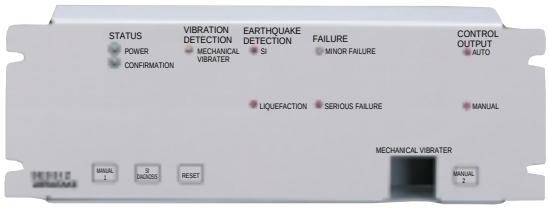
Automatic Shut-down Control Unit SES51Z21 User's Manual



Thank you for purchasing the Automatic Shut-down Control Unit SES51Z21.
This manual contains information for ensuring correct use of the SES51Z21. It also provides necessary information for installation, maintenance, and troubleshooting.
This manual should be read by those who design and maintain devices that use the SES51Z21.
Be sure to keep this manual nearby for handy reference.
For details, refer to the product specification AD13269E.

RESTRICTIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment.
Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

REQUEST

Ensure that this User's Manual is handed over to the user before the product is used.
Copying or duplicating this User's Manual in part or in whole is forbidden. The information and specifications in this User's Manual are subject to change without notice.
Considerable effort has been made to ensure that this User's Manual is free from inaccuracies and omissions.
If you should find any inaccuracies or omissions, please contact Yamatake Corporation.
In no event is Yamatake Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

SES ® is a registered trademark of Yamatake Corporation.

SAFETY PRECAUTIONS

Safety precautions are for ensuring safe and correct use of this product, and for preventing injury to the operator and other people or damage to property. You must observe these safety precautions. Also, be sure to read and understand the contents of this user's manual.

⚠ WARNING — Warnings are indicated when mishandling this product might result in death or serious injury to the user.

⚠ CAUTION — Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to this product.

⚠ WARNING

- Always turn OFF the power completely before starting the wiring work. Failure to do so might cause electrical shock.
- Never attempt to disassemble or modify this unit.

⚠ CAUTION

- Only authorized engineers who have proper knowledge and technical skill about the equipment and this unit are allowed to carry out the installation, wiring, inspection, and maintenance work.
- Any lightening preventive measures are not taken for this unit. When necessary, take appropriate lightening preventive measures on the measuring instrument side.
- Do not use a transceiver within 2 m of this unit and cables connected to this unit. Doing so might cause this unit to malfunction.
- Always carry out the wiring work properly. Incorrect wiring may cause this unit to malfunction.
- If this unit malfunctions, the electrical output may not respond correctly. If the safety of the equipment cannot be ensured, appropriate failsafe design or redundancy design, such as classification of the controller and limit or dual safety measures must be taken.

Unpacking

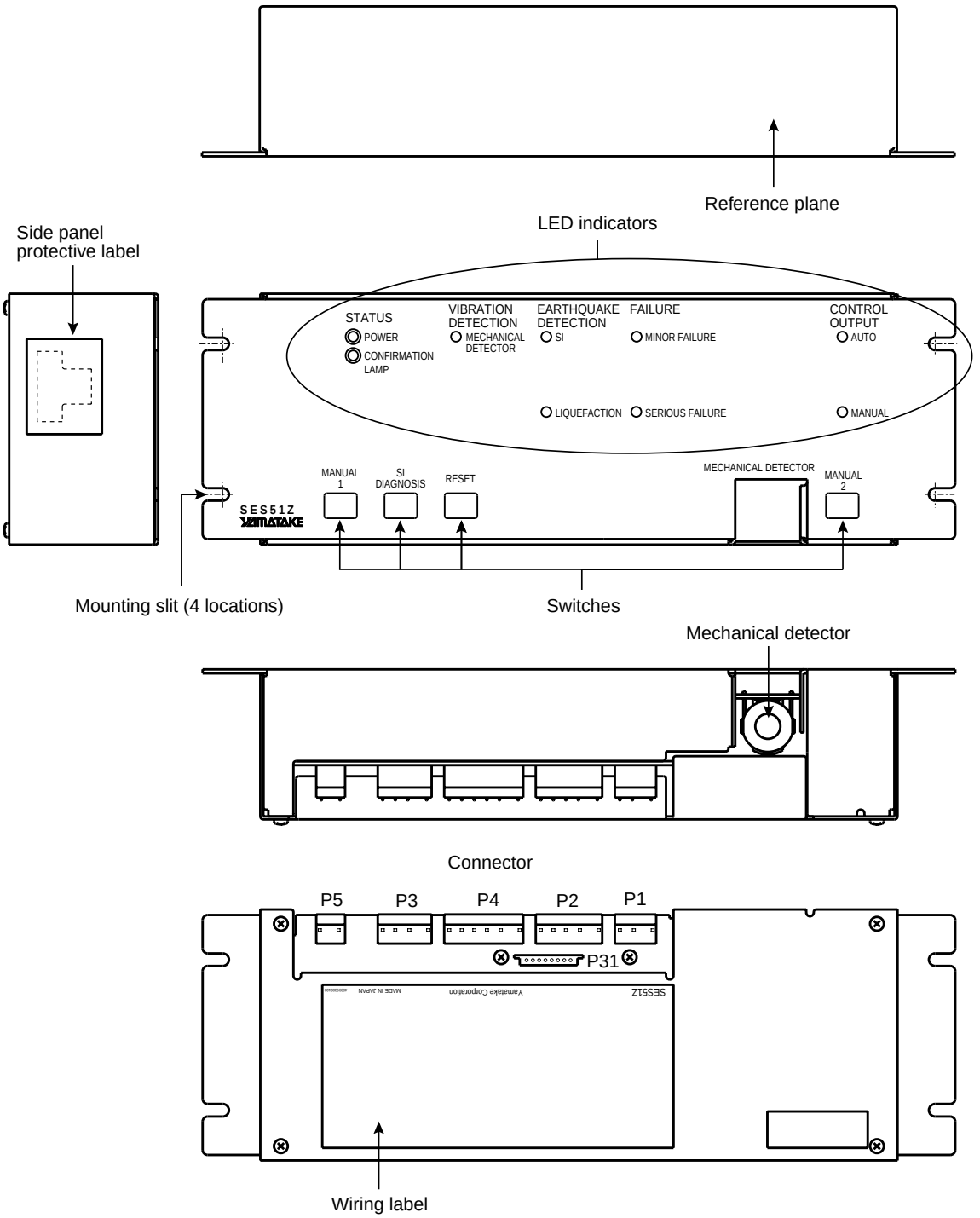
The package of this control unit model SES51Z21 contains the following items:

Name		Q'ty	Remarks
Main body	(Model No.: SES51Z21000)	1	
Label	(Side panel protective label)	1	(This model does not use any protective label.)
User's Manual	(Manual No.: CP-UM-5209E)	1	(This manual)

1. Overview

This automatic shut-down control unit model SES51Z21 is so designed that it is combined with Yamatake's intelligent earthquake sensor to operate the control output if an earthquake occurs. The control output is automatically turned ON if both the SI vibration detection output of the earthquake sensor and the mechanical detector (mechanical vibration detector) of the model SES51Z21 are turned ON at the same time. Additionally, this automatic shut-down control unit also has several functions, such as indication of the intelligent earthquake sensor status, monitor output, and switch for diagnosis output.

2. Part names



● LED indicators

"PX-X" stated in the table shows the connector No. and pin No.
For example, "P5-1" shows pin No. 1 of the connector P5.

Indicator name		LED indication color	Function
STATUS	POWER *	Green	Used to check the power failure status. When the electric power is supplied to the power connector P1-1, 2, the POWER LED is lit and the power monitor output P31-6 is turned ON.
	CONFIR-MATION LAMP	Green	Used to check the status change that may affect the control output operation. If the status is changed to that other than the minor failure flashing input status, the CONFIRMATION LED goes off and the confirmation outputs P5-1, 2, and confirmation monitor output P4-4 are turned OFF.
VIBRATION DETECTION	MECHANICAL DETECTOR	Orange	Used to check the vibration detection status of the mechanical detector. If the mechanical detector (mechanical vibration detector) detects any vibration, the MECHANICAL DETECTOR LED is lit and the mechanical vibrator monitor output P31-5 is turned ON.
EARTH-QUAKE DETECTION	SI	Red	Used to check the SI vibration detection output status of the intelligent earthquake sensor. When the SI vibration detection input P2-2 is turned ON, the SI LED is lit, and the SI vibration detection or serious failure monitor output P4-2 and the SI vibration detection monitor output P4-6 are turned ON.
	LIQUEFACTION	Red	Used to check the liquefaction output status of the intelligent earthquake sensor. When the liquefaction input P2-1 is turned ON, the LIQUEFACTION LED is lit and the liquefaction monitor output P4-1 is turned ON. Additionally, since the liquefaction input signal is latched inside the unit, the ON status is kept until the RESET switch is pressed.
FAILURE	MINOR FAILURE	Orange	Used to check the minor failure output status of the intelligent earthquake sensor. When the minor failure input P2-4 is turned ON, the MINOR FAILURE LED is lit and the minor failure monitor output P31-4 is turned ON. Additionally, when the MINOR FAILURE LED is flashing, the minor failure flashing monitor output P31-3 is turned ON.
	SERIOUS FAILURE	Red	Used to check the serious failure output status of the intelligent earthquake sensor. When the serious failure input P2-3 is turned ON, the SERIOUS FAILURE LED is lit, and the SI vibration detection or serious failure monitor output P4-2, and the serious failure monitor output P4-5 and serious failure status monitor output P31-8 are turned ON. Additionally, since the serious failure signal other than the status monitor signal is latched inside the unit, the ON status is kept until the RESET switch is pressed.
CONTROL OUTPUT	AUTO	Red	Used to check the operation of the automatic control output. When both the mechanical vibrator and SI vibration detection input P2-2 are turned ON at the same time, the AUTO LED is lit and the control outputs P3-1, 2 and P3-3, 4, control output monitor P4-3, automatic shut-down monitor output P31-1, and control output status monitor output P31-7 are turned ON. Additionally, since a signal other than the control output and status monitor signals is latched inside the unit, the ON status is kept until the RESET switch is pressed.
	MANUAL	Red	Used to check the operation of the manual control output. When both the MANUAL 1 and MANUAL 2 switches are pressed at the same time, the MANUAL LED is lit and the control outputs P3-1,2 and P3-3,4, control output monitor P4-3, manual shut-down monitor output P31-2, and control output status output P31-7 are turned ON. Additionally, since a signal other than the control output and status monitor signals is latched inside the unit, the ON status is kept until the RESET switch is pressed.

* The POWER LED may be lit and the power monitor output may be turned ON at a voltage beyond the rated voltage range. In this case, the unit may not function correctly. Therefore, always observe the rated power voltage range strictly.

● Switches

Switch name	Function
MANUAL 1	Used to operate the manual control output. When pressing both the MANUAL 1 and MANUAL 2 switches at the same time, the manual control output is then output. (Refer to the description of the MANUAL indicator.)
SI DIAGNOSIS	Used to request the transition to the maintenance mode of the intelligent earthquake sensor. When pressing the SI DIAGNOSIS switch, the earthquake sensor diagnosis output P2-5 is turned ON. After that, it is possible to transit the mode of the earthquake sensor to the maintenance mode or to complete the operation.
RESET	Used to reset the latch status. When pressing the RESET switch, the latch status of the liquefaction, serious failure, and control output (auto/manual) are then reset. (Refer to the description of the LIQUEFACTION, SERIOUS FAILURE, AUTO, and MANUAL indicators.)
MANUAL 2	Used to operate the manual control output. When pressing both the MANUAL 1 and MANUAL 2 switches at the same time, the manual control output is issued. (Refer to the description of the MANUAL indicator.)

For details about operation, refer to the product specification AD13269E.

3. Installation and wiring

⚠ WARNING

- Always turn OFF the power completely before starting the wiring work. Failure to do so might cause electrical shock.

⚠ CAUTION

- Any lightening preventive measures are not taken for this unit. When necessary, take appropriate lightening preventive measures on the measuring instrument side.
- Do not use a transceiver within 2 m of this unit and cables connected to this unit. Doing so might cause this unit to malfunction.
- Always carry out the wiring work properly. Incorrect wiring may cause this unit to malfunction.

■ Installation place

When installing this unit, do not install it in following places where:

- Ambient temperature is beyond a range of –10 to +60°C.
- Ambient humidity exceeds 90%RH.
- Temperature changes rapidly and dew condensation may occur.
- Corrosive gas or flammable gas exists.
- A large amount of conductive material, such as dust, salt content, or iron particle, or organic solvent exists.
- Any impact or vibration other than the vibration caused by the earthquake is directly applied to the main body.
- Earthquake vibration cannot be measured correctly (place where any resonance occurs).
- It is exposed to the direct sunlight.
- Water or rain splashes onto it.
- Oil or chemical splashes onto it.
- Strong magnetic field or electric field is produced.

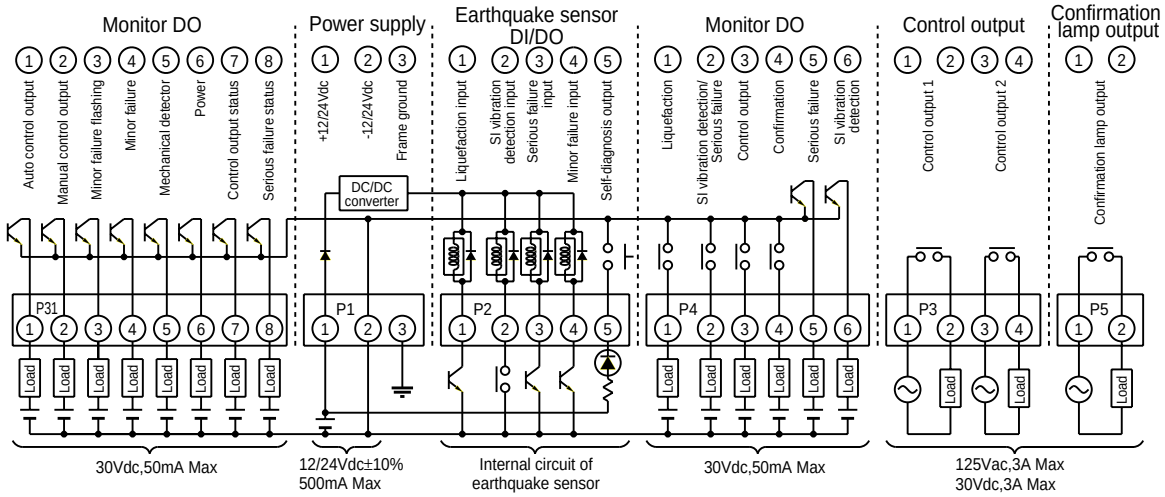
■ Wiring and mounting

(1) Connect the cables using the following connection connectors:

SES51Z21 connector			Connection connector		
Connector No.	Number of poles	Model No.	Model No.	Terminal	Manufacturer
P1	3	5289-3A	5199-3	5194(AWG#18–24)	Molex Japan
P2	5	5289-5A	5199-5	5194(AWG#18–24)	
P3	4	5289-4A	5199-4		
P4	6	5289-6A	5199-6		
P5	2	5289-2A	5199-2		
P31	8	HNC2-2.5P-8DS(02)	HNC2-2.5S-8	HNC-2.5S-D-A(AWG#22–26) HNC-2.5S-D-B(AWG#26–30)	Hirose Electric

(2) Tighten the screws at four mounting slits to fix the unit.

(3) Place a level on the reference plane to check that the levelness is ±5° or less.
Check the leveled surface in all directions (360°).
If a level cannot be placed on the reference plane, check the levelness on the front using a metallic plate.



Wiring diagram

! Handling Precautions

- If the levelness of the reference plane is beyond a range of ±5° or less, the mechanical detector may not function correctly.
- Keep the wiring cables away from the cables connected to the commercial power supply or motor drive power supply that may cause noise.
- Connect the wires and cables properly while referring to the wiring diagram.
- Carry out the grounding construction work grade D or higher (grounding resistance: 100Ω or less).
- If any power surge is produced by lightning, use Yamatake's FA SURGENON, an induced lightening surge preventive device (model No.: QN430 series).
  Make the distance of the wiring between this unit and SURGENON as short as possible.
  For details about wiring, refer to the User's Manual for FA SURGENON QN430, CP-UM-1192E.

4. Start-up check

(1) Turn ON the power and make sure that the POWER LED is lit.

(2) Press the RESET switch to initialize the unit and make sure that CONFIRMATION LAMP is lit.

! Handling Precautions

If the CONFIRMATION LAMP is off and other Lamps are on, check the input/output operation. However, the MINOR FAILURE LAMP flashes for approximately 30 sec. when the intelligent earthquake sensor is in the initialize mode.

(3) Move the mechanical detector by finger to make sure that the MECHANICAL DETECTOR lamp is lit.

(4) Press both the MANUAL 1 and MANUAL 2 switches at the same time to make sure that the manual control output is operated.

(5) Press the SI DIAGNOSIS switch to put the earthquake sensor in the maintenance mode, and then make sure that the operation, such as auto control output and the wiring are correct.
For details about sequence operation in the maintenance mode, refer to the User's Manual for Intelligent Earthquake Sensor SES55, "Design", CP-SP-1105E.

5. Maintenance and troubleshooting

■ Maintenance

Check the following items periodically:

- Check that the indication and output status are correct.
- Check the case, decoration sheet, and mechanical detector for damage.
- Check that the levelness of the reference plane is not beyond a range of ±5°.
- Check the contents described in previous section 4, Start-up check.

■ Troubleshooting

If this unit does not function or its operation is faulty, check the following items:

- Check for loose or faulty wiring.
- Check that the power voltage and load resistance are correct.
- Check if any failure is output.
  If any failure is output, connect the loader to the intelligent earthquake sensor to check the detailed information about error.
  For details about how to take the corrective actions, refer to the User's Manual for intelligent earthquake sensor SES55, "Design", CP-SP-1105E.

6. Specifications

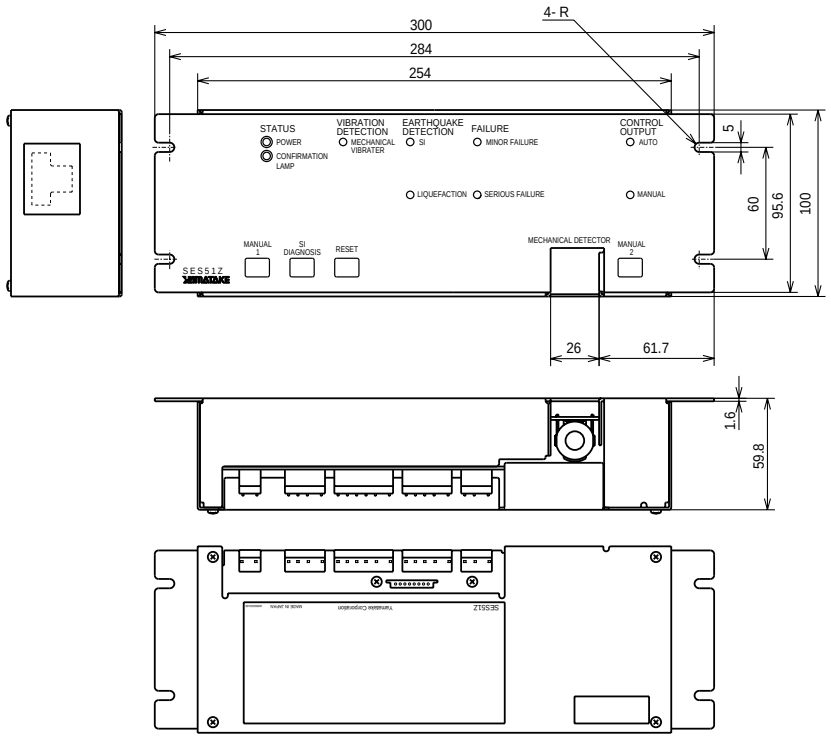
■ Specifications

Item		Contents
Electrical specifications	Rated voltage	12Vdc ±10%/24Vdc ±10%
	Consumption current (at power voltage of 12Vdc)	Normal operation *1: 250mA or less Heavy load operation *2: 500mA or less
	Consumption current (at power voltage of 24Vdc)	Normal operation *1: 150mA or less Heavy load operation *2: 300mA or less
	Relay output	Max. 3A at 30Vdc or Max. 3A at 125Vac (P3, P5)
	Monitor output	NPN open collector, Max. 50mA at 30Vdc (P4-5, 6, P31) Contact output, Negative power common, Max. 50mA at 30Vdc (P4-1, 2, 3, 4)
	Earthquake sensor input/output	Special signals for Yamatake's intelligent earthquake sensor
	Dielectric strength	Relay output (P3, P5), 1500Vac for 1 min. Other parts, 500Vac for 1 min.
	Insulation resistance	50 MΩ or more (To be measured by 500Vdc Megger)
	Mechanical vibrator	90 to 170 Gal (Horizontal continuous vibration input at intervals of 0.3, 0.5, and 0.7 sec.)
Mechanical specifications	Material	Case/Cover: Galvanized steel plate
	Allowable mounting angle	Mounting level: ±5° or less
	Mass	1.2kg
Environmental specifications	Operating temperature	Ambient temperature: -10 to +60°C (No condensation allowed)
	Storage temperature	-10 to +70°C
	Operating humidity	90%RH or less at 40°C (No condensation allowed)
	Vibration resistance *3	490 cm/s^2 (0.5G) or less
	Shock resistance *3	29400 cm/s^2 (30G) or less
Accessories	Side panel protective label	For repapering (This model does not use any protective label.)
	User's Manual	Manual No.: CP-UM-5209E (This manual)

*1 All input signals are OFF.
*2 Serious failure, Minor failure, and RESET switch are ON.
*3 Nondestructive conditions. If any vibration or impact is applied, the correct operation is not guaranteed.

■ External dimensions

Unit: mm



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