TSUBAKI

EHESS.0611

SHOCK RELAY
TSBSS Series
INSTRUCTION MANUAL

WARNING

1. Make sure you read this instruction manual thoroughly before installing, wiring, operation and inspecting this SHOCK RELAY.
2. Please make sure that this instruction manual accompanies the SHOCK RELAY to the end user.
3. Product specification are subject to change for improvement without notice.
4. Disconnect power. Always lock out power switch before installing, removing, or servicing unit. Comply with Occupational Safety and Health Standards 1910. 147 “The Control of Hazardous Energy (Lock Out/Tag Out).”
5. Install in proper enclosure in accordance with NEMA 250-1991 “Enclosures for Electrical Equipment (1000Volts Maximum)” and NFPA496 1993 edition “Purged and Pressurized Enclosures for Electrical Equipment, 1993 Edition.” When revisions of these standards are published, the updated edition shall apply.
6. Guards must be provided on all power transmission and conveyor applications in accordance with provisions of ASME B15.1-1996 “Safety Standards for Conveyors and Related Equipment, or other applicable standards. When revision of these standards are published, the updated edition shall apply.

CAUTION

- If danger is expected from your application, take the necessary steps to ensure that it operates safely.
- If your Tsubaki Emerson product does not operate normally, take care to ensure that dangerous operating conditions do not occur.
- Wear suitable clothing and protective equipment (safety glasses, gloves, safety shoes, etc.)
- Keep your work place tidy and safe to prevent accidents.

TSUBAKI EMERSON CO.

2011. 7. 20

1. Preface

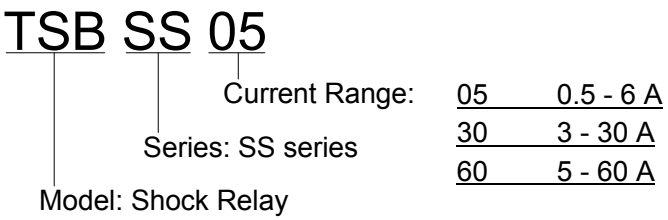
Thank you for purchasing the Shock Relay TSBSS series.

This instruction manual describes everything from installation to adjustment.

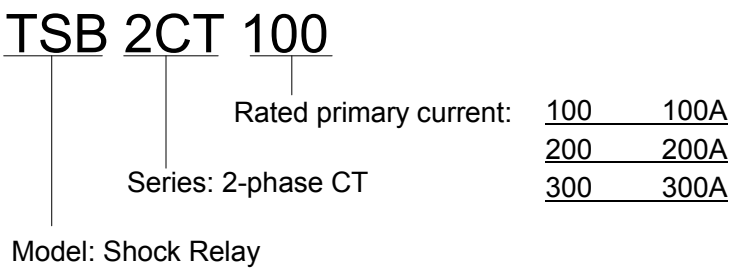
Be sure to read this manual carefully before using your Shock Relay.
When delivering a device containing the Shock Relay, be sure that this instruction manual is included.

2. TSBSS and TSB2CT Model identification

・Shock relay

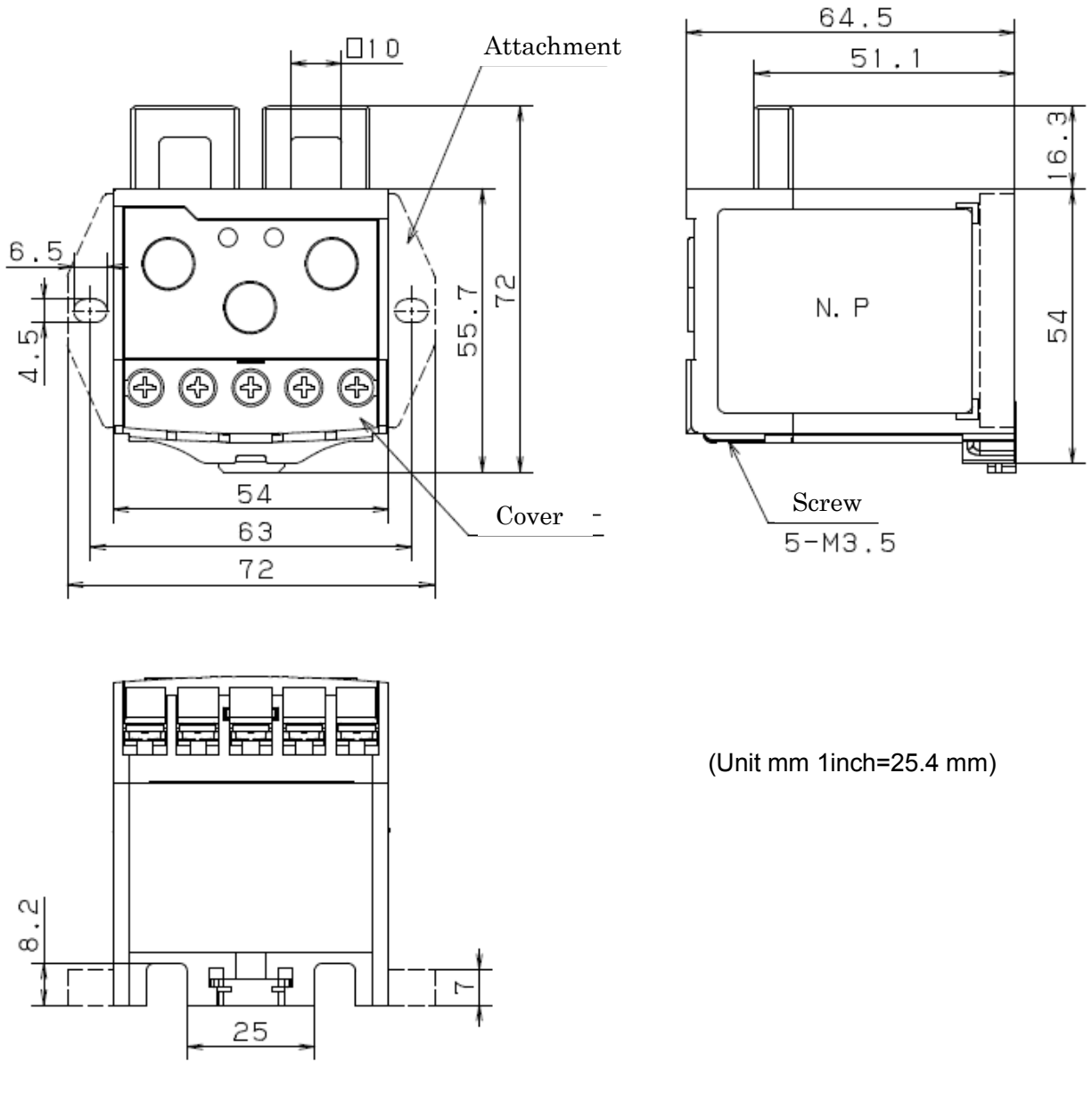


・External 2-phase CT



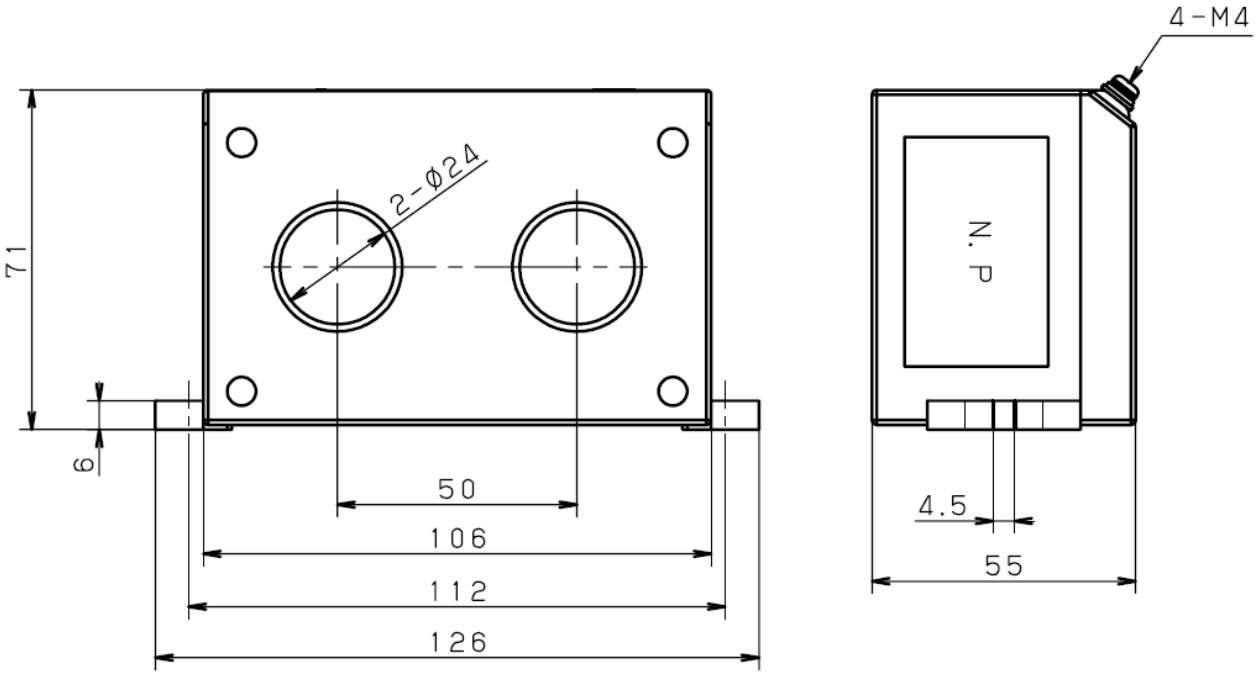
3. Dimensions

・ Shock relay

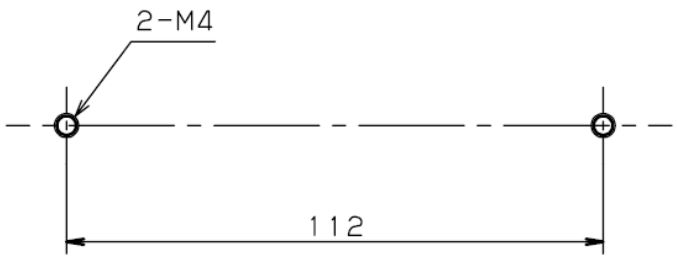


(Unit mm 1inch=25.4 mm)

• External 2-phase CT



Details for installation holes



4. Specifications

Series			TSB SS
Current Setting *1		Model	Range
		05	0.5-6A
		30	3-30A
		60	5-60A
Time Setting *1	Starting Trip Delay	Start Time	0.2-30s
	Trip Time	Shock Time	0.2-10s
Accuracy		Current	±10% (Full scale)
Control Power Supply			100～240VAC±10%, 50/60Hz
Maximum motor voltage			600VAC, 50/60Hz *2
Current Sensing method			2 Integral Current Transformer
Output Relay	Mode		1-SPDT(1c)
	Contact Rating (max.)		3A / 240VAC cos ϕ =1
	Contact Rating (min.) *3		10VDC 10mA
	Operation		Fail safe operation,Normally energized
	Reset		Manual or Electrical (Interrupt power supply)
	Expected Life		100,000 operations
Ambient Environment	Temperature	Operating	-20 - +60℃ (-4 - +158 F)
		Storage	-30 - +70℃ (-22 - +176 F)
	Humidity		45 – 85% RH without Condensation
	Altitude		2,000m max.
	Pollution degree		Class 3 To be free from dust and corrosive gas
	Vibration		5.9 m/s^2 or less.
Insulation	Between casing and circuit		Over 10MΩ with 500 VDC Megger
Dielectric Strength	Between casing and circuit		AC 2000V, 60Hz, 1min
	Between contacts		AC 1000V, 60Hz, 1min
	Between circuits and contacts		AC 2000V, 60Hz, 1min
Protection Structure			IP20
Power Consumption		115VAC	2.7 VA(0.35W)
		230VAC	11.0 VA(1.2W)
Material	Case		Polyamide 66 (PA66)
	Terminal cover		Polyamide 6 (PA6)
Mounting			35mm DIN rail or Panel
Dimension(W x H x D /Including Integral CT Windows)			54 x 72 x 64.5 mm
Weight			Less than 200g (0.44LBS) without External CT

*1 Current and time setting ranges can be set within the warranty range, but not the upper or lower level of setting volume.

*2 When Shock Relay is used with Inverter, the output frequency of Inverter should be from 30Hz to 60Hz.

*3 When directly inputting output relay contact into the programmable controller (PLC), be aware that a minute electric current can cause contact failure. As for the input to PLC, it is commended to drive the relay coil for minute current by relay signal of Shock Relay at first, then input this relay contact to PLC.

*4 CE marking

EMC Directive 03.05.1989 Low Voltage Directive 19.02.1973

EN60947-1 1994 EN50081-2 1993 EN55011 1991

EN50082-2 1995 EN61000-4-2 1995 (□4kV)

5. Installation

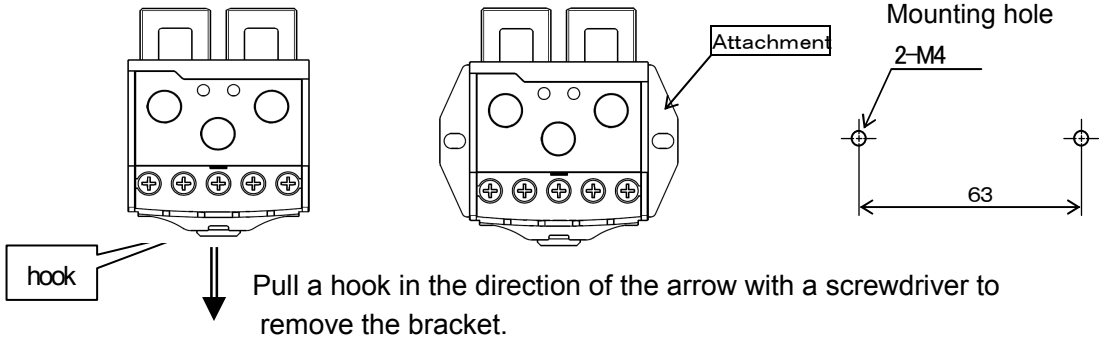
1. Environmental specifications

Install the Shock Relay in the following environment.

- Temperature: －20 to ＋60℃ not in direct sunlight.
- Humidity：45～85% relative humidity without condensation and freezing.
- Place：Indoors, no water splash.
- Atmosphere：Free from dust, corrosion gas, and oil mist.
- Height: 2000m or less above sea level.
- Vibration: 5.9m/s^2 and under.

2. Installation to the panel

Put the Attachment for installation at the both side or Shock Relay, and install Shock Relay to the panel



Pull a hook in the direction of the arrow with a screwdriver to remove the bracket.

3. Installation to the DIN rail

While pulling the hook of Shock Relay to the arrow direction, install Shock Relay to 35mm DIN rail. When removal, put the hook to the arrow direction with flathead screwdriver.

6. Wiring

(1) Connect 100－240VAC power source to the terminal L1- L2.

Never connect the output of an inverter or a servo driver to terminals L1-L2. Install an insulation transformer between the power line and terminals L1-L2 of the SHOCK RELAY when harmonic noise is included in the power line.

(2) Check and correct the following items before turning the power on.

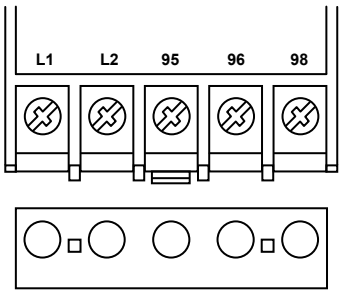
a. Is there any misconnection?

b. Have you forgotten to complete any connections?

c. Are there any abnormal conditions such as a short-circuit or ground fault?

WARNING	**ELECTRICAL SHOCK AND BURN** Do not operate without the ground wire connected.

7. Terminal Function



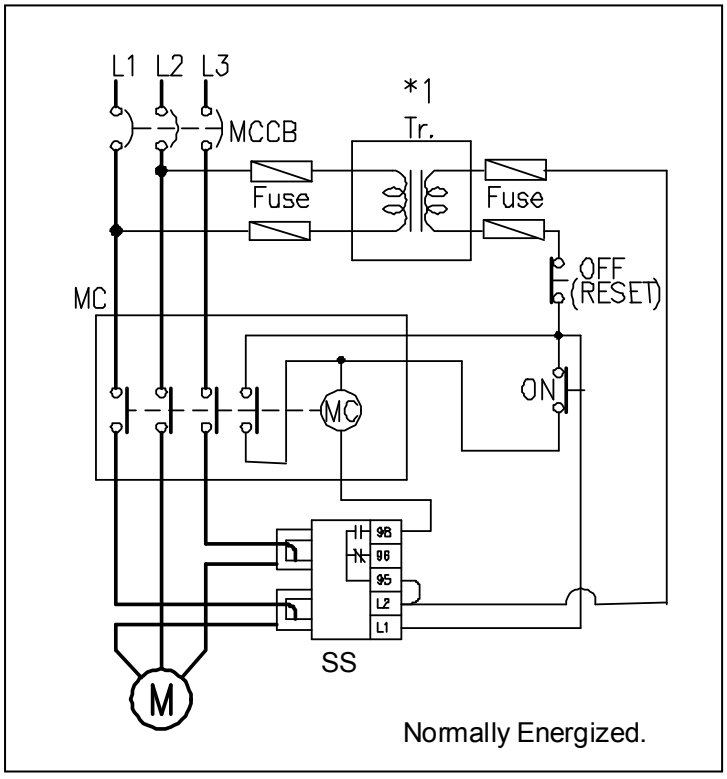
Terminal	Function	Contents.
L1	Power Supply	100 – 240VAC commercial power supply is wired
L2		
95	Output Relay	Common
96		Normally close (Power on : open Power off or tripped: close)
98		Normally open (Power on : close Power off or tripped: open)

8. Current Transformer

Select the number of wires passing through the CT (Current Transformer) by using the following table for best performance. When two motor leads pass through the CT, the current sensed by the CT is twice the motor current flowing through the motor lead.

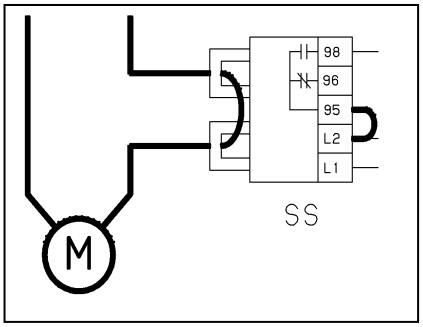
AC 200 ~ 230 Volt Motor				AC 400 ~ 460 Volt Motor			
Motor Capacity (kW)	Motor Capacity (Hp)	TSBSS TYPE	Wires passing through CT	Motor Capacity (kW)	Motor Capacity (Hp)	TSBSS TYPE	Wires passing through CT
0.1	1/8	TSBSS05	4	—	—	—	—
0.2	1/4	TSBSS05	3	0.2	1/4	TSBSS05	4
0.4	1/2	TSBSS05	2	0.4	1/2	TSBSS05	3
0.75	1	TSBSS05	1	0.75	1	TSBSS05	2
1.5	2	TSBSS30	3	1.5	2	TSBSS05	1
2.2	3	TSBSS30	2	2.2	3	TSBSS05	1
3.7	5	TSBSS30	1	3.7	5	TSBSS30	3
5.5	7-1/2	TSBSS30	1	5.5	7-1/2	TSBSS30	2
7.5	10	TSBSS60	1	7.5	10	TSBSS30	1
11	15	TSBSS60	1	11	15	TSBSS30	1
—	—	—	—	15	20	TSBSS60	1
—	—	—	—	18.5	25	TSBSS60	1
—	—	—	—	22	30	TSBSS60	1

Basic wiring diagram



M : THREE-PHASE MOTOR
MC : Magnetic contactor
ON : Start switch
OFF : Stop switch
Fuse : Fuse
Tr : Transformer

1. A transformer may be required, depending on the voltage of Motor (i.e. over 240VAC)
2. Output relay is normally energized when there is power to the Shock Relay. When Shock Relay trips, the contacts change state.
3. Two of three phases of the motor are passed through the Shock Relay's CT in the same direction.
4. A fire might be happened as there is no protection circuit in main circuit.
5. Please select a fuse capacity depending upon capacity of a contactor MC to be connected.



M: SINGLE-PHASE MOTOR

9. TSB2CT（External 2-phase CT）

・Specifications

Model No.	TSB2CT100	TSB2CT200	TSB2CT300
Class	3		
Rated primary current	100A	200A	300A
Rated secondary current	5A		
Rated burden	5VA		
Rated frequency	50/60Hz		
Approximately weight	0.5kg		

・Installation

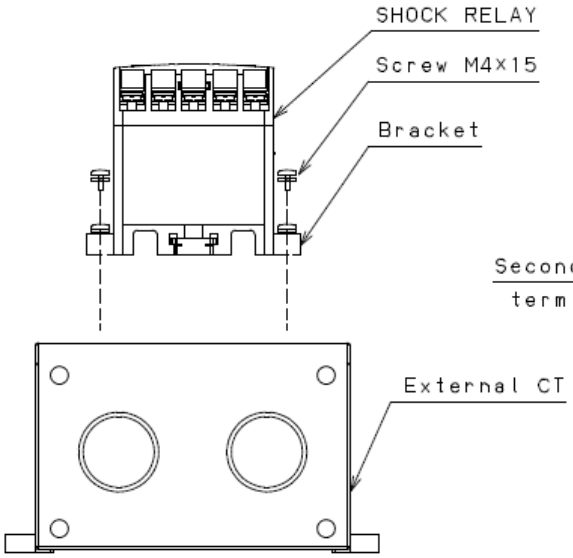


Figure 1

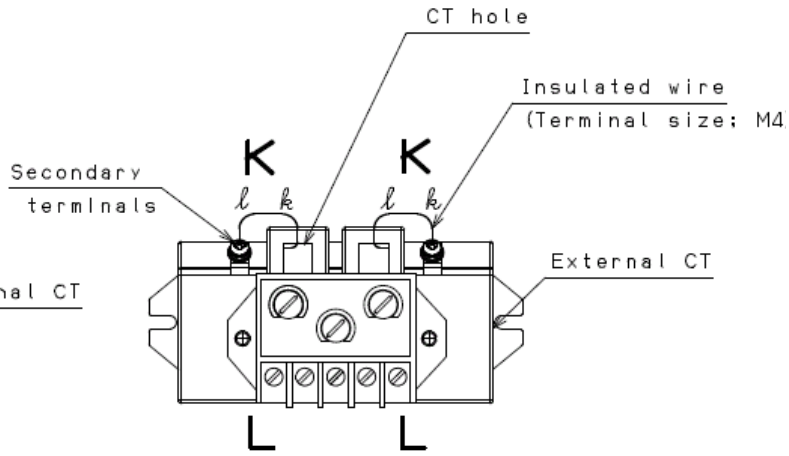
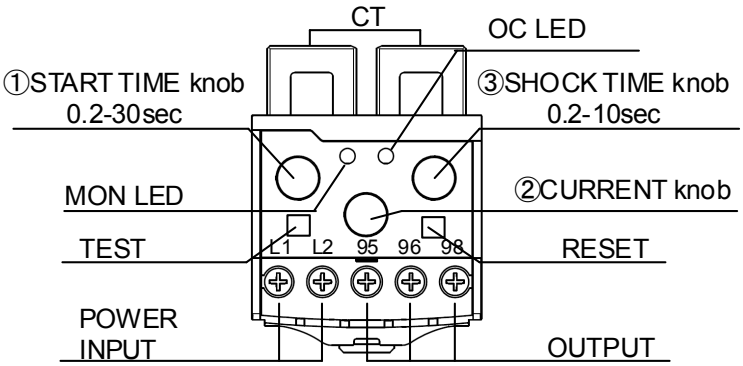


Figure 2

Procedure

1. Install the SHOCK RELAY on the External CT with screws according to Figure 1.
2. Connect the wire between "ℓ" and "λ" after passing the wire through CT hole According to Figure 2.

10. Construction



Description

Shock Relay senses the motor current passing through the two CTs and automatically detects the starting of the motor.

Shock Relay filters out the large starting current during the start-up delay preset with the START TIME knob.

Shock Relay detects an overload by comparing the CT-sensed motor current with the trip current that is preset with the CURRENT knob.

When the motor current exceeds the preset trip current level, the Shock Relay trips after the trip delay that is preset with the SHOCK TIME knob.

Shock Relay can be used as an electronic shear-pin for a motor-driven machine.

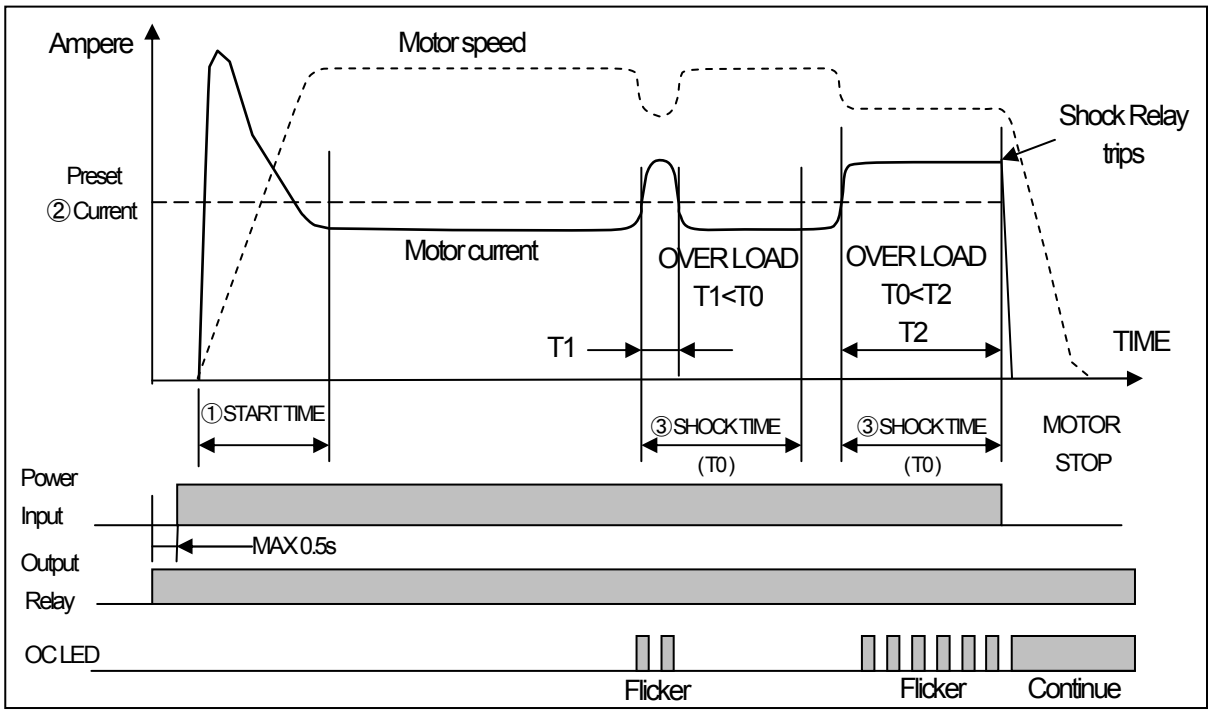
Every time that the Shock Relay trips, always investigate the cause of the overload and correct the cause.

Release the tripped Shock Relay by pressing the RESET button or by shutting power down before restarting the equipment.

As a fail-safe, the Shock Relay keeps the built-in output relay operating except when trips occur, provided that power is applied to the Shock Relay.

Shock Relay lights the OC LED when sensing a greater current than preset with the CURRENT knob and remains lit after the relay trips. MON LED (green) shows monitor condition. It is turned on under the normal monitor condition, and the relay turns off the lights while it is outputted.

Shock Relay provides a TEST button to confirm the operation of the output relay and the two timers －START TIME and SHOCK TIME. The Shock Relay trips after the total of the START TIME and the SHOCK TIME when the TEST button is pressed and held.



11. Set up

1. Set START TIME knob (start-up delay) at the start-up time if the start-up time is known. Set START TIME knob (start-up delay) at the maximum if the start-up time is unknown.
2. Set SHOCK TIME knob (trip delay timer) at the desired trip time.
3. Set CURRENT knob (trip current) at the rated current of the motor.
4. Supply control voltage to the Shock Relay. Then confirm that the SHOCK TIME activates its built-in output relay – the contacts will change state.
5. Press and hold the TEST button. Confirm that the Shock Relay lights its OC LED and trips after total of the START TIME and SHOCK TIME. Confirm that this also deactivates the built-in output relay.
6. Press the RESET button. Confirm that the OC LED turns off and that the built-in output relay activates.
7. Start the motor and check that the start-up time was correctly set. Then slowly turn the CURRENT knob counter clockwise until the Shock Relay flashes its LED. At this point, the CURRENT knob indicates 100% of the motor running current.
8. Set the CURRENT knob at the proper trip current, this is commonly at 110% of the actual motor running current.
9. Recheck and adjust the START TIME knob so that it is a little longer than the normal start-up time.

12. Troubleshooting

Trouble	Check	Result	Solution
Even when the Shock Relay trips, the 95-98 contacts do not shut down the attached motor.	Wiring of the power source (L1-L2)	Not attached correctly	Wire properly.
	Power source voltage (L1-L2) by voltage tester	Out of source voltage	Supply 100-240V AC voltage
The Shock Relay does not trip even with the CURRENT knob set to the minimum	Model no. of the SHOCK RELAY See the nameplate	Incorrect size Shock Relay	Switch to the correct Shock Relay
	Number of wires passing through the CT	Improper	Rewire properly
	Press and hold TEST button	It does not trip	Exchange SHOCK RELAY for a new one
During start-up, an overload trip occurs.	CURRENT knob setting	Set too low	Turn CURRENT knob CW and set it properly
	START TIME knob setting	Set too short.	Turn START TIME knob CW and set it properly
During operation, overload trip occurs.	CURRENT knob setting	Set too low	Turn CURRENT knob CW and set it properly
	SHOCK TIME knob setting	Set too short.	Turn SHOCK TIME knob CW and set it properly
Shock Relay does not trip with an overload occurs	CURRENT knob setting	Set too high	Turn CURRENT knob CCW and set it properly
	SHOCK TIME knob setting	Set too long	Turn SHOCK TIME knob CCW and set it properly
	Press and hold TEST button	It does not trip	Exchange SHOCK RELAY for new one

If replacement of the shock Relay is necessary, please make contact with our company office.

13. Maintenance

(1) To prevent an accident, keep the surrounding area clean and create a safe environment.

(2) Before checking the installation and connection of the Shock Relay, turn off the power source. Be sure that the equipment is completely stopped and the OC LED of the Shock Relay is off. Make sure that the power source is locked out and cannot be accidentally turned on.

14. Daily check and periodic check

(1) Confirm that there is no looseness in the installation of the Shock Relay and current transformer. Check the wiring connections every six months.

(2) Regularly check the function of the output relay, terminal 95-96, terminal 97-98, by pressing the TEST button.

(3) A typical life time of electrolytic capacitor mounted in the SHOCK RELAY is about 10 years at an average ambient temperature of 30℃, but this lifetime may vary with a different ambient environment and with the operating period when power is supplied. We recommend you to exchange the Shock Relay for a new one before trouble occurs.

15. Point for safe use

(1) Take measures beforehand to prevent danger when using a TSUBAKI EMERSON product.

(2) If our product begins to operate improperly, be sure to take measures to prevent a dangerous situation from arising.

16. Warranty

1. Range of warranty

With regard to any troubles happened to our products, replacement or repair of such troubled parts will be provided for free of charge during the effective period of warranty, provided that installation and maintenance/management of said products have been performed properly pursuant to the description of this instruction manual and said products have been used under the condition described in the brochures or agreed separately through mutual consultations. The content of warranty is limited only to the Shock Relay itself delivered to you and the judgment thereof will be made by our selection because such judgment pertaining to the range of warranty is often complex.

2. Warranty period

The warranty period shall be either 18 months after shipment from our factory or 12 months after starting operation, whichever is shorter. Any and all inspection/repair undertaken by us after the above warranty period has passed will be charged. Should questions arise, please do not hesitate to contact us or the dealer from whom you purchased.

3. Miscellaneous

(1) Any matters described in this instruction manual are subject to change without notice.

(2) We have tried our best in preparing the contents of this instruction manual. Should any mistake or oversight be found, we will be more than happy if you would advice us of them.

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