of an alarm, follow the procedures described in "What to do when warnings occur".
	Axis 1 Sub code: 0, 1, 2, ... F. If there is no sub code, 0 is displayed.
	Axis 1 Alarm code
	Axis 2 Sub code: 0, 1, 2, ... F. If there is no sub code, 0 is displayed.
	Axis 2 Alarm code

- ✓ Sub code subdivides alarm contents for one alarm code.
- ✓ Status codes are not displayed on the 7-segment LED, but can be checked in the alarm history.

9.5.3 What to do when warnings occur

(1) Communication Related Error (AL 1x-x)

- **Alarm code 10_0 (IN Rx invalid frame error)**
 Summary: Monitors IN Rx invalid frame errors (Reg: 0x300) in each communication cycle and detects them when 0x20F2-04 communication frame errors are not received for the set number of consecutive times.

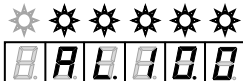
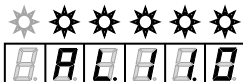
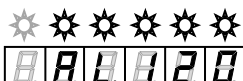
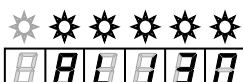
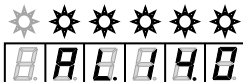
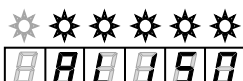
■ **Alarm code 11_0 (OUT Rx invalid frame error)**
 Summary: Monitors OUT Rx invalid frame errors (Reg: 0x302) in each communication cycle and detects them when 0x20F2-04 communication frame errors have not been received for the set number of consecutive times.

■ **Alarm code 12_0 (IN Rx CRC error)**
 Summary: Monitors IN Rx CRC errors (Reg: 0x301) in each communication cycle and detects them when 0x20F2-04 communication frame errors are not received for a set number of consecutive times.

■ **Alarm code 13_0 (OUT Rx CRC error)**
 Summary: This property monitors OUT Rx CRC errors (Reg: 0x303) in each communication cycle and detects them when 0x20F2-04 communication frame error is not received for the set number of consecutive times.

■ **Alarm code 14_0 (IN Tx error)**
 Summary: Monitors IN Tx errors (Reg: 0x308) in each communication cycle and detects them when 0x20F2-04 communication frame errors are not received for a set number of consecutive times.

■ **Alarm code 15_0 (OUT Tx error)**
 Summary: Monitors OUT Tx errors (Reg: 0x309) in each communication cycle and detects them when 0x20F2-04 communication frame errors are not received for the set number of consecutive times.

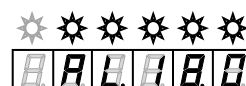
Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.	✓	✓	✓
Issued during operation.	✓	✓	✓

◆ What to do

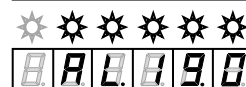
	Cause	Investigation and corrective actions
1	Defect in communication cable.	● Confirm contact failure of communication cable wiring.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the Ethernet cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
3	Defect in control PCB.	● Replace the servo amplifier.

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- Alarm code 18_0 (IN lost link)



- Alarm code 19_0 (OUT lost link)



Summary: The port 0/1 cable is disconnected or unplugged while the servo is ON.
The controller power supply was cut off.

Status at the time of alarm	Cause	
	1	2
Cable was unplugged.	✓	
Issued during operation.		✓

◆ What to do

	Cause	Investigation and corrective actions
1	Cable was unplugged while motor operation.	● Plug/unplug of cable shall be performed during servo OFF or before Pre-OP state.
2	Communication cable disconnection. Contact failure between connector and terminal.	● Check the wiring conditions between controller and servo amplifier and correct it if improper.

- Alarm code 1A_0 (Communication timeout)



Summary: Monitors SM2 events (command reception) in each communication cycle and detects it when 0x20F2-05 communication timeout setting times Output data is not received.

Status at the time of alarm	Cause	
	1	2
Issued in Safe-OP or OP state.	✓	
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Command was unreceived during prescript set time of communication timeout. (SM2 event: PDO output data cannot received.)	● Review whether Output data is output at the communication timing of the controller.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the Ethernet cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

(2) Driving Related Error (AL 2x-x)

■ Alarm code 21_0 (Output Power Device Error)



Summary: Detects when an excessive current flows to the output power device (IPM, IGBT, FET) used in the servo amplifier or when the power supply voltage supplied to the output power device drops.

Status at the time of alarm	Cause					
	1	2	3	4	5	6
Issued when control power is turned ON.			✓	✓		✓
Issued at input of servo ON.	✓	✓		✓		
Issued while starting and stopping the servo motor.	✓	✓		✓		
Issued after operation for some time.	✓	✓		✓		✓
Issued during dynamic braking operation at high speed rotation.					✓	

◆ What to do

	Cause	Investigation and corrective actions
1	The U, V, or W phase of the motor power line is shorted or ground faulted.	Check the motor power line. If the motor power line is shorted or grounded, replace the power line.
2	U/V/W phases on the servo motor side are shorted or grounded.	Disconnect the motor power wire on the servomotor side, check the insulation between phases (U, V, W, and ground), and replace the servomotor if there is a short or ground fault.
3	Malfunction due to noise.	- Confirm proper grounding of the amplifier. - Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
4	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
5	If the dynamic brake is activated during high-speed rotation (exceeding the maximum rotation speed), it may be detected.	- Do not use the dynamic brake as a braking stop during high-speed rotation. Note 1) - If the alarm reset does not work, replace the servo amplifier.
6	The output power device overheat detection worked. (Not detected for 50A or less).	Check the temperature inside the control panel (ambient temperature of the servo amplifier) and review the mounting method of the servo amplifier and the cooling method of the control panel to keep the temperature below 55°C.

Note 1) The endurance frequency of the built-in circuit is 1,000 times when dynamic braking is used for rotational braking.

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- Alarm code 21_1 (Output Power Device Error. Sub code 1)



Summary: Detects when excessive current flows to the output power devices (IPM, IGBT) used in the servo amplifier.

Status at the time of alarm	Cause				
	1	2	3	4	5
Issued when control power is turned ON.			✓	✓	
Issued at input of servo ON.	✓	✓		✓	
Issued while starting and stopping the servo motor.	✓	✓		✓	
Issued after operation for some time.	✓	✓		✓	
Issued during dynamic braking operation at high speed rotation.					✓

◆ What to do

	Cause	Investigation and corrective actions
1	The U, V, or W phase of the motor power line is shorted or ground faulted.	Check the motor power line. If the motor power line is shorted or grounded, replace the power line.
2	U/V/W phases on the servo motor side are shorted or grounded.	Disconnect the motor power wire on the servomotor side, check the insulation between phases (U, V, W, and ground), and replace the servomotor if there is a short or ground fault.
3	Malfunction due to noise.	- Confirm proper grounding of the amplifier. - Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
4	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
5	If the dynamic brake is activated during high-speed rotation (exceeding the maximum rotation speed), it may be detected.	- Do not use the dynamic brake as a braking stop during high-speed rotation. Note 1) - If the alarm reset does not work, replace the servo amplifier.

Note 1) The endurance frequency of the built-in circuit is 1,000 times when dynamic braking is used for rotational braking.

- ✓ Not detected by servo amplifiers with amplifier capacity of 50 A or less.

■ Alarm code 21_2 (Output Power Device Error. Sub code 2)



Summary: Detects when the power supply voltage supplied to the output power device used for the servo amplifier drops.

Status at the time of alarm	Cause				
	1	2	3	4	5
Issued when control power is turned ON.			✓	✓	
Issued at input of servo ON.	✓	✓		✓	
Issued while starting and stopping the servo motor.	✓	✓		✓	
Issued after operation for some time.	✓	✓		✓	
Issued during dynamic braking operation at high speed rotation.					✓

◆ What to do

	Cause	Investigation and corrective actions
1	The U, V, or W phase of the motor power line is shorted or ground faulted.	Check the motor power line. If the motor power line is shorted or grounded, replace the power line.
2	U/V/W phases on the servo motor side are shorted or grounded.	Disconnect the motor power wire on the servomotor side, check the insulation between phases (U, V, W, and ground), and replace the servomotor if there is a short or ground fault.
3	Malfunction due to noise.	- Confirm proper grounding of the amplifier. - Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
4	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
5	If the dynamic brake is activated during high-speed rotation (exceeding the maximum rotation speed), it may be detected.	- Do not use the dynamic brake as a braking stop during high-speed rotation. Note 1) - If the alarm reset does not work, replace the servo amplifier.

Note 1) The endurance frequency of the built-in circuit is 1,000 times when dynamic braking is used for rotational braking.

✓ Not detected by servo amplifiers with amplifier capacity of 50 A or less.

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- Alarm code 21_3 (Output Power Device Error. Sub code 3)



Summary: Detects overheating of output power devices used in servo amplifiers.

Status at the time of alarm	Cause				
	1	2	3	4	5
Issued when control power is turned ON.			✓	✓	✓
Issued at input of servo ON.	✓	✓		✓	✓
Issued while starting and stopping the servo motor.	✓	✓		✓	✓
Issued after operation for some time.	✓	✓		✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The U, V, or W phase of the motor power line is shorted or ground faulted.	Check the motor power line. If the motor power line is shorted or grounded, replace the power line.
2	U/V/W phases on the servo motor side are shorted or grounded.	Disconnect the motor power wire on the servomotor side, check the insulation between phases (U, V, W, and ground), and replace the servomotor if there is a short or ground fault.
3	Malfunction due to noise.	- Confirm proper grounding of the amplifier. - Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
4	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
5	Ambient temperature is high.	Check the temperature inside the cabinet (ambient temperature of the servo amplifier) and review the installation method of the servo amplifier and the cooling method of the control panel to keep the temperature below 55°C. Refer to "Installation conditions in the cabinet" in user's manual-3 (Hardware).

- ✓ Not detected by servo amplifiers with amplifier capacity of 50 A or less.

■ Alarm code 21_4 (Output Power Device Error. Sub code 4)



Summary: Detects when an output power device error occurs and the cause cannot be identified.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	
Issued at input of servo ON.	✓	✓
Issued while starting and stopping the servo motor.	✓	✓
Issued after operation for some time.	✓	✓
Issued during dynamic braking operation at high speed rotation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
2	Multiple power device abnormality factors are occurring.	● Please take corrective action of alarm code 21_1, alarm code 21_2, and alarm code 21_3.

- ✓ Not detected by servo amplifiers with amplifier capacity of 50 A or less.

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■ Alarm code 22_0 (Current Detection Error 0)



Summary: Detects when the output current detection IC inside the servo amplifier receives a value exceeding the upper limit current of the combination motor immediately after servo on.

Status at the time of alarm	Cause		
	1	2	3
Issued at input of servo ON.	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Wrong combination of servo amplifier and servo motor.	Check if the servo motor is attached according to the motor code, and if it is wrong, replace it with the correct servo motor.
2	The automatic motor parameter setting function is disabled and the combination of the motor parameters set in the servo amplifier and the actual servo motor is wrong.	Check if the motor parameters set in the servo amplifier are correct, and if not, set the correct motor parameters.
3	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

■ Alarm code 23_0 (Current Detection Error 1)



Summary: Detects when there is no data update from the output current detection IC inside the servo amplifier.

Status at the time of alarm	Cause		
	1	2	3
Issued during operation.	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Malfunction due to noise.	- Confirm proper grounding of the amplifier. - Add noise filter, ferrite core or similar countermeasures to against noise. Refer to "Noise countermeasures" in user's manual-3 (Hardware).
2	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
3	Power current to the servo motor is not flowing.	- Check if the motor power wire is not disconnected. - Check the wiring conditions and correct it if improper. - Replace the servo motor.

■ Alarm code 24_0 (Current Detection Error 2)



Summary: Detects when a communication error occurs between the output current detection IC inside the servo amplifier and the FPGA for control.

Status at the time of alarm	Cause	
	1	2
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Add noise filter, ferrite core or similar countermeasures to against noise. Refer to "Noise countermeasures" in user's manual-3 (Hardware).
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

■ Alarm code 25_0 (Safe Torque Off error 1)



Summary: Detects when either one of the safety inputs 1 (/HWGOFF1) or 2 (/HWGOFF2) is turned off and the other is not turned off within 10 s.

Status at the time of alarm	Cause	
	1	2
Occurred in about 10 s after control power turned on.	✓	✓
Issued during operation.	✓	

◆ What to do

	Cause	Investigation and corrective actions
1	Input logic of /HWGOFF1 and /HWGOFF2 mismatch.	● Match the input logic of /HWGOFF1 and /HWGOFF2. ● Check the wiring of both /HWGOFF1 and /HWGOFF2 signals and wire them correctly if they are wrong. ● When switching the logic of either /HWGOFF1 or /HWGOFF2 signal, be sure to switch also the logic of the other signal within 10 s. Refer to "Safe Torque Off" in user's manual-4 (Laws/Regulations Conformity Guidelines).
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

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■ Alarm code 26_0 (Safe Torque Off error 2)



Summary: Detects internal circuit failures based on the state of the safety input and the internal state.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓
Issued during operation.		✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

■ Alarm code 27_0 (Fan stop)



Summary: When the internal temperature of the servo amplifier rises, this alarm occurs when the servo amplifier commands the cooling fan to rotate but the fan does not rotate or only rotates at an extremely low speed.

- * Even if the cooling fan is stopped when the temperature of the servo amplifier is sufficiently low during servo-off, no alarm is detected.
- * The servo amplifier with a capacity of 10 A is not equipped with a cooling fan and therefore does not generate an alarm.

Status at the time of alarm	Cause				
	1	2	3	4	5
Stopped suddenly during operation.	✓			✓	✓
Issued when the servo was turned on or during operation.	✓	✓	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Foreign matter is caught in the cooling fan blades. Dust is adhering.	● Check the area around the cooling fan blades and remove any foreign matter or dust.
2	The cooling fan has reached the end of its service life due to bearing wear, etc.	● Check the remaining life monitor of the cooling fan using monitor ID75 "Fan motor remaining life [FANLF]". If there is no remaining life, replace or overhaul the cooling fan.
3	Oil is adhering to the fan and the blades do not rotate.	● Replace the cooling fan. Or overhaul the servo amplifier.
4	Cooling fan failure.	● Replace the cooling fan. If the problem persists after replacement, replace the servo amplifier.
5	Defect in internal circuit of servo amplifier.	● If the problem is not corrected by performing No. 4, repair or replace the servo amplifier.

- ✓ Contact us for replacement of the cooling fan.

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(3) Load Related Error (AL 4x-x to AL 5x-x)

■ Alarm code 41_0 (Overload 1)



Summary: The alarm is detected when the estimated temperature rise of the servo motor, which is estimated from the rotation speed of the servo motor and the output current of the servo amplifier, exceeds the allowable range in the overload characteristics table.

(For the overload characteristics of the servo motor, refer to "Overload Characteristics" in user's manual-2 (Servo Motor).)

Status at the time of alarm	Cause									
	1	2	3	4	5	6	7	8	9	10
Issued at input of servo ON.							✓		✓	✓
After command input, issued without motor rotation.			✓	✓	✓		✓			✓
After command input, issued after motor operation for a while.	✓	✓	✓		✓	✓		✓		

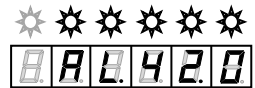
◆ What to do

	Cause	Investigation and corrective actions
1	Effective torque exceeds the rated torque.	Monitor the load status using monitor ID41 "Effective torque monitor [TRMS]" and check if effective torque exceeds the rated torque. Or calculate the motor effective torque from load conditions and operation conditions. If the effective torque is excessive, check the operation or load condition, or replace to the capacity of the large motor.
2	Defect in servo motor and servo amplifier combination.	Check if the motor model number setting and the servo motor in use match, and correct the setting if it is incorrect.
3	The motor holding brake of the servo motor is not released.	Check that the wiring and applied voltage of the motor holding brake are correct, and correct any abnormality. If the above is correct, replace the servo motor. Refer to "Holding Brake" and "Wiring of Servo Motor" in user's manual-2 (Servo Motor).
4	Wiring of U/V/W phases between the servo amplifier and servo motor is not correct.	Check the wiring and if it is incorrect, wire correctly.
5	One or all of the U/V/W phase wires between the servo amplifier and the servo motor are missing.	Check the wiring and if it is incorrect, wire correctly.
6	Machine has collided.	Review operating conditions and machine operating range.
7	The motor encoder resolution is not set correctly.	Set System2 ID07 "Encoder division number code" correctly according to the servo motor encoder.
8	The estimated servo motor temperature rise is higher than the actual temperature rise.	When the control power is interrupted or reset, the estimated value on the temperature rise of the servo motor is lost, so hot start setting is used when the control power is turned on or reset. ^{Note 1)} Start the servo motor operation after the effective load factor monitor value has dropped sufficiently or after a sufficient interval.
9	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
10	Defect in internal circuit of motor encoder.	Replace the servo motor.

✓ If the cause of the alarm is No. 1, repeatedly "shutting off the control power → turning it on" may cause the servo motor to burn out. After shutting off the power, allow sufficient cooling time (30 minutes or more) before resuming operation.

Note 1) When the control power is shut off or the software is reset, the estimated value on the temperature of the servo motor is lost. When an overload alarm occurs (servo motor is in a high temperature state), if operation is immediately restarted by turning on the control power supply again, the servo motor may be burned out. So, it starts from the estimated temperature rise in the high temperature state (hot start) if the control power is turned on or software is reset.

■ Alarm code 42_0 (Overload 2)



Summary: Monitors the rotation speed of the servo motor and the output current of the servo amplifier, and detects an alarm if the rotation speed is low and an excessive output current flows for a certain period of time.

(For the overload characteristics of the servo motor, refer to "Overload Characteristics" in user's manual-2 (Servo Motor).)

Status at the time of alarm	Cause										
	1	2	3	4	5	6	7	8	9	10	11
Issued at input of servo ON.							✓			✓	✓
After command input, issued without motor rotation.			✓	✓	✓		✓	✓	✓		✓
After command input, issued after motor operation for a while.	✓	✓	✓		✓	✓					

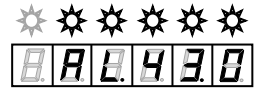
◆ What to do

	Cause	Investigation and corrective actions
1	The rotation speed is low and excessive output current is flowing. * The rotation speed considered as low rotation speed varies depending on the combination motor.	Check if the torque command exceeds the overload 2 detection current ratio (I/IR) using monitor ID18 "Torque Command Monitor [TCMON]" at low rotation speed. If it exceeds the overload 2 detection current ratio (I/IR), review the operation or load conditions, or replace the servo amplifier with a larger capacity. Note) The overload 2 detection current ratio is "at stop" at the lower right of the overload characteristics.
2	Defect in servo motor and servo amplifier combination.	Check if the motor model number setting and the servo motor in use match, and correct the setting if it is incorrect.
3	The motor holding brake of the servo motor is not released.	Check that the wiring and applied voltage of the motor holding brake are correct, and correct any abnormality. If the above is correct, replace the servo motor. Refer to "Holding Brake" and "Wiring of Servo Motor" in user's manual-2 (Servo Motor).
4	Wiring of U/V/W phases between the servo amplifier and servo motor is not correct.	Check the wiring and if it is incorrect, wire correctly.
5	One or all of the U/V/W phase wires between the servo amplifier and the servo motor are missing.	Check the wiring and if it is incorrect, wire correctly.
6	Machine has collided.	Review operating conditions and machine operating range.
7	The motor encoder resolution is not set correctly.	Set System2 ID07 "Encoder division number code" correctly according to the servo motor encoder.
8	Two axes rotate in different directions when using tandem operation.	Set System1 ID10 "Polarity (position, velocity, torque command polarity)" to "04: PC- _VC+ _TC+" for one axis only. Also, change Group9 ID23 "Inter-axis synchronization compensation input polarity selection" to "01: Reversed" for both axes.
9	Wiring of the servo motor and encoder is not correct when using tandem operation.	Check the wiring and if it is incorrect, wire correctly.
10	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
11	Defect in internal circuit of motor encoder.	Replace the servo motor.

✓ This function does not detect servo amplifiers with an amplifier capacity of 75 A or more. However, an overcurrent condition of the output power device is detected with an output power device error (alarm code 21).

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■ Alarm code 43_0 (Regenerative Overload)



Summary: Detects when the power consumption of the regenerative resistor reaches the instantaneous withstand capacity of the regenerative resistor from the operating state of the regenerative resistor. For the instantaneous withstand capacity, use a fixed value for each capacitance in the case of a built-in regenerative resistor or a fixed value in the case of an external regenerative resistor.

Status at the time of alarm	Cause							
	1	2	3	4	5	6	7	8
Issued when control power is turned ON.							✓	
Issued when main circuit power is turned ON.		✓	✓	✓		✓	✓	✓
Issued during operation.	✓			✓	✓		✓	

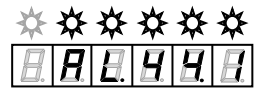
◆ What to do

	Cause	Investigation and corrective actions
1	The regenerative power allowance was exceeded by the built-in regenerative resistor specification. Load inertia moment is too large. Or the takt time is too short.	● Review the load conditions and operating conditions. ● Use an external regenerative resistor. ● Keep the load inertia moment within the specification range. ● Increase the deceleration time. ● Increase the takt time. Refer to "Regenerative processing" in user's manual-3 (Hardware).
2	Regenerative resistor is connecting to the servo amplifier having specification of no regenerative resistor.	● Remove the regenerative resistor.
3	Wiring of the regenerative resistor is incorrect according to the specifications of the built-in regenerative resistor or external regenerative resistor.	● Check the wiring and if it is incorrect, wire it correctly. ● For the built-in regenerative resistor, connect a short jumper between RB1 and RB4. ● For the external regenerative resistor, remove the short jumper between RB1 and RB4, and connect the resistor between RB1 and RB2.
4	The regenerative resistor is disconnected.	● If the servo amplifier is of the built-in regenerative resistor type, replace the servo amplifier. ● If an external regenerative resistor is used, replace the regenerative resistor.
5	The resistance value of the external regenerative resistor is too large.	● Replace the resistance value with one that meets the specifications.
6	Input power supply voltage exceeds the specification range.	● Review the input power supply voltage. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
7	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
8	"02: External_R" is selected in System1 ID03 "Regenerative resistor selection", but an external regenerative resistor is not installed.	● Install an external regenerative resistor. ● If you do not connect a regenerative resistor, change System1 ID03 "Regenerative resistor selection" to "00: Not_connect".

✓ If System1 ID03 "Regenerative resistor selection" is not set correctly, the servo amplifier and peripheral circuits may be damaged or burned because the regenerative overload is not detected correctly.

■ Alarm code 44_1

(Magnetic pole position estimation error. Sub code 1)



Summary: It detects when magnetic pole position estimation is not completed normally.

When Group4 ID70 "Magnetic pole position estimation method selection" is set to Type0 (torque command excitation method)

Status at the time of alarm	Cause							
	1	2	3	4	5	6	7	8
Issued when control power supply is turned ON.				✓				
Issued during magnetic pole position detection.	✓	✓	✓		✓	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The pole position detection frequency and the resonance point of the mechanism are coincident. The motor is butting up against the stroke end.	● Change Group4 ID48 "Excitation command frequency setpoint". ● Secure the distance to the stroke end.
2	Load mass is too large.	● Re-select a linear servo motor.
3	Thrust limit command is too small.	● If you are using the internal thrust limit value, please increase the setting value of Group5 ID21 "Positive torque limit value" and Group5 ID22 "Negative torque limit value". ● If you use external thrust limit input, increase the analog input voltage.
4	Defect in control circuit of servo amplifier.	● Replace the servo amplifier.
5	Wiring of U/V/W phases between the servo amplifier and linear servo motor is not correct.	● Check the wiring and if it is incorrect, wire correctly.
6	The wiring of phases A and B of the linear encoder is incorrect.	● Check the wiring and if it is incorrect, wire correctly.
7	The linear encoder resolution/division is not set correctly.	● Set System2 ID07 "Encoder division number code" correctly.
8	The linear encoder is not moving in the correct direction.	● Set System2 ID2A "Encoder operation direction selection" correctly.

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When Group4 ID70 "Magnetic pole position estimation method selection" is set to Type1 (control loop method)

Status at the time of alarm	Cause
	1
Issued during magnetic pole position detection.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The gain of the magnetic pole estimation loop is low, and the estimated value did not converge sufficiently.	- Set Group4 ID71 "Magnetic pole position estimation rigidity selection" to "02: High rigidity" and perform magnetic pole position estimation. - If a magnetic pole position estimation error is detected again, increase the setting value of Group4 ID72 "Magnetic Pole Position Estimation Gain Ratio" within the range where mechanical resonance vibration does not occur. If the gain cannot be increased, increase the setting value of Group4 ID73 "Magnetic Pole Position Estimation Measurement Time Multiplier."
2	The gain of the magnetic pole estimation loop is high, and the estimated value is oscillating.	Set Group 4 ID71 "Magnetic Pole Position Estimation Rigidity Selection" to "01: Low Rigidity" and perform magnetic pole position estimation. If magnetic pole position estimation abnormalities are detected again, increase the setting value of Group 4 ID73 "Magnetic Pole Position Estimation Measurement Time Multiplier."
3	The load inertia moment setting is incorrect.	Set Group 1 ID14 "Load Inertia Moment Ratio 1" accurately.

- ✓ Please note that lowering the rigidity setting will increase the amount of movement of the machine during operation.
- ✓ The time required to detect the magnetic pole position will vary depending on the settings of Group 4 ID71 "Magnetic Pole Position Estimation Rigidity Selection" and Group 4 ID73 "Magnetic Pole Position Measurement Estimation Time Multiplier."

Magnetic pole position estimation method selection	Magnetic pole position estimation rigidity selection	Magnetic pole position estimation measurement time multiplier	Time required to detect magnetic pole position
Type 1 (control loop method)	Low rigidity	1 to 8 times	8 to 64 s
	Middle rigidity	1 to 8 times	4 to 32 s
	High rigidity	1 to 8 times	2 to 16 s

■ Alarm code 44_2

(Magnetic pole position estimation error. Sub code 2)



Summary: It detects when magnetic pole position estimation function is incorrectly set.

Status at the time of alarm	Cause
	1
Issued during the magnetic pole position estimation run.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Magnetic pole position estimation function cannot be executed due to wrong setting.	If Group4 ID70 "Magnetic pole position estimation method selection" is set to Type1 (control loop method, for horizontal axis), set System1 ID00 "Amplifier control cycle setting" to 00.

■ Alarm code 45_0 (Excessive continuous rotation speed)



Summary: Detects when the average rotation speed exceeds the maximum rotation speed in the continuous area.

Status at the time of alarm	Cause
	1
Issued during operation.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The average rotation speed exceeds the maximum rotation speed in the continuous range.	- Review the operating conditions. - Reselect the servo motor. For the continuous range of the servo motor, refer to "Data Sheet" in user's manual-2 (Servo Motor).

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- Alarm code 52_1
(Inrush prevention resistance overheat. Sub code 1)



Summary: Detects overheating of the inrush protection resistor.

Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.			✓
Issued when main circuit power is turned ON.	✓		
Issued during operation.		✓	

◆ What to do

	Cause	Investigation and corrective actions
1	Power ON frequency is too high.	● Reduce the frequency of power-on/off. Specification: Do not exceed 30 times/day, 5 times/hour.
2	Ambient temperature is high.	● Check the temperature inside the cabinet (ambient temperature of the servo amplifier) and review the installation method of the servo amplifier and the cooling method of the control panel to keep the temperature below 55°C. Refer to "Installation conditions in the cabinet" in user's manual-3 (Hardware).
3	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

- ✓ During an overheat condition of the inrush prevention resistor, the main circuit power supply is not discharged even when the main circuit power supply discharge selection is set to "Discharge".

- Alarm code 52_2
(Inrush prevention resistance overheat. Sub code 2)



Summary: Detects when the temperature sensor is disconnected or when the temperature of the inrush prevention resistor drops.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Low ambient temperature.	● Keep the ambient temperature of the installed servo amplifier within the operating temperature range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

- ✓ During an overheat condition of the inrush prevention resistor, the main circuit power supply is not discharged even when the main circuit power supply discharge selection is set to "Discharge".

■ Alarm code 53_1

(Dynamic brake resistor overheat. Sub code 1)



Summary: Detects overheating of the dynamic brake resistor.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.		✓
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The frequency of dynamic braking operation is too high.	The frequency of dynamic brake operation should be "10 times or less per hour, 30 times or less per day" at the maximum rotation speed within the allowable load inertia moment.
2	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

- ✓ Not detected by servo amplifiers with amplifier capacity of 50 A or less.

■ Alarm code 53_2

(Dynamic brake resistor overheat. Sub code 2)



Summary: Detects when the temperature sensor is disconnected or when the temperature of the inrush prevention resistor drops.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Low ambient temperature.	Keep the ambient temperature of the installed servo amplifier within the operating temperature range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

- ✓ Not detected by servo amplifiers with amplifier capacity of 50 A or less.

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■ Alarm code 53_3

(Dynamic brake resistor overheat. Sub code 3)



Summary: Detects when dynamic brake operation frequency is high.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.		✓
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The frequency of dynamic braking operation is too high.	The frequency of dynamic brake operation should be "10 times or less per hour, 30 times or less per day" at the maximum rotation speed within the allowable load inertia moment.
2	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

■ Alarm code 54_1

(Built-in regenerative resistor overheat. Sub code 1)



Summary: Detects overheating of the regenerative resistor.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.		✓
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Regenerative resistor temperature is high.	● Check the regenerative power of the built-in regenerative resistor. ● Review the operating conditions so that the regenerative power is less than the allowable regenerative power. Refer to "Regenerative Process" in user's manual-3 (Hardware). ● Use an external regenerative resistor. ● Check the temperature inside the cabinet (ambient temperature of the servo amplifier) and review the mounting method of the servo amplifier and the cooling method of the cabinet to keep the temperature below 55°C. Refer to "Installation conditions in the cabinet" in user's manual-3 (Hardware).
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

- ✓ When using a regenerative resistor built into the servo amplifier, be sure to set "01: Built-in_R" in System1 ID03 "Regenerative resistor selection". This setting determines whether the overheat protection detection processing of the built-in regenerative resistor is enabled or disabled.
- ✓ If "02: External_R" is selected and the short connector for the built-in regenerative resistor is connected, the built-in regenerative resistor may burn or smoke because the power consumption of the regenerative resistor is estimated and calculated as an external regenerative resistor specification.
- ✓ The cooling fan of the servo amplifier rotates at high speed while the built-in regenerative resistor is overheated.

■ Alarm code 54_2

(Built-in regenerative resistor overheat. Sub code 2)



Summary: Detects when the temperature sensor is disconnected or when the temperature of the built-in regenerative resistor drops.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Low ambient temperature.	● Keep the ambient temperature of the installed servo amplifier within the operating temperature range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

- ✓ The cooling fan of the servo amplifier rotates at high speed while the built-in regenerative resistor is overheated.

User's Manual (Troubleshooting)

■ Alarm code 54_3

(Built-in regenerative resistor overheat. Sub code 3)



Summary: Detected when the power consumption of the regenerative resistance detected by the amplifier reaches the continuous withstand capacity.

Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.		✓	✓
Issued during operation.	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Regenerative power is too large.	● Check the regenerative power of the built-in regenerative resistor. ● Review the operating conditions so that the regenerative power is less than the allowable regenerative power. Refer to "Regenerative Process" in user's manual-3 (Hardware). ● Use an external regenerative resistor.
2	The built-in regenerative resistor is wired incorrectly.	● Check the wiring and if it is incorrect, wire correctly.
3	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

- ✓ When using a regenerative resistor built into the servo amplifier, be sure to set "01: Built-in_R" in System1 ID03 "Regenerative resistor selection". This setting determines whether the overheat protection detection processing of the built-in regenerative resistor is enabled or disabled.
- ✓ If "02: External_R" is selected and the short connector for the built-in regenerative resistor is connected, the built-in regenerative resistor may burn or smoke because the power consumption of the regenerative resistor is estimated and calculated as an external regenerative resistor specification.
- ✓ The cooling fan of the servo amplifier rotates at high speed while the built-in regenerative resistor is overheated.

■ Alarm code 55_0 (External Error)



Summary: Detects when the state of the contact input (temperature thermal, etc.) set and connected to the external trip input function becomes abnormal.

In case of thermal signal of external regenerative resistor or output signal of host device not connected

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The enable condition selection for the external trip function is set to enable.	If not used, set Group6 ID0B "External Trip Input Function [EXT-E]" to "00: Always_Disable".
2	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

In case of thermal signal of external regenerative resistor is connected

Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.	✓		✓
Issued after operation for some time.		✓	✓

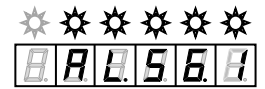
◆ What to do

	Cause	Investigation and corrective actions
1	The external regenerative resistor is wired incorrectly.	Check the wiring and if it is incorrect, wire correctly.
2	External thermal terminal (external regenerative resistor) has operated.	- Review the operating conditions. Refer to "Regenerative Processing" in user's manual-3 (Hardware). - Increase the capacity of the external regenerative resistor.
3	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

- ✓ When the output terminal of a host device is connected, remove the alarm factor in the host device.

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- Alarm code 56_1
(Servo Amplifier Temperature Error. Sub code 1)



Summary: Detects overheating of the servo amplifier internal temperature.

Status at the time of alarm	Cause			
	1	2	3	4
Issued when control power is turned ON.	✓		✓	✓
Issued at input of servo ON.	✓	✓	✓	
Issued while starting and stopping the servo motor.	✓	✓	✓	
Issued after operation for some time.	✓	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The U/V/W phases are short-circuited in the wiring between the servo amplifier and the servo motor. Or, U/V/W phases of the servo amplifier are grounded.	Check the wiring and if it is incorrect, wire correctly.
2	U/V/W phases on the servo motor side are shorted or grounded.	Replace the servo motor.
3	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
4	Ambient temperature is high.	Check the temperature inside the cabinet (ambient temperature of the servo amplifier) and review the installation method of the servo amplifier and the cooling method of the control panel to keep the temperature below 55°C. Refer to "Installation conditions in the cabinet" in user's manual-3 (Hardware).

- ✓ The internal temperature of the servo amplifier is measured in the immediate vicinity of the output power devices (IPM, IGBT).
- ✓ This function does not detect servo amplifiers with an amplifier capacity of 75 A or more. However, an overheat condition of the output power device is detected with an output power device error (alarm code 21) or an amplifier temperature warning.

- Alarm code 56_2
(Servo Amplifier Temperature Error. Sub code 2)



Summary: Detects a temperature sensor failure or a drop in the internal temperature of the amplifier.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓
Issued at input of servo ON.	✓	✓
Issued while starting and stopping the servo motor.	✓	✓
Issued after operation for some time.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Low ambient temperature.	● Keep the ambient temperature of the installed servo amplifier within the operating temperature range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

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■ Alarm code 59_1

(Inrush Prevention/Regenerative Integrated Resistor
Temperature Error. Sub code 1)



Summary: Detects overheating of the inrush protection resistor.
The sub code is determined from the regenerative operation status.

Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.			✓
Issued when main circuit power is turned ON.	✓		
Issued during operation.		✓	

◆ What to do

	Cause	Investigation and corrective actions
1	Power ON frequency is too high.	Reduce the frequency of power-on/off. Specification: Do not exceed 30 times/day, 5 times/hour.
2	Ambient temperature is high.	Check the temperature inside the cabinet (ambient temperature of the servo amplifier) and review the installation method of the servo amplifier and the cooling method of the control panel to keep the temperature below 55°C. Refer to "Installation conditions in the cabinet" in user's manual-3 (Hardware).
3	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

- ✓ When using a regenerative resistor built into the servo amplifier, be sure to set "01: Built-in_R" in System1 ID03 "Regenerative resistor selection". This setting determines whether the overheat protection detection processing of the built-in regenerative resistor is enabled or disabled.
- ✓ The cooling fan of the servo amplifier rotates at high speed during the overheat state of the inrush prevention/regenerative integrated resistor.
- ✓ The main circuit power supply is not discharged during the inrush prevention/regenerative integrated resistor overheat conditions, even if the main circuit power supply discharge selection is set to "Discharge".
- ✓ Not detected by servo amplifiers with amplifier capacity of 50 A or less.

- Alarm code 59_2
(Inrush Prevention/Regenerative Integrated Resistor
Temperature Error. Sub code 2)



Summary: Detects overheating of the inrush protection resistor.
The sub code is determined from the regenerative operation status.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.		✓
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Regenerative resistor temperature is high.	● Check the regenerative power of the built-in regenerative resistor. ● Review the operating conditions so that the regenerative power is less than the allowable regenerative power. Refer to "Regenerative Process" in user's manual-3 (Hardware). ● Use an external regenerative resistor. ● Check the temperature inside the cabinet (ambient temperature of the servo amplifier) and review the mounting method of the servo amplifier and the cooling method of the cabinet to keep the temperature below 55°C. Refer to "Installation conditions in the cabinet" in user's manual-3 (Hardware).
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

- ✓ When using a regenerative resistor built into the servo amplifier, be sure to set "01: Built-in_R" in System1 ID03 "Regenerative resistor selection". This setting determines whether the overheat protection detection processing of the built-in regenerative resistor is enabled or disabled.
- ✓ The cooling fan of the servo amplifier rotates at high speed during the overheat state of the inrush prevention/regenerative integrated resistor.
- ✓ The main circuit power supply is not discharged during the inrush prevention/regenerative integrated resistor overheat conditions, even if the main circuit power supply discharge selection is set to "Discharge".
- ✓ Not detected by servo amplifiers with amplifier capacity of 50 A or less.

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- Alarm code 59_3
(Inrush Prevention/Regenerative Integrated Resistor
Temperature Error. Sub code 3)

Summary: Detects when the temperature sensor is disconnected or when the temperature of the inrush prevention/regeneration integrated resistor drops.

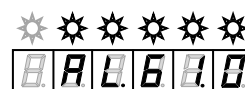
Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Low ambient temperature.	● Keep the ambient temperature of the installed servo amplifier within the operating temperature range. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

- ✓ The cooling fan of the servo amplifier rotates at high speed during the overheat state of the inrush prevention/regenerative integrated resistor.
- ✓ The main circuit power supply is not discharged during the inrush prevention/regenerative integrated resistor overheat conditions, even if the main circuit power supply discharge selection is set to "Discharge".
- ✓ Not detected by servo amplifiers with amplifier capacity of 50 A or less.

(4) Power Supply Related Error (AL 6x-x to AL 7x-x)



■ Alarm code 61_0 (Over-Voltage)

Summary: Detects when the voltage of the internal DC power supply of the main circuit exceeds the maximum rating of the main circuit electrolytic capacitor.

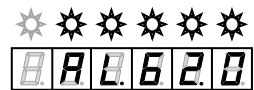
Status at the time of alarm	Cause			
	1	2	3	4
Issued when control power is turned ON.	✓			
Issued when main circuit power is turned ON.	✓	✓		
Issued while starting and stopping the servo motor.		✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
2	Main circuit power supply voltage is out of specification range.	● Review the input power supply voltage. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
3	Load inertia moment is too large.	● Keep the load inertia moment within the specification range.
4	Wiring of the regenerative resistor is incorrect. Regenerative circuits do not work.	● Check the wiring and if it is incorrect, wire it correctly. ● For the built-in regenerative resistor, connect a short jumper between RB1 and RB4. ● For the external regenerative resistor, remove the short jumper between RB1 and RB4, and connect the resistor between RB1 and RB2. ● When using an external regenerative resistor, replace the resistor value with one that meets the specifications. For the minimum allowable external resistor value, refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction). ● If the abnormality still occurs, replace the servo amplifier.

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■ Alarm code 62_0 (Main Circuit Under-voltage)



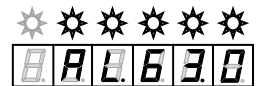
Summary: Detects when the voltage of the internal DC power supply of the main circuit drops and motor control becomes impossible.

Status at the time of alarm	Cause				
	1	2	3	4	5
Issued when control power is turned ON.				✓	✓
Issued after the main circuit power was turned on.	✓	✓	✓		
Issued during operation.		✓	✓		

◆ What to do

	Cause	Investigation and corrective actions
1	Input power supply voltage is below the specification range.	Review the input power supply voltage. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	The rectifier in the main circuit is damaged.	Replace the servo amplifier.
3	Input power supply voltage dropped. Or, a momentary power interruption has occurred.	Check the power supply and review to ensure that there are no momentary power interruptions or power supply voltage drops.
4	Main circuit power (L1, L2, L3) is supplied with low voltage outside the specification range.	Check the main circuit voltage and make sure that power is not supplied to L1, L2, or L3 from other sources when the main circuit is off.
5	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

■ Alarm code 63_0 (Main power supply phase loss)



Summary: Detects when one of the phases of the three-phase power supply L1, L2, or L3 input is in a missing phase state.

Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.		✓	
Issued when main circuit power is turned ON.	✓	✓	✓
Issued during operation.	✓	✓	

◆ What to do

	Cause	Investigation and corrective actions
1	One of the three phase inputs (L1, L2, L3) is not input.	● Check the wiring and if it is incorrect, wire correctly.
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
3	The power input type setting is not appropriate for the single-phase specification.	● Change System1 ID01 "Power input type selection" to "01: AC_AC_Single-phase".

■ Alarm code 68_0 (Main circuit voltage detection error)



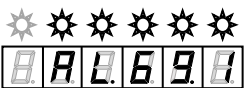
Summary: A failure of the main circuit voltage detection circuit occurred.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

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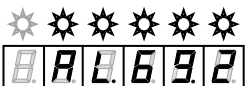
- Alarm code 69_1 (Inrush prevention time error. Sub code 1) 

Summary: Detects when the main circuit capacitor inside the servo amplifier is not charged correctly when the main circuit power is turned on.

Status at the time of alarm	Cause	
	1	2
Issued when main circuit power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The internal fuse of the servo amplifier is disconnected.	- Before the alarm occurs, check to see if an excessive current is flowing through the servo amplifier such that the wiring circuit breaker is tripped. - If the wiring circuit breaker is tripped, review the environment and implement countermeasures, then replace the servo amplifier.
2	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

- Alarm code 69_2 (Inrush prevention time error. Sub code 2) 

Summary: The main circuit DC voltage is charged instantaneously so detect malfunctions such as welding of the inrush prevention circuit contacts. Detection is not possible when control power and main circuit power are turned on simultaneously.

Status at the time of alarm	Cause
	1
Issued when main circuit power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The contact point of the servo amplifier inrush prevention circuit has welded.	Replace the servo amplifier.

■ Alarm code 6A_0 (Main circuit power input overvoltage)



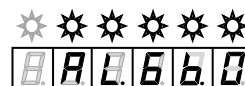
Summary: Detects when the main circuit power supply input voltage exceeds the upper limit specified for the servo amplifier's input power supply voltage.

Status at the time of alarm	Cause		
	1	2	3
Issued when main circuit power is turned ON.	✓		✓
Issued during operation.	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Input power supply voltage is higher than the specification upper limit.	Review the input power supply voltage. Refer to the section "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	The input power supply voltage has fluctuated.	Check the power supply and review the input voltage so that it is not higher than the specification upper limit.
3	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

■ Alarm code 6B_0 (Discharge error)



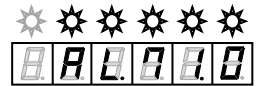
Summary: Detects when the main circuit DC voltage discharge is not completed after 2 seconds in the state of discharge by the regenerative resistor.

Status at the time of alarm	Cause	
	1	2
Issued when main circuit power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Abnormal resistance value of regenerative resistor	Check for abnormal regenerative resistance value.
2	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

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■ Alarm code 71_0 (Control power voltage error)

Summary: Detects when the control power supply (L1C, L2C) voltage is out of the specified range of input power supply voltage for the servo amplifier. The detection conditions vary depending on the input voltage specifications.

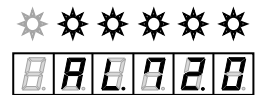
- ✓ For 200 VAC input: 150 VAC or lower.
- ✓ For 100 VAC input: The value is below 74 VAC.
- ✓ For 300 VDC input: The value is below 213 VDC or above 365 VDC.
- ✓ For 150 VDC input: The value is below 106 VDC or above 185 VDC.
- ✓ For 48 VDC input: The value is below 17 VDC or above 29 VDC.

Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.	✓	✓	
Issued during operation.	✓		✓

◆ What to do

	Cause	Investigation and corrective actions
1	Input power supply voltage exceeds the specification range.	Review the input power supply voltage. Refer to "Servo amplifier standard specifications" in user's manual-1 (Introduction).
2	The input power supply voltage has fluctuated, or a momentary power failure has occurred.	Check the power supply and review to ensure that there are no momentary power failures or power supply drops.
3	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

■ Alarm code 72_0 (Control circuit undervoltage 1)



Summary: Detects a drop in the control DC power supply $\pm 12V$.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
2	Defect in external circuit.	Remove the X1 connector and reconnect power; if it is not an alarm, check the external circuit.

■ Alarm code 73_0 (Control circuit undervoltage 2)



Summary: Detects a drop in the control DC power supply $\pm 5 V$.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
2	Defect in external circuit.	- Remove the X1 connector and reconnect power; if it is not an alarm, check the external circuit. - Replace the servo motor and reconnect the power supply. If it is not an alarm, the internal circuit of the motor encoder is defective.

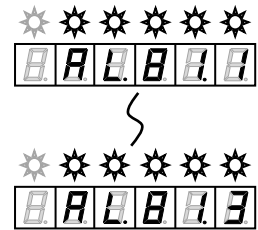
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(5) Encoder Wiring Related Error (AL 8x-x)

■ Alarm code 81_1

(Encoder connector 1 disconnection. Sub code 1)

Summary: Detects a break in the A-phase and power line of the incremental encoder with encoder connector 1 (X3) input.



■ Alarm code 81_2 (Encoder connector 1 disconnection. Sub code 2)

Summary: Detects a break in the B-phase and power line of the incremental encoder with encoder connector 1 (X3) input.

■ Alarm code 81_3 (Encoder connector 1 disconnection. Sub code 3)

Summary: Detects a break in the Z-phase and power line of the incremental encoder with encoder connector 1 (X3) input.

■ Alarm code 87_0 (CS disconnection)

Summary: Detects a break in the CS signal of the incremental encoder.



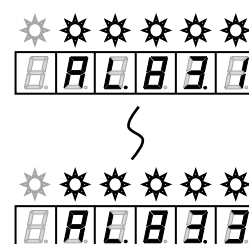
Status at the time of alarm	Cause			
	1	2	3	4
Issued when control power is turned ON.	✓	✓	✓	✓
Issued during operation.	✓		✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	In the motor encoder wiring, Wiring is incorrect. Connector is disconnected. Poor contact in the connector. Encoder cable is too long. Encoder cable is too thin.	- Check the wiring and if it is incorrect, wire correctly. Refer to "Wiring of motor encoder" in user's manual-2 (Servo Motor). - Confirm that the encoder power supply voltage at the motor side is above 4.75 V, and correct it if it is less than 4.75 V.
2	Wrong combination of servo amplifier and motor encoder.	Replace to a servo motor with the correct encoder.
3	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
4	Defect in internal circuit of motor encoder.	Replace the servo motor.

- Alarm code 83_1
(Encoder connector 2 disconnection. Sub code 1)

Summary: Detects a break in the A-phase and power line of the incremental encoder with encoder connector 2 (X4) input.



- Alarm code 83_2 (Encoder connector 2 disconnection. Sub code 2)

Summary: Detects a break in the B-phase and power line of the incremental encoder with encoder connector 2 (X4) input.

- Alarm code 83_3 (Encoder connector 2 disconnection. Sub code 3)

Summary: Detects a break in the Z-phase and power line of the incremental encoder with encoder connector 2 (X4) input.

[When X3 is used as a motor encoder in a semi-closed system]

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Parameters are set to full-closed system.	● Change System2 ID20 "Position Loop Control Encoder Selection" to "00: Motor_Enc".
2	X4 is selected as the encoder connector. When the 10th digit of the servo amplifier model number (encoder type) is "2".	● Change System2 ID01 "Motor encoder input selection" to "00: X3".

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[When X4 is used as a motor encoder in a semi-closed system]

Status at the time of alarm	Cause			
	1	2	3	4
Issued when control power is turned ON.	✓	✓	✓	✓
Issued during operation.	✓		✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	In the motor encoder wiring, Wiring is incorrect. Connector is disconnected. Poor contact in the connector. Encoder cable is too long. Encoder cable is too thin.	- Check the wiring and if it is incorrect, wire correctly. Refer to "Wiring of motor encoder" in user's manual-2 (Servo Motor). - Confirm that the encoder power supply voltage at the motor side is above 4.75 V, and correct it if it is less than 4.75 V.
2	Wrong combination of servo amplifier and motor encoder.	Replace to a servo motor with the correct encoder.
3	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
4	Defect in internal circuit of motor encoder.	Replace the servo motor.

[When X4 is used as an external encoder]

Status at the time of alarm	Cause			
	1	2	3	4
Issued when control power is turned ON.	✓	✓	✓	✓
Issued during operation.	✓		✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	In the motor encoder wiring, Wiring is incorrect. Connector is disconnected. Poor contact in the connector. Encoder cable is too long. Encoder cable is too thin.	- Check the wiring and if it is incorrect, wire correctly. Refer to "Wiring of motor encoder" in user's manual-2 (Servo Motor). - Confirm that the encoder power supply voltage at the motor side is above 4.75 V, and correct it if it is less than 4.75 V.
2	The power supply for the external encoder is turned on too late.	Check the external encoder power supply voltage immediately after the control power supply is turned on, and if the power supply has not been established, accelerate the power supply timing for the external encoder.
3	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
4	Defect in internal circuit of motor encoder.	Replace the servo motor.

■ Alarm code 84_0 (Absolute Encoder Communication Error)



Summary: A communication error occurred with the absolute encoder.

Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.	✓	✓	✓
Issued during operation.		✓	

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
3	Motor encoder wiring is incorrect.	● Check the wiring and if it is incorrect, wire correctly. Refer to "Wiring of motor encoder" in user's manual-2 (Servo Motor).

■ Alarm code 85_0 (Encoder Initial Process Error)



Summary: Initial processing is not possible between the absolute encoder and the servo amplifier.

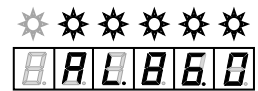
Status at the time of alarm	Cause				
	1	2	3	4	5
Issued when control power is turned ON.	✓	✓	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	In the motor encoder wiring, Wiring is incorrect. Connector is disconnected. Poor contact in the connector. Encoder cable is too long. Encoder cable is too thin.	● Check the wiring and if it is incorrect, wire correctly. Refer to "Wiring of motor encoder" in user's manual-2 (Servo Motor). ● Confirm that the encoder power supply voltage at the motor side is above 4.75 V, and correct it if not satisfied.
2	Wrong combination of servo amplifier and motor encoder.	● Replace to a servo motor with the correct encoder.
3	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
4	Defect in internal circuit of motor encoder.	● Replace the servo motor.
5	Initial setting of position data could not be made because the servomotor was rotating at a speed of 250 min ⁻¹ or more when the power was turned on.	● Turn the power on again with the servo motor stopped. (Only when an absolute encoder is used.)

User's Manual (Troubleshooting)

■ Alarm code 86_0 (CS Error)



Summary: Detects abnormal CS movement.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

■ Alarm code 88_0 (External Absolute Encoder Communication Error)



Summary: A communication error occurred with the absolute encoder for external use.

Status at the time of alarm	Cause			
	1	2	3	4
Issued when control power is turned ON.	✓	✓	✓	
Issued during operation.		✓		✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of external encoder.	● Replace the external encoder.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
3	External encoder wiring is incorrect.	● Check the wiring and if it is incorrect, wire correctly. Refer to "External encoder (X4) signal names and pin numbers" in user's manual-1 (Introduction).
4	The power supply voltage for the external encoder has dropped.	● Check if the external encoder power supply voltage is 4.75 V or more, and correct if it is less than 4.75 V.

■ Alarm code 89_0 (External Encoder Initial Process Error)



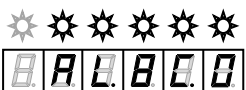
Summary: Initial processing is not possible between the external absolute encoder and the servo amplifier.

Status at the time of alarm	Cause			
	1	2	3	4
Issued when control power is turned ON.	✓	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	In the external encoder wiring, Wiring is incorrect. Connector is disconnected. Poor contact in the connector. Encoder cable is too long. Encoder cable is too thin.	● Check the wiring and if it is incorrect, wire correctly. Refer to "External encoder (X4) signal names and pin numbers" in user's manual-3 (Hardware). ● Check if the external encoder power supply voltage is 4.75 V or more, and correct if it is less than 4.75 V.
2	The power supply for the external encoder is turned on too late.	● Check the external encoder power supply voltage immediately after the control power supply is turned on, and if the power supply has not been established, accelerate the power supply timing for the external encoder.
3	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
4	Defect in internal circuit of external encoder.	● Replace the external encoder.

User's Manual (Troubleshooting)

- Alarm code 8C_0 (Motor encoder (EnDat) combination error) 

Summary: Detected when EnDat is selected as the motor encoder and the EnDat encoder is unusable.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The servo amplifier is not compatible with the combined external encoder.	Replace the encoder with one recommended by our company. For details, refer to "Applicable linear encoder" in user's manual-10 (Linear Servo Motor).

- Alarm code 8D_0 (External encoder (EnDat) combination error) 

Summary: Detected when EnDat is selected as the external encoder and an unusable EnDat encoder is used.

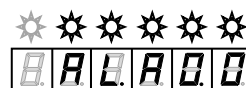
Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The servo amplifier is not compatible with the combined external encoder.	Replace the encoder with one recommended by our company. For details, refer to "Combination Encoder" in user's manual-3 (Hardware).

(6) Encoder Related Error (AL Ax-x)

- Alarm code A0_0 (Absolute Encoder Internal Error 0)



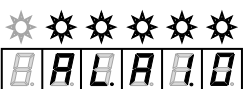
Summary: Detects failures in the internal circuit of the motor encoder.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

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- Alarm code A1_0 (Absolute Encoder Internal Error 1/MT Error) 

Summary: Detects error in multi-turn data.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Make sure that the encoder is not subjected to a strong magnetic field (e.g., magnetic stand). ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

- ✓ This is the case for battery-less encoders. For encoder clear and alarm reset method, refer to "Encoder clear function" in user's manual-5 (Hardware).
- ✓ When this alarm occurs, there is a possibility that the mechanical system is misaligned. After alarm reset, perform JOG operation at low speed to confirm that the equipment origin has not shifted.

■ Alarm code A3_0 (Absolute Encoder Internal Error 3/Overspeed Error)

Summary: Detects encoder rotation speed errors.



Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.	✓	✓	
Issued during operation.	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
3	The rotation speed of the servo motor exceeds the allowable speed.	● Review the operating conditions and lower the maximum rotation speed.

- ✓ This is the case for battery-less encoders. For encoder clear and alarm reset method, refer to "Encoder clear function" in user's manual-5 (Hardware).

User's Manual (Troubleshooting)

■ Alarm code A4_0

(Absolute Encoder Internal Error 3/MEM Error)



Summary: Detects errors of non-volatile memory in the encoder.

Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.	✓	✓	✓
Issued during operation.	✓	✓	

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
3	Defect in non-volatile memory data in the encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.

- ✓ This is the case for battery-less encoders. For encoder clear and alarm reset method, refer to "Encoder clear function" in user's manual-5 (Hardware).
- ✓ When this alarm occurs, there is a possibility that the mechanical system is misaligned. After alarm reset, perform JOG operation at low speed to confirm that the equipment origin has not shifted.

- Alarm code A5_0 (Absolute Encoder Internal Error 5/MT Error)



Summary: Detects single-turn data error.

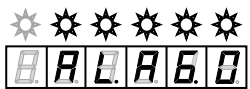
Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

- ✓ This is the case for battery-less encoders. For encoder clear and alarm reset method, refer to "Encoder clear function" in user's manual-5 (Hardware).
- ✓ When this alarm occurs, there is a possibility that the mechanical system is misaligned. After alarm reset, perform JOG operation at low speed to confirm that the equipment origin has not shifted.

User's Manual (Troubleshooting)

- Alarm code A6_0 (Absolute Encoder Internal Error 6/PS Error) 

Summary: Detects anomalies in the consistency of multi-turn data and single-turn data.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Make sure that the encoder is not subjected to a strong magnetic field (e.g., magnetic stand). ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

- ✓ This is the case for battery-less encoders. For encoder clear and alarm reset method, refer to "Encoder clear function" in user's manual-5 (Hardware).
- ✓ When this alarm occurs, there is a possibility that the mechanical system is misaligned. After alarm reset, perform JOG operation at low speed to confirm that the equipment origin has not shifted.

■ Alarm code A9_0

(Absolute Encoder Internal Error 9/ Temperature Error)



Summary: Occurs when the encoder detection temperature exceeds the threshold value.

Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.	✓	✓	
Issued during operation.	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
3	The servo motor is not generating heat, but the encoder ambient temperature is too high.	● Review the ambient temperature environment of the encoder.
4	Servo motor is overheated.	● Review the cooling method of the servo motor.

- ✓ This is the case for battery-less encoders. For encoder clear and alarm reset method, refer to "Encoder clear function" in user's manual-5 (Hardware).

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■ Alarm code AA_0

(Absolute Encoder Internal Error 10/INC Error)



Summary: Detects incremental signal errors inside the encoder.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓
Issued during operation.	✓	✓

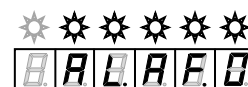
◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

- ✓ This is the case for battery-less encoders. For encoder clear and alarm reset method, refer to "Encoder clear function" in user's manual-5 (Hardware).
- ✓ When this alarm occurs, there is a possibility that the mechanical system is misaligned. After alarm reset, perform JOG operation at low speed to confirm that the equipment origin has not shifted.

- Alarm code AF_0
(Absolute Encoder Internal Error 15/M-code Error)

Summary: Detects abnormalities in M-code signals.



Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of motor encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

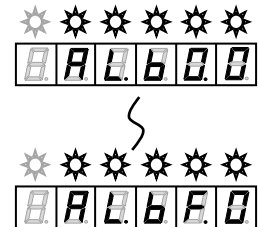
- ✓ This is the case for battery-less encoders. For encoder clear and alarm reset method, refer to "Encoder clear function" in user's manual-5 (Hardware).
- ✓ When this alarm occurs, there is a possibility that the mechanical system is misaligned. After alarm reset, perform JOG operation at low speed to confirm that the equipment origin has not shifted.

User's Manual (Troubleshooting)

(7) External Encoder Related Error (AL Bx-x)

- Alarm code B0 to BF_0
(External Absolute Encoder Internal Error 0 to 15)

Summary: Refer to the table of EnDat Error message and alarm code correspondence.



Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	
Issued during operation.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of external encoder.	● Turn on the power again, and if it cannot be recovered, replace the servo motor.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

■ Correspondence table of EnDat Error message and alarm code

EnDat Encoder		Servo Amplifier	
Bit	Error message	Alarm Code	Priority
0	Light Source	B0	1
1	Signal amplitude	B1	2
2	Position	B2	3
3	Overvoltage	B3	4
4	Undervoltage	B4	5
5	Overcurrent	B5	6
6	Battery	B6	7
7	Currently not allocated Extension planned	B7	8
8		B8	9
9		B9	10
10		BA	11
11		BB	12
12		BC	13
13		BD	14
14		BE	15
15		BF	16

- ✓ Error message indicates Operation Status Word 0 of EnDat.
- ✓ Alarm Code means the Alarm Code output by the servo amplifier for the corresponding Error Message.
- ✓ Priority means the priority of the Alarm Code to be output when multiple Error Messages are received at the same time. Even if multiple Error Messages are received, only one Alarm Code (with the highest priority) is output from the servo amplifier.
- ✓ For details of EnDat Error messages, please contact HEIDENHAIN.

User's Manual (Troubleshooting)

(8) Control Related Error (AL Cx-x / AL Dx-x)

- Alarm code C1_1 (Overspeed. Sub code 1)



Summary: Detects when the servo motor rotation speed exceeds 120% of the maximum speed.

Status at the time of alarm	Cause				
	1	2	3	4	5
Issued when command is input after the servo is turned on.				✓	✓
Issued while starting the servo motor.	✓	✓	✓		
Issued during operation, except during startup.	✓				✓

◆ What to do

	Cause	Investigation and corrective actions
1	Overshoot at startup is too large.	● Adjust the servo parameters. ● Loosen the command acceleration/deceleration pattern. ● Reduce the load inertia moment or review the motor capacity.
2	Wiring of U/V/W phases between the servo amplifier and servo motor is not correct.	● Check the wiring and if it is incorrect, wire correctly.
3	The wiring of phases A and B of the incremental encoder is incorrect.	● Check the wiring and if it is incorrect, wire correctly.
4	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
5	Defect in internal circuit of motor encoder.	● Replace the servo motor.

■ Alarm code C1_2 (Overspeed. Sub code 2)



Summary: Detects when the output frequency of the servo amplifier exceeds 600 Hz.

Status at the time of alarm	Cause				
	1	2	3	4	5
Issued when command is input after the servo is turned on.				✓	✓
Issued while starting the servo motor.	✓	✓	✓		
Issued during operation, except during startup.	✓				✓

◆ What to do

	Cause	Investigation and corrective actions
1	Overshoot at startup is too large.	● Adjust the servo parameters. ● Loosen the command acceleration/deceleration pattern. ● Reduce the load inertia moment or review the motor capacity.
2	Wiring of U/V/W phases between the servo amplifier and servo motor is not correct.	● Check the wiring and if it is incorrect, wire correctly.
3	The wiring of phases A and B of the incremental encoder is incorrect.	● Check the wiring and if it is incorrect, wire correctly.
4	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
5	Defect in internal circuit of motor encoder.	● Replace the servo motor.

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■ Alarm code C2_0 (Velocity Control Error)



Summary: Detects when the motor is accelerating with the polarity of the speed feedback and torque command not matching while the motor is rotating and the torque command is 100% or more.

Status at the time of alarm	Cause			
	1	2	3	4
Issued when servo-on was input.	✓		✓	
Issued when the command was input.	✓	✓	✓	
Issued while starting and stopping the servo motor.				✓

◆ What to do

	Cause	Investigation and corrective actions
1	Wiring of U/V/W phases between the servo amplifier and servo motor is not correct.	Check the wiring and if it is incorrect, wire correctly.
2	The wiring of phases A and B of the incremental encoder is incorrect.	Check the wiring and if it is incorrect, wire correctly.
3	The servo motor is vibrating (oscillating).	Adjust the servo parameters to prevent vibration (oscillation).
4	Overshoot/undershoot is too large.	- Adjust servo parameters to reduce overshoot and undershoot. - Execute servo tuning. Refer to "Types of Servo Tuning Function" in user's manual-6 (Adjustment). - Loosen the acceleration/deceleration pattern of the command. - Set Group8 ID14 "Velocity control error (ALM_C2) detection [VCALM]" to "00: Disabled.

- ✓ The standard setting of Group8 ID14 "Velocity control error (ALM_C2) detection [VCALM]" is "00: Disabled" (Invalid) because the alarm may be detected at start/stop in applications with a large load inertia moment or in vertical axis. If detection is required, please contact us.

■ Alarm code C3_0 (Velocity Feedback Error)



Summary: Detects when the control (PWM) signal to the output power device inside the servo amplifier is saturated while the servo is ON and the motor is stopped.

Status at the time of alarm	Cause	
	1	2
Issued when the command was input.	✓	✓
Issued when control power is turned ON.	✓	

◆ What to do

	Cause	Investigation and corrective actions
1	Servo motor does not rotate.	● Check if the servo motor power wire is not disconnected or wired incorrectly, and if so, wire it correctly. ● Replace the servo motor.
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

■ Alarm code C5_0



(Model Following Vibration Suppression Control Error)

Summary: When model following vibration control is used, if the torque limit persists, the vibration control does not provide sufficient damping effect, so an error is detected.

Status at the time of alarm	Cause			
	1	2	3	4
Issued after inputting a position command pulse.	✓	✓	✓	✓

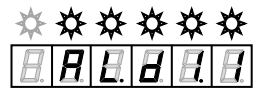
◆ What to do

	Cause	Investigation and corrective actions
1	Model control gain setting is too high.	● Lower Group2 ID10 "Model Control Gain 1".
2	The acceleration/deceleration time of a position command is too short.	● Loosen the acceleration/deceleration pattern of the command.
3	Low torque limit value.	● Increase the torque limit value. Or, disable the torque limit. Refer to "Torque limit function" in user's manual-5 (Functions).
4	Switched from standard position control to model-following vibration suppression control.	● Please switch with the servo motor stopped.

- ✓ This alarm may occur when other alarms occur, and alarm resetting is performed during deceleration by the servo brake.

User's Manual (Troubleshooting)

- Alarm code D1_1 (Position Deviation Excess. Sub code 1)



Summary: Detects when the position deviation exceeds the deviation counter overflow value.

Status at the time of alarm	Cause														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Issued when control power is turned ON.													✓		
Issued while motor stopping.						✓								✓	
Issued immediately after entering the command.	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓		✓	
Issued while command inputting.	✓	✓					✓	✓	✓					✓	✓
Issued during magnetic pole position detection.										✓					

◆ What to do

	Cause	Investigation and corrective actions
1	Position command frequency is too high.	Review the position command of the controller.
2	Excessive load inertia moment or low motor capacity.	Review the load condition or increase the motor capacity.
3	Holding brake is not released.	Check the wiring/holding brake control signal and if it is incorrect, wire correctly. If correct (specified voltage is applied), replace the servo motor. Refer to "Servo Motor Wiring" in user's manual-2 (Servo Motor).
4	Application collided to something or locked mechanically.	Review the mechanical system.
5	One or all phases of U/V/W -phase of the servo amplifier and motor has disconnected.	Check the wiring and if it is incorrect, wire correctly.
6	Motor is being rotated by an external force (Gravity, etc.) during stopping (positioning completion).	Review the load condition or increase the motor capacity.
7	A torque limit enable command is input from the controller and the torque limit setting is too small. The velocity limit command is set too small. The motor encoder pulse count setting does not match that of the servo motor.	- Increase the torque limit value or disable the torque limit. Refer to "Torque limit function" in user's manual-5 (Functions). - Increase the set value of Group4 ID27 "Velocity Limit Command". - Set System2 ID07 "Encoder division number code" correctly according to the motor encoder.
8	Servo parameters (position loop gain, etc.) are not set properly.	Adjust the servo parameters. (Increase the position loop gain, etc.)
9	Setting of an excessive position deviation is too small.	Increase the setting of Group8 ID11 "Deviation counter overflow value".

See next page for continuation of what to do.

◆ What to do (continued)

	Cause	Investigation and corrective actions
10	The set value of deviation overflow for magnetic pole position estimation is too small.	● Increase the setting of Group4 ID75 "Deviation counter overflow value for magnetic pole position estimation". Refer to "Adjustment of magnetic pole position estimation parameters" in user's manual (Introduction).
11	Two axes rotate in different directions when using tandem operation.	● Set System1 ID10 "Polarity (position, velocity, torque command polarity)" to "04: PC- _VC+ _TC+" for only one axis. Also, change Group9 ID23 "Inter-axis synchronization compensation input polarity selection" to "01: Reversed" for both axes.
12	Wiring of the servo motor and encoder is not correct when using tandem operation.	● Check the wiring and if it is incorrect, wire correctly.
13	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
14	Defect in internal circuit of motor encoder.	● Replace the servo motor.
15	Low main circuit power supply voltage.	● Review the main circuit power supply voltage.



■ Alarm code D1_2

(Excessive Position Deviation at Servo On. Sub code 2)

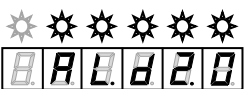
Summary: Detects when the servo-on signal is input while the position deviation has accumulated to the servo-on deviation counter overflow value or more.

Status at the time of alarm	Cause	
	1	2
Issued at the time of servo-on signal input.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The servo-on signal was input while the position deviation was accumulated.	● Change the set value of Group5 ID10 "Deviation clear selection" to "Clear deviation" with servo-off.
2	The set value of "Servo-on time deviation counter overflow value" is too small.	● Increase the setting of Group8 ID15 "Deviation counter overflow value at servo-ON".

User's Manual (Troubleshooting)

- Alarm code D2_0 (Position command pulse frequency error 1) 

Summary: Detects when the width of the position command pulse becomes less than the set value of the position command pulse digital filter.

Status at the time of alarm	Cause
	1
Issued after inputting a position command pulse.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	A command is input that is higher than the digital filter setting of the command pulse input.	● Lower the command pulse input frequency. Check the value of monitor ID30 "Position command pulse frequency monitor". ● Decrease the minimum pulse width of System1 ID13 "Position command pulse digital filter".

■ Alarm code D3_1

(Position command pulse frequency error 2. Sub code 1)



Summary: Detects when the electronic gear calculation process exceeds the signed 64-bit range.

Status at the time of alarm	Cause	
	1	2
Issued after inputting a position command pulse.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Command pulse input frequency is too high.	Lower the command pulse input frequency. Check the value of monitor ID30 "Position command pulse frequency monitor".
2	Electronic gear setting is too large.	Change the setting of System2 ID52 to 54 appropriately. Refer to "Scale Function" in user's manual-5 (Functions).

■ Alarm code D3_2

(Position command pulse frequency error 2. Sub code 2)



Summary: Detects when the command input to the position controller is larger than signed 29 bits.

Status at the time of alarm	Cause	
	1	2
Issued after inputting a position command pulse.	✓	✓

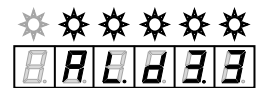
◆ What to do

	Cause	Investigation and corrective actions
1	Command pulse input frequency is too high.	Lower the command pulse input frequency. Check the value of monitor ID30 "Position command pulse frequency monitor".
2	Electronic gear setting is too large.	Lower the electronic gear setting. Refer to "Electronic Gear" in user's manual-7 (Parameters).

User's Manual (Troubleshooting)

■ Alarm code D3_3

(Position command pulse frequency error 2. Sub code 3)



Summary: Detects when the result of electronic gear calculation exceeds 32 signed bits.

Status at the time of alarm	Cause	
	1	2
Issued after inputting a position command pulse.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Command pulse input frequency is too high.	Lower the command pulse input frequency. Check the value of monitor ID30 "Position command pulse frequency monitor".
2	Electronic gear setting is too large.	- Change the setting of System2 ID52 to 54 appropriately. Refer to "Scale Function" in user's manual-5 (Functions). - Lower the electronic gear setting. Refer to "Electronic Gear" in user's manual-7 (Parameters).

■ Alarm code D4_0 (Inter-axis sync error excess)



Summary: When the tandem operation function is used, this function detects when the position deviation between the two axes exceeds the inter-axis sync error excess.

Status at the time of alarm	Cause				
	1	2	3	4	5
Issued immediately after entering the command.	✓	✓	✓	✓	✓
Issued during starting /stopping at high speed.	✓		✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The parameter settings for the two axes are different.	● Please set the parameters according to "Tandem Operation/Inter-axis sync compensation function " in user's manual-5 (Functions).
2	A common position command is not input to the 2 axes.	● Check the wiring and if it is incorrect, wire correctly.
3	The set value of the inter-axis sync error anomaly is too small.	● Increase the setting of Group8 ID31 "Excessive inter-axis sync error value".
4	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
5	Defect in internal circuit of motor encoder.	● Replace the servo motor.

User's Manual (Troubleshooting)

■ Alarm code D5_0 (Dual Position Error Excess)



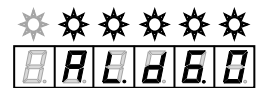
Summary: Detects when the difference between the motor position and load position exceeds the dual position error excess value when dual position feedback is used.

Status at the time of alarm	Cause									
	1	2	3	4	5	6	7	8	9	10
Issued immediately after entering the command.	✓		✓	✓	✓		✓	✓	✓	✓
Issued while command inputting.	✓	✓				✓	✓	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Motor and load (external encoder) are not mechanically connected, or the coupling rigid is low.	Review the mechanical coupling condition.
2	Position loop gain set value is too high.	Adjust Group1 ID02 "Position loop proportional gain 1" and Group9 ID25 "Dual position feedback filter" so that the set value of position loop gain becomes lower according to "Setting of dual position feedback compensation" of the section "Full-closed system" in user's manual-5 (Functions).
3	The motor encoder pulse count setting does not match that of the servo motor.	Set System2 ID07 "Encoder division number code" correctly according to the motor encoder.
4	The external encoder resolution does not match the motor encoder resolution after the feedback electronic gear.	Review the setting values of System2 ID41 "External Encoder Resolution", ID21 "Feedback Pulse Electronic Gear Numerator" and ID22 "Feedback Pulse Electronic Gear Denominator" according to the contents of "Full-closed Control" in user's manual-5 (Functions).
5	The polarity of the external encoder and the motor encoder do not match.	- Check the wiring of the external encoder, and if it is wrong, wire it correctly. Refer to "External encoder (X4) signal names and pin numbers" in user's manual-3 (Hardware). - Set System2 ID25 "External encoder polarity selection" according to "Servo motor rotation direction setting" in user's manual-5 (Functions).
6	Rounded off the remainder when setting system parameter ID24,25 "Feedback pulse electronic gear numerator/denominator".	Set 0 Pulse to Group8 ID1A "Dual Position Error Excess Value" to disable the alarm.
7	The set value for Dual Position Error Excessive Value is too small.	Increase the setting of Group8 ID1A "Dual Position Error Excessive Value".
8	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
9	Defect in internal circuit of motor encoder.	Replace the servo motor.
10	Defect in internal circuit of external encoder.	Replace the external encoder.

■ Alarm code D6_0 (Dual Position Feedback Error)



Summary: Detects when the motor cannot operate normally when dual position feedback is used.

Status at the time of alarm	Cause							
	1	2	3	4	5	6	7	8
Issued after inputting a position command.	✓	✓	✓	✓	✓	✓	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Motor and load (external encoder) are not mechanically connected, or the coupling is not rigid.	Review the mechanical coupling condition.
2	The motor encoder pulse count setting does not match that of the servo motor.	Set System2 ID07 "Encoder division number code" correctly according to the motor encoder.
3	The number of external encoder divisions does not match the number of motor encoder divisions after the feedback electronic gear.	Review the setting values of System2 ID41 "External Encoder Resolution," ID21 "Feedback Pulse Electronic Gear Numerator," and ID22 "Feedback Pulse Electronic Gear Denominator" according to "Feedback pulse setting" of "Full closed system" in user's manual-5 (Functions).
4	The polarity of the external encoder and motor encoder do not match.	- Check the wiring of the external encoder, and if it is incorrect, wire it correctly. Refer to "Signal names and pin numbers of external encoder (X4)" in user's manual-1 (Introduction). - Set System2 ID25 "External Encoder Polarity Selection" according to "Servo Motor Rotation Direction Setting" of "Full closed system" in user's manual-5 (Functions).
5	Feedback pulse electronic gear ratio is too large.	Review the setting values of System2 ID21 "Feedback Pulse Electronic Gear Numerator" and ID22 "Feedback Pulse Electronic Gear Denominator".
6	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
7	Defect in internal circuit of motor encoder.	Replace the servo motor.
8	Defect in internal circuit of external encoder.	Replace the external encoder.

- ✓ In a system with a large number of motor encoder divisions and a large feedback electronic gear ratio, the maximum motor speed is limited.

User's Manual (Troubleshooting)

■ Alarm code D7_0 (Inter-amplifier communication error)



Summary: Detects when there are the wrong parameter setting, miswiring between amplifiers or an error occurs in the position information, during tandem operation.

Status at the time of alarm	Cause				
	1	2	3	4	5
Issued after the control power was turned on.	✓	✓	✓	✓	
Issued during operation.					✓

◆ What to do

	Cause	Investigation and corrective actions
1	In the inter-amplifier wiring, Wiring is incorrect. Connector is disconnected. Poor contact in the connector. Cable is too long.	- For analog/pulse interface Use our optional "Cable for communication between amplifiers". AL-01134653-01 (0.2 m, between X6 and X6) AL-01134653-02 (3 m, between X6 and X6) - For EtherCAT interface Check the wiring of the X1 connector and wire it correctly if it is wrong. Refer to "X1 connector and signal arrangement (EtherCAT)" in user's manual-3 (Hardware). - Use our recommended cable.
2	In case with tandem operation function use Tandem operation is not set in the parameter setting of the mating axis.	Change System1 ID09 "Amplifier communication function selection" of the mating axis to "01: Tandem".
3	In case without tandem operation function use Tandem operation is set in the parameter setting of the own axis.	Change System1 ID09 "Amplifier communication function selection" of own axis to "00: Disable".
4	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
5	Malfunction due to noise.	- Confirm proper grounding of the amplifier. - Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

■ Alarm code D8_0 (Excessive position deviation difference)



Summary: Detects when the position deviation difference exceeds the position deviation difference excess value.

Status at the time of alarm	Cause															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Issued when control power is turned ON.														✓		
Issued when servo ON and while motor stopping.								✓							✓	
Issued immediately after entering the command.	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	
Issued while motor operation.	✓	✓	✓						✓	✓	✓				✓	✓

See next page for what to do.

User's Manual (Troubleshooting)

◆ What to do

	Cause	Investigation and corrective actions
1	The model following control mode or the model following vibration suppression control mode is selected, and Group8 ID1C "Excessive position deviation difference alarm level" is not 0.	Set the mode to the standard position control mode, or set the set value of Group8 ID1C "Excessive position deviation difference alarm level" to 0.
2	Position command frequency is too high.	Review the position command from the controller. Check the value of monitor ID30 "Position command pulse frequency monitor".
3	Excessive load inertia moment or low motor capacity.	Review the load condition or increase the motor capacity.
4	Holding brake is not released.	Check the wiring and if it is incorrect, wire correctly. If correct (specified voltage is applied), replace the servo motor. Refer to "Servo Motor Wiring" in user's manual-2 (Servo Motor).
5	Application collided to something or locked mechanically.	Review the mechanical system.
6	One or all phases of U/V/W -phase of the servo amplifier and motor has disconnected. Or, wiring is incorrect.	Check the wiring and if it is incorrect, wire correctly.
7	Encoder wiring has disconnected. Or, wiring is incorrect.	Check the wiring and if it is incorrect, wire correctly.
8	Motor is being rotated by an external force (Gravity, etc.) during stopping (positioning completion).	Review the load condition or increase the motor capacity.
9	A torque limit enable command is input from the controller and the torque limit setting is too small. The velocity limit command is set too small. The motor encoder pulse count setting does not match that of the servo motor.	- Increase the torque limit value or disable the torque limit. Refer to "Torque limit function" in user's manual-5 (Functions). - Increase the set value of Group4 ID27 "Velocity Limit Command". - Set System2 ID07 "Encoder division number code" correctly according to the motor encoder.
10	The servo parameter (Group1 ID02 "Position loop proportional gain 1", etc.) setting is not appropriate.	Adjust the servo parameters. (Increase Group1 ID02 "Position Loop Proportional Gain 1" etc.)
11	The setting value of the setting parameter for excessive position deviation difference is not appropriate.	- Increase the set value of Group8 ID1C "Excessive position deviation difference alarm level". - Adjust the set value of Group8 ID1D "Excessive position deviation difference detection LPF". - Increase the set value of Group8 ID1E "Position deviation difference detection duration".
12	Mating/own axes rotate in different directions, when using tandem operation.	Set System1 ID10 "Polarity (position, velocity, torque command polarity)" to "04: PC- _VC+_TC+" for one axis only. Also, change Group9 ID23 "Inter-axis synchronization compensation input polarity selection" to "01: Reversed" for both axes.
13	Wiring of the servo motor and encoder is not correct when using tandem operation.	Check the wiring and if it is incorrect, wire correctly.
14	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
15	Defect in internal circuit of motor encoder.	Replace the servo motor.
16	Low main circuit power supply voltage.	Review the main circuit power supply voltage.

■ Alarm code DE_0 (Parameter Change Completion)



Summary: If a change in a system parameter that requires power resumption is completed via EtherCAT communication, it is considered abnormal because the set value becomes effective when the control power is resumed. Or, detected when the encoder baud rate changeover or the parameter restoration is executed.

Status at the time of alarm	Cause		
	1	2	3
Issued after setting in the initialization process.	✓		
Issued at system parameter change.	✓		
Encoder baud rate changeover was executed.		✓	
Parameter restoration is executed.			✓

◆ What to do

	Cause	Investigation and corrective actions
1	A system parameter that requires power resumption has been changed via EtherCAT communication.	Shut off the control power supply and restart the servo amplifier.
2	Encoder baud rate changeover was executed.	Shut off the control power supply and restart the servo amplifier.
3	Parameter restoration is executed.	Shut off the control power supply and restart the servo amplifier.

■ Alarm code DF_0 (Test Run Close)



Summary: After the test mode is executed, the deviation remains on the controller side so is considered as an error.

Status at the time of alarm	Cause
	1
Issued after test mode execution.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Normal operation.	Perform an alarm reset to recover. (After the test mode is executed, the error is assumed to be an error in consideration of the deviation remaining on the controller side.)

User's Manual (Troubleshooting)

(9) Control element/Memory Related Error (AL Ex-x / AL Fx-x)

■ Alarm code E1_0 (Memory Error 1)



Summary: An anomaly in non-volatile memory was detected.

Status at the time of alarm	Cause
	1
Issued during display key operation or setup software operation.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

■ Alarm code E2_1 (Memory Error 2. Sub code 1)



Summary: Detects checksum errors in non-volatile memory.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The correct value was not read into the CPU from the servo amplifier's built-in non-volatile memory.	● Replace the servo amplifier.
2	Failed to write to non-volatile memory at last power off.	● Replace the servo amplifier.

■ Alarm code E2_2 (Memory Error 2. Sub code 2)



Summary: Detects errors when the download function (FoE) is executed via EtherCAT communication.

Status at the time of alarm	Cause	
	1	2
Issued when download function (FoE) is performed.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Execution failed in the download function (FoE).	● Shut off the control power and restart the servo amplifier. If the problem persists after several attempts, replace the servo amplifier.
2	Wrong file to download.	● Please check if the servo amplifier parameter file matches the product and select the correct file.

User's Manual (Troubleshooting)

■ Alarm code E3_0 (CPU Error 1)



Summary: CPU internal memory error

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.

■ Alarm code E4_1 (CPU Error 2. Sub code 1)



Summary: Program checksum error

Status at the time of alarm	Cause		
	1	2	3
Issued when control power is turned ON.	✓		
Issued after executing the upload function (FoE, USB upload).		✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	Replace the servo amplifier.
2	Power was interrupted while executing the upload function (FoE, USB upload).	Please execute the upload function (FoE, USB upload) again. Do not shut off the control power while executing the download function.
3	The checksum of the file to be downloaded is wrong.	Please check with our sales representative to make sure it is the correct file.

■ Alarm code E4_2 (CPU Error 2. Sub code 2)



Summary: Program error

Status at the time of alarm	Cause
	1
Issued when executing the upload function (FoE).	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
2	Wrong file to download.	● Please check with our sales representative to make sure it is the correct file.

■ Alarm code E8_1 (Control Circuit Error 1. Sub code 1)



Summary: External bus access error

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

User's Manual (Troubleshooting)

■ Alarm code E5_1 (System Parameter Error 1. Sub code 1)



Summary: The system parameter setting is out of range.
Or, a combination that does not match the amplifier model number is set.

Status at the time of alarm	Cause	
	1	2
Issued after the control power was turned on.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	A value outside the setting range is set for a system parameter.	Check the set value of the system parameter and set a value within the set range. Turn on the control power again and confirm that there are no alarms.
2	Motor code and servo amplifier power specifications do not match.	- Check the servo amplifier model number. - Check and correct the system parameter setting values. Turn on the control power again and confirm that there is no alarm.

■ Alarm code E5_2 (System Parameter Error 1. Sub code 2)



Summary: The initial value of the real position exceeds the signed 32-bit range due to the scale setting.

Status at the time of alarm	Cause
	1
Issued after the control power was turned on.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The initial value of the actual position exceeds the signed 32-bit range. (EtherCAT)	Check the value of the scale-related system parameter setting. Refer to "Scale Function" in user's manual-5 (Functions).

■ Alarm code E5_3 (System Parameter Error 1. Sub code 3)



Summary: EtherCAT communication cycle setting and scale function selection are not consistent.

Status at the time of alarm	Cause
	1
Issued after the control power was turned on.	✓
Issued during operation.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The EtherCAT communication cycle setting does not match the scale function selection.	When using the scale function, set the EtherCAT communication cycle to 250 μs or more.

User's Manual (Troubleshooting)

■ Alarm code E5_4 (System Parameter Error 1. Sub code 4)



Summary: Due to scale-related parameter settings and combination encoder specifications, the scale conversion factor inside the servo amplifier is out of the adaptive range.

Status at the time of alarm	Cause 1
Issued after the control power was turned on.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The scale conversion factor inside the servo amplifier is out of the adaptive range.	● Check the set value of the scale-related system parameter. ● Check the restrictions of the "scale function" in user's manual-5 (Functions).

■ Alarm code E5_5 (System Parameter Error 1. Sub code 5)



Summary: The conditions for using the pushing control function are not matched.

Status at the time of alarm	Cause 1
Issued after the control power was turned on.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The parameter that cannot be used during the pushing control function is set. (Pushing control combination error)	● When pushing control is used, set System1 ID00 "Amplifier control cycle setting" to "00:Standard_cycle". ● When pushing control is used, set System2 ID20 "Position loop control encoder selection" to "00:Motor_Enc". ● For the setting values when using the pushing control function, refer to "Pushing control function" in user's manual-5 (Functions).

■ Alarm code E5_6 (System Parameter Error 1. Sub code 6)



Summary: The conditions for using the encoder resolution shift function are conflicted.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Wrong combination of encoder resolution shift function settings.	- System2 ID2F “Encoder resolution shift selection” must be set correctly. - For the setting value when using the encoder resolution shift function, refer to the section “Encoder resolution shift function” in user's manual-5 (Functions).
2	Encoder resolution shift is set with an encoder that does not support encoder resolution shift.	The encoder resolution shift function cannot be used. Please set the set value of system2 ID2F “Encoder resolution shift selection” to “00: Standard”.

■ Alarm code E5_7 (System Parameter Error 1. Sub code 7)



Summary: The external encoder division number setting is incorrect.

Status at the time of alarm	Cause	
	1	
Issued when control power is turned ON.	✓	

◆ What to do

	Cause	Investigation and corrective actions
1	A value outside the setting range has been set for the external encoder division number.	Set system2 ID41 “External Encoder Resolution” to a value within the setting range that matches the encoder you are using.

User's Manual (Troubleshooting)

■ Alarm code E6_1 (System Parameter Error 2. Sub code 1)



Summary: Detects abnormal combinations of system parameter settings and amplifier model numbers (hardware).

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Motor combination error.	Set System2 ID00 "Motor structure selection" correctly.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	- Check the servo amplifier model number. - Set the motor parameters that match the servo amplifier capacity. - Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. - Replace the servo amplifier.

■ Alarm code E6_2 (System Parameter Error 2. Sub code 2)



Summary: The motor encoder selection setting is not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Motor encoder selection setting error.	Set System2 ID01 "Motor Encoder Input Selection" correctly.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	- Check the servo amplifier model number. - Set the motor parameters that match the servo amplifier capacity. - Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. - Replace the servo amplifier.

■ Alarm code E6_3 (System Parameter Error 2. Sub code 3)



Summary: The motor encoder combination is not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	X3 encoder type error.	● Set System2 ID06 "Encoder type code" correctly.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	● Check the servo amplifier model number. ● Set the motor parameters that match the servo amplifier capacity. ● Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. ● Replace the servo amplifier.

■ Alarm code E6_4 (System Parameter Error 2. Sub code 4)



Summary: The external encoder combination is not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	X4 encoder type error.	● Set System2 ID06 "Encoder type code" correctly.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	● Check the servo amplifier model number. ● Set the motor parameters that match the servo amplifier capacity. ● Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. ● Replace the servo amplifier.

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- Alarm code E6_5 (System Parameter Error 2. Sub code 5)



Summary: Wrong combination of amplifier capacity and motor.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Amplifier capacity error.	● Amplifier capacity code and motor code information do not match. Check the combination of motor parameters and servo amplifier.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	● Check the servo amplifier model number. ● Set the motor parameters that match the servo amplifier capacity. ● Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. ● Replace the servo amplifier.

- Alarm code E6_6 (System Parameter Error 2. Sub code 6)



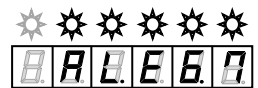
Summary: The power supply voltage selection combination is not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Power supply voltage error.	● Power supply voltage code and motor code information do not match. Check the combination of motor parameters and servo amplifier.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	● Check the servo amplifier model number. ● Set the motor parameters that match the servo amplifier capacity. ● Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. ● Replace the servo amplifier.

■ Alarm code E6_7 (System Parameter Error 2. Sub code 7)



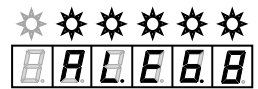
Summary: The motor encoder baud rate setting is not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Motor encoder baud rate error.	● Set System2 ID06 "Encoder type code" correctly.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	● Check the servo amplifier model number. ● Set the motor parameters that match the servo amplifier capacity. ● Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. ● Replace the servo amplifier.

■ Alarm code E6_8 (System Parameter Error 2. Sub code 8)



Summary: The external encoder baud rate setting is not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	External encoder baud rate error.	● Set System2 ID08 "External Encoder Type Code" correctly.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	● Check the servo amplifier model number. ● Set the motor parameters that match the servo amplifier capacity. ● Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. ● Replace the servo amplifier.

User's Manual (Troubleshooting)

- Alarm code E6_9 (System Parameter Error 2. Sub code 9)



Summary: Model control settings are not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Model control combination error.	When using model control, set System1 ID00 "Amplifier control cycle setting" to "00".
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	- Check the servo amplifier model number. - Set the motor parameters that match the servo amplifier capacity. - Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. - Replace the servo amplifier.

- Alarm code E6_A (System Parameter Error 2. Sub code A)



Summary: Position loop encoder selection is not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Position loop encoder selection error.	When using full-closed control, set System1 ID00 "Amplifier control cycle setting" to "00".
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	- Check the servo amplifier model number. - Set the motor parameters that match the servo amplifier capacity. - Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. - Replace the servo amplifier.

■ Alarm code E6_B (System Parameter Error 2. Sub code B)



Summary: The CS decision method setting is not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	CS decision selection error.	● Set System2 ID06 "Encoder type code" correctly.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	● Check the servo amplifier model number. ● Set the motor parameters that match the servo amplifier capacity. ● Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. ● Replace the servo amplifier.

■ Alarm code E6_C (System Parameter Error 2. Sub code C)



Summary: The selection of CS normalization method is not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	CS normalization selection error.	● Set System2 ID06 "Encoder Type Code" correctly.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	● Check the servo amplifier model number. ● Set the motor parameters that match the servo amplifier capacity. ● Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. ● Replace the servo amplifier.

User's Manual (Troubleshooting)

- Alarm code E6_D (System Parameter Error 2. Sub code D)



Sync system settings are not set correctly.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Sync system error.	- When using the tandem operation function, set the following system parameters. - Set the set value of System1 ID00 "Amplifier control cycle setting" to 00. - Set the set value of System1 ID06 "Control mode selection" to 02. - Set the set value of System1 ID07 "Position control function selection" within 00 to 02. - If the encoder type code, in the 10th digit of the model number, is 2, set the following system parameters. - Set System2 ID20 "Position loop control encoder selection" to 00.
2	Wrong combination of system parameter settings and actual hardware. Wrong combination of motor parameters and servo amplifier. Wrong combination of system parameter settings. Defect in internal circuit of servo amplifier.	- Check the servo amplifier model number. - Set the motor parameters that match the servo amplifier capacity. - Check and correct the system parameter settings. Turn on the control power again and confirm that there is no alarm. - Replace the servo amplifier.

■ Alarm code E7_1 (Motor Parameter Error. Sub code 1)



Summary: Checksums of motor parameters do not match.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Checksums of motor parameters do not match.	After resetting the motor parameters, reconnect the control power and if the alarm recurs, replace the servo amplifier.

■ Alarm code E7_2 (Motor Parameter Error. Sub code 2)



Summary: Checksums of motor parameter data do not match.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Writing the motor parameter list failed when using the uploader function of SANMOTION MOTOR SETUP SOFTWARE.	Write the motor parameter list again using the uploader function and reconnect the control power. If the alarm is still displayed after that, replace the servo amplifier.

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■ Alarm code E9_1 (Control Circuit Error 2. Sub code 1)



Summary: The hardware information code of the control circuit is incorrect.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Power board code error.	● Replace the servo amplifier.

■ Alarm code E9_2 (Control Circuit Error 2. Sub code 2)



Summary: Incremental encoder selection information on the control board cannot be read.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Incremental type selection code error.	● Replace the servo amplifier.

■ Alarm code E9_3 (Control Circuit Error 2. Sub code 3)



Summary: Encoder selection information on the control board cannot be read.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Encoder selection code error	● Replace the servo amplifier.

■ Alarm code E9_4 (Control Circuit Error 2. Sub code 4)



Summary: STO selection code cannot be read correctly.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	STO selection error	● Replace the servo amplifier.

✓ STO is an abbreviation for "Safe Torque Off".

■ Alarm code E9_5 (Control Circuit Error 2. Sub code 5)



Summary: The control board code cannot be read correctly.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Control board code error	● Replace the servo amplifier.

User's Manual (Troubleshooting)

■ Alarm code EA_0 (Memory Error 3)



Summary: Flash ROM device with built-in servo amplifier is abnormal.

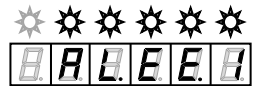
Status at the time of alarm	Cause
	1
Issued during display key operation or setup software operation.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

■ Alarm code EE_1

(Motor Parameter Automatic Setting Error 1. Sub code 1)



Summary: The automatic motor parameter setting function cannot be executed.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The servo amplifier of encoder type 2 (the 10th digit of the servo amplifier model number is 2) and the motor encoder input selection is set to X4.	Set System2 ID01 "Motor encoder input selection" to X3 and connect a servo motor equipped with an encoder that supports automatic setting to X3. For the servo amplifier model number, refer to "Servo Amplifier Model Number" in user's manual-1 (Introduction).

■ Alarm code EE_2

(Motor Parameter Automatic Setting Error 1. Sub code 2)



Summary: Automatic setting is made with an amplifier model number (encoder specification) for which automatic motor setting is not possible.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The servo amplifier of encoder type A (the 10th digit of the servo amplifier model number is A) is used.	Motor automatic setting cannot be used with your servo amplifier model number. Set the motor code to System2 ID05 "Motor Code Setting". For the servo amplifier model number, refer to "Servo Amplifier Model Number" in user's manual-1 (Introduction).

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■ Alarm code EE_3

(Motor Parameter Automatic Setting Error 1. Sub code 3)



Summary: The automatic setting identification code set in the encoder memory is incorrect.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The automatic setting identification code set for the connected encoder is incorrect.	Replace the servo motor with a servo motor equipped with an encoder that supports automatic setting.

■ Alarm code EE_4

(Motor Parameter Automatic Setting Error 1. Sub code 4)



Summary: The combination of encoder information and servo amplifier set in the encoder memory is incorrect.

Status at the time of alarm	Cause
	1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Encoder information is incorrect.	Replace the servo motor.
	Encoder information is not applicable.	Select a compatible encoder.

- Alarm code EF_1
(Motor Parameter Automatic Setting Error 2. Sub code 1)



Summary: Incorrect results for automatic motor parameter setting.

Status at the time of alarm	Cause 1
Issued when control power is turned ON.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Motor information is incorrect.	● Replace the servo motor.

- Alarm code EF_2
(Motor Parameter Automatic Setting Error 2. Sub code 2)



Summary: There is no applicable servo motor in the motor parameter list registered in the servo amplifier.

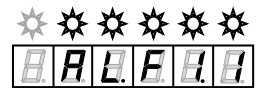
Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	The motor parameter list registered in the servo amplifier is not up to date.	● Make sure that the software version and module version of the servo amplifier are the latest versions in SANMOTION MOTOR SETUP SOFTWARE. ● If the software version and module version of the servo amplifier are not the latest versions, use the uploader function of SANMOTION MOTOR SETUP SOFTWARE to write the latest motor parameter list.
2	The servo motor does not support the automatic motor parameter setting function.	● Manually set the applicable motor parameters using the group-specific parameter setting function in SANMOTION MOTOR SETUP SOFTWARE. Refer to "Automatic Motor Parameter Setting Function Selection" and "Motor Code Setting" in user's manual-7 (Parameters).

User's Manual (Troubleshooting)

- Alarm code F1_1 (Task Process Error. Sub code 1)



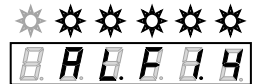
Summary: CPU1 processing cannot be executed normally.

- Alarm code F1_2 (Task Process Error. Sub code 2)



Summary: CPU2 processing cannot be executed normally.

- Alarm code F1_4 (Task Process Error. Sub code 4)



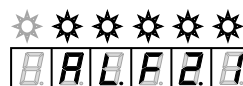
Summary: CPU2 processing cannot be executed normally.

Status at the time of alarm	Cause
	1
Issued during operation.	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Check the shielding of the encoder cable. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).
2	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.

- Alarm code F2_1 (Initialization Process Timeout. Sub code 1)



Summary: Initial processing is not completed within the specified time.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

- Alarm code F2_2 (Initialization Process Timeout. Sub code 2)



Summary: Initial setting of IC for control is not completed.

Status at the time of alarm	Cause	
	1	2
Issued when control power is turned ON.	✓	✓

◆ What to do

	Cause	Investigation and corrective actions
1	Defect in internal circuit of servo amplifier.	● Replace the servo amplifier.
2	Malfunction due to noise.	● Confirm proper grounding of the amplifier. ● Add ferrite core or similar countermeasures to against noise. Refer to "Noise Suppression" in user's manual-3 (Hardware).

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9.6 Warranty

9.6.1 Warranty contents

If the product fails or malfunctions during the warranty period due to our responsibility, the product will be repaired free of charge through the dealer from whom you purchased the product or through our service.

However, we will not be responsible for any on-site readjustment, test operation, etc. that accompanies the replacement of the product.

9.6.2 Warranty Period

The warranty period of the product is 12 months after delivery to the customer's designated location.

(However, this does not apply to cases where individual agreements have been made on delivery drawings, etc.).

The warranty period for repaired products is 12 months against a repaired point.

9.6.3 Warranty Coverage

- (1) The customer's condition of use, method of use, and operating environment shall be in accordance with the conditions and precautions described in the delivery drawings, manuals, and other documents.
- (2) Failure diagnosis should be performed by the customer. However, upon the customer's request, we can perform this work for a fee. In this case, if the cause of the failure is on our side, it will be free of charge.
- (3) Repair will be charged for the following cases even within the warranty period.

- Failures caused by improper storage/handling, carelessness, negligence, or other causes different from those described in the delivery drawings, manuals, etc., as well as failures caused by the customer's hardware or software design.
- Failure caused by modification of the product by the customer without our company consent.
- Failures that can be avoided if the customer's equipment is equipped with safety devices that comply with legal regulations or functions, structures, safety devices, etc. that are generally accepted in the industry when our company products are used in the customer's equipment.
- Failures that could have been prevented by normal maintenance, inspection, and replacement of consumable parts specified in the manuals, etc.
- Replacement of consumable parts (battery, cooling fan, oil seal, bearing, etc.)
- Failure due to natural disasters (earthquake, lightning, wind, flood, etc.)
- Failure caused by external factors such as fire or other man-made disasters.
- Other malfunctions for which we are not responsible or for which the customer acknowledges that we are not responsible.

9.6.4 Repair period for discontinued products

We will accept product repairs for a fee for a period of 6 years after the product is discontinued. Our sales staff will inform you of the discontinuation of production. However, we may discontinue repair services early if maintenance parts are no longer available or if equipment and jigs essential for production are compromised.

9.6.5 Product Applications and Conditions

- (1) When using our servo systems, it shall be limited to the use having no serious accident even if a failure or malfunction of the servo system should occur, and a backup or fail-safe function is systematically implemented outside the equipment in the event of a failure or malfunction.
- (2) When our servo systems are used in combination with other products, customers are requested to confirm the standards and regulations to which they must conform. Also, customers are requested to confirm the compatibility of our servo systems with the systems, machines, and equipment used by the customer. If not, we assume no responsibility for the compatibility of the servo system.
- (3) Our servo systems are designed and manufactured for use in general industrial equipment. They are not intended for use in environments subject to vibration, such as onboard vehicles and ships. If you intend to use our servo systems in the following applications, please contact us.
 - Equipment in medical institutions, etc., where effect to human lives.
 - Systems and equipment that may cause damage to human life, such as trains, elevators, etc.
 - Systems and equipment that have a significant social or public impact.
 - Special applications such as aerospace, nuclear power, electric power, and submarine relay equipment.

9.6.6 Changes to descriptions in catalogs and manuals

Please note that the contents of catalogs, manuals, etc. are subject to change without prior notice.

9.6.7 Limitation of Liability

- (1) In no event shall we be liable for any loss arising from reasons beyond its control.
- (2) In no event shall the Company be liable for lost opportunities and lost profits of customers caused by malfunction of the Company's servo system.
- (3) In no event shall we be liable for any damage, secondary damage, accident compensation, or damage to other than our products resulting from special circumstances, regardless of our foreknowledge.
- (4) We shall not be liable for costs incurred by the customer for replacement work, reconditioning of equipment, or other work.

User's Manual (Troubleshooting)

9.7 Inquiries about purchases and services

For inquiries about product purchase, repair and service, please contact us below.

<https://www.sanyodenki.com/>

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TEL: +49 6196 76 11 3 35

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TEL: +82 51 796 5151

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TEL: +86 28 8661 6901

TEL: +66 2261 8670

TEL: +91 44 420 384 72

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9.8 Trademark

All company and product names mentioned herein are trade names, trademarks or registered trademarks of their respective companies.

"SANMOTION" is a registered trademark of SANYO DENKI CO., LTD.

The information in this document is subject to change without notice.

9.9 Revision History

Edition	Revision Date	Changes
1 st edition (B)	Dec. 2022	■ Newly created
2 nd edition (C)	July 2023	■ p. 9-11 Correction and addition of terms. ■ p. 9-16 Added the connector name. ■ p. 9-21 ■ Cannot communicate with the servo amplifier using "SANMOTION MOTOR SETUP SOFTWARE". • Item 1, Assumed causes and corrective actions Added: Introduction of our website for downloading latest software. • Item 5, Assumed causes and corrective actions Added: Cable length regulation (3m) Added: Item 6 ■ The motor holding brake no longer works • Item 1, Assumed causes and corrective actions The order of confirmation was reversed. • Item 2, Assumed causes and corrective actions Reviewed contents. ■ p. 9-22 ■ The motor holding brake cannot be released. • Item 2, Assumed causes and corrective actions Reviewed contents. ■ p. 9-37 • Changed: rectifier element → rectifier circuit (rectifier element, fuse, and inrush prevention resistor) ■ p. 9-40, -41 • Changed: drive module → power device ■ p. 9-50, -51 • Changed: encoder cable → Ethernet cable ■ p. 9-62 ■ Alarm code 52_1: Order of what to do is reviewed. ■ Alarm code 52_2: Order of what to do is reviewed. ■ p. 9-63 ■ Alarm code 53_1: Order of what to do is reviewed. ■ Alarm code 53_2: Order of what to do is reviewed. ■ p. 9-64 ■ Alarm code 53_3: Order of what to do is reviewed. ■ p. 9-65 ■ Alarm code 54_1: Order of what to do is reviewed. ■ Alarm code 54_2: Order of what to do is reviewed. ■ p. 9-66 ■ Alarm code 54_3: Order of what to do is reviewed. Note is reviewed. ■ p. 9-97 ■ Alarm code C3_0: Summary is reviewed. ■ p. 9-98 ■ Alarm code D1_1 • Reviewed the status at the time of alarm. • Reviewed the investigation and corrective actions of item 3.

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Edition	Revision Date	Changes
2 nd edition (C)	July. 2023	■ p. 9-101 ■ Alarm code D3_2, Corrected: 29 bits or more → larger than 29 bits ■ p. 9-104 ■ Alarm code D5_0 • Reviewed: Summary, Status at the time of alarm, Item 2 ■ p. 9-106 ■ Alarm code D7_0 • Reviewed: Overall ■ p. 9-107 ■ Alarm code D8_0 • Reviewed: Status at the time of alarm ■ p. 9-108 ■ Alarm code D8_0 • Changed: Item 12, 2axes → Mating/own axes ■ p. 9-109 ■ Alarm code DE_0 • Moved: A part of contents of what to do → Summary ■ p. 9-112 ■ Alarm code E3_0, E4_0, E8_1 • Added: What to do ■ p. 9-113 ■ Alarm code E5_1 • Added: What to do ■ p. 9-115 ■ Alarm code E5_5 • Reviewed: What to do ■ p. 9-116 ■ Alarm code E6_1, E6_2: Order of what to do is reviewed. ■ p. 9-117 ■ Alarm code E6_3, E6_4: Order of what to do is reviewed. ■ p. 9-118 ■ Alarm code E6_5, E6_6: Order of what to do is reviewed. ■ p. 9-119 ■ Alarm code E6_7, E6_8: Order of what to do is reviewed. ■ p. 9-120 ■ Alarm code E6_9, E6_A: Order of what to do is reviewed. ■ p. 9-121 ■ Alarm code E6_B, E6_C: Order of what to do is reviewed. ■ p. 9-122 ■ Alarm code E6_D: Order of what to do is reviewed. Note is reviewed. ■ p. 9-123 ■ Alarm code E7_2: Contents of what to do is reviewed. ■ p. 9-127 ■ Alarm code EE_2, _2: Contents of cause is reviewed.

Edition	Revision Date	Changes
2 nd edition (C)	July.2023	■ p. 9-130 ■ Alarm code EF_2: Summary/Cause/What to do are reviewed. ■ p. 9-131 ■ Alarm code F2_2: Contents of summary is reviewed. ■ Overall - Terms have been unified. • Positive overtravel (F-OT), Negative overtravel (R-OT) • fan, fan motor → cooling fan Etc.
3 rd edition (D)	Nov.2023	■ Safety Precautions - Reviewed contents. ■ p. 9-41 - Corrected and added sub codes. ■ p. 9-61 ■ Alarm code 44_1/control loop method was added. ■ p. 9-62 - Alarm code 44_2 was added. ■ p. 9-85 to 9-92 - Revised note for battery-less encoders. ■ p. 9-99, 9-100 - Alarm code D1_1/Status was added during detection of magnetic pole position, and the order of what to do was replaced. ■ p. 9-110 - Reviewed status/what to do of alarm code DE. ■ p. 9-113 - Reviewed what to do/investigation and corrective actions of alarm code E4_0. ■ p. 9-131 - Reviewed what to do for alarm code F1_1 and F1_2. - Alarm code F1_4 was added.

User's Manual (Troubleshooting)

Edition	Revision Date	Changes
4 th edition (E)	Sep. 2024	■ p. 9-15 Description of "POWER: Control power establishment LED (blue) is on, 7-segment LED is off" added. ■ p. 9-26 "Temperature sensor failure" was added to the amplifier temperature warning. ■ p. 9-40, 9-54 to 9-57 Added contents for ALM21 subcodes 1, 2, 3, and 4. ■ p. 9-41, 9-75 to 9-77 Alarm code 59 added. ■ p. 9-63, P9-73 Added note for use of 75A or higher. ■ p. 9-67 Added note on discharge operation. ■ p. 9-73 ■ Alarm code 56_0 Sub code 0 → 1 ■ Alarm code 56_2 added.
5 th edition (F)	Dec. 2024	■ p. 9-48 Action at detection and Alarm reset are noted to Alarm code: EF and Sub code: 2.
6 th edition (G)	Aug. 2025	■ Overall 2-axis integrated AC servo amplifier has been added. 48 VDC power supply input type has been added. ■ 9.5.1 Added subcodes 6 and 7 for alarm code E5 in alarm list. ■ 9.5.3 Subcode 7 has been added to alarm code E5 at What to do when warnings occur (9). ■ 9.5.3 For Alarm Code 44_1 (Magnetic Pole Position Estimation Error Subcode 1) at What to do when warnings occur (3). • The content of What to do has been revised. • The time required for detecting the magnetic pole position has been added. ■ 9.5.3 For Alarm Code D1_1 (Position Deviation Excess Subcode 1) at What to do when warnings occur (8). • The explanation has been revised.

Edition	Revision Date	Changes
7 th edition (H)	Jun. 2026	■ Safety Precautions/Installation/Notice The following has been added. Do not use in environments exposed to corrosive gases or liquids. Damage to this product could otherwise result. ■ 9.5.1 Reviewed alarm contents. • Load Related Error • Encoder Wiring Related Error • Power Supply Related Error Changed the note at the end of this section. ■ 9.5.3(4) Updated the description for alarm code 6A_0. ■ 9.6.4 Repair period after discontinuation has been revised from 7 years to 6 years.



■ ECO PRODUCTS

Eco Products are eco-friendly products designed to reduce the environmental impact of the product and its packaging materials compared to conventional products on the market. Our products are assessed over the product's life cycle against our own eco-design requirements including product size, weight, power consumption, and CO₂ emissions, and those meeting our standards and higher standards qualify as Eco Products and Eco Products Plus, respectively.

■ Precautions For Adoption

Failure to follow the precautions on the right may cause moderate injury and property damage, or in some circumstances, could lead to a serious accident.

Always follow all listed precautions.



Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The Products presented in this Instruction Manual are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

* For any question or inquiry regarding the above, contact our Sales Department.

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