TSUBAKI

EHFSA05.0601-4

SHOCK RELAY
TSBSA 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 E&M CO.

2013.12. 1

1. Preface

Thank you for purchasing the Shock Relay TSBSA 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. TSBSA and TSB2CT Model identification

・Shock relay

TSB SA 05

Current Range:

05	0.5 - 5 A
10	1 - 10A
30	3 - 30 A
60	5 - 60 A

Series: SS series

Model: Shock Relay

・External 2-phase CT

TSB 2CT 100

Rated primary current:

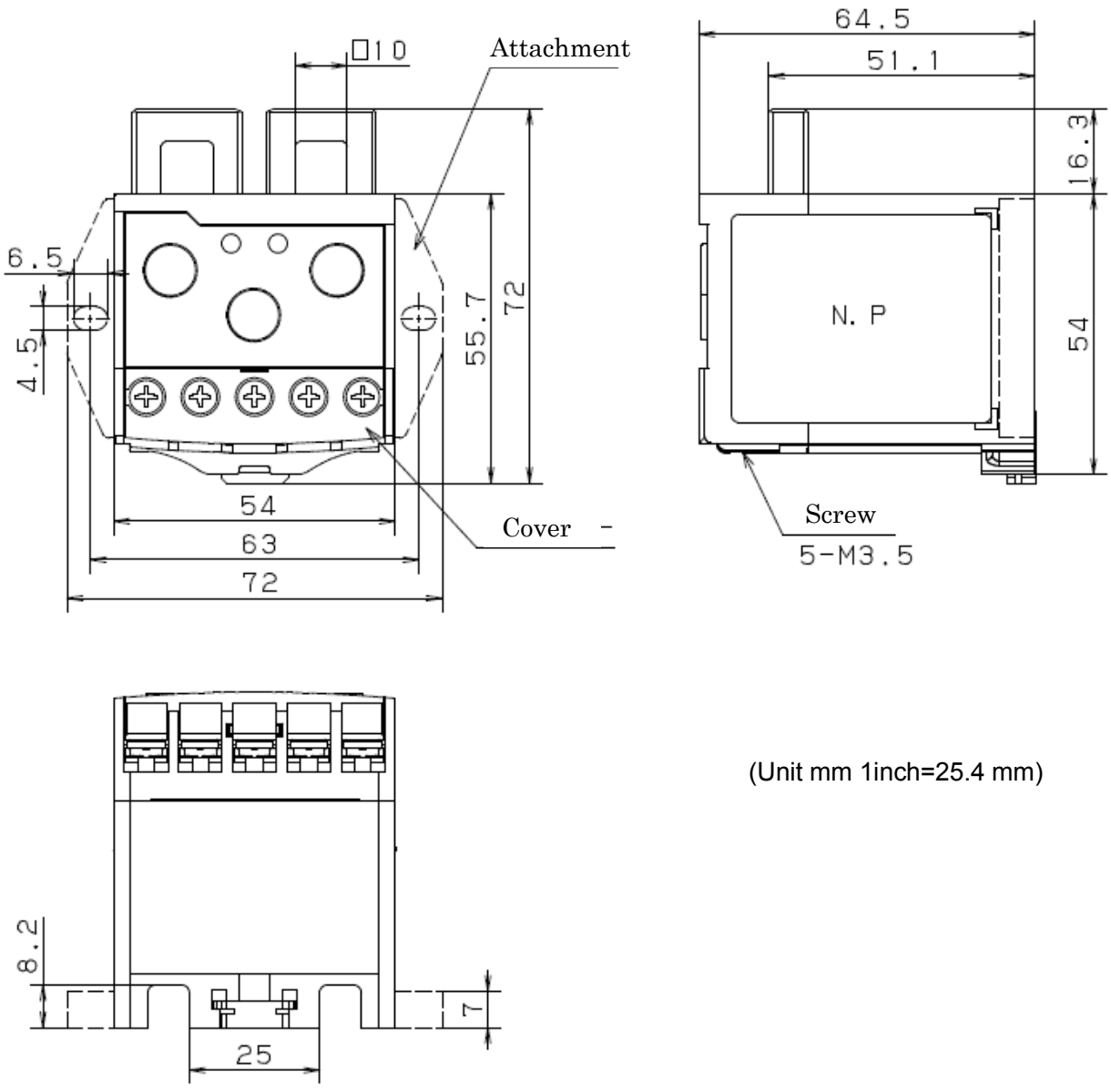
100	100A
200	200A
300	300A

Series: 2-phase CT

Model: Shock Relay

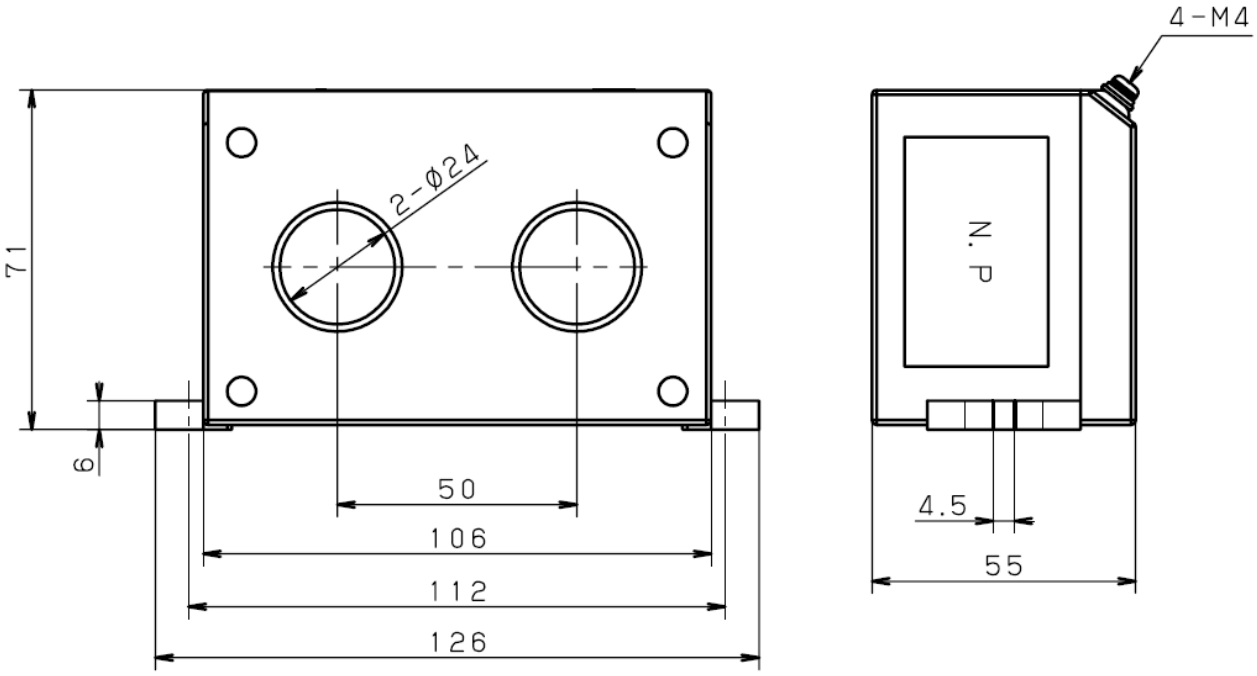
3. Dimensions

・ Shock relay

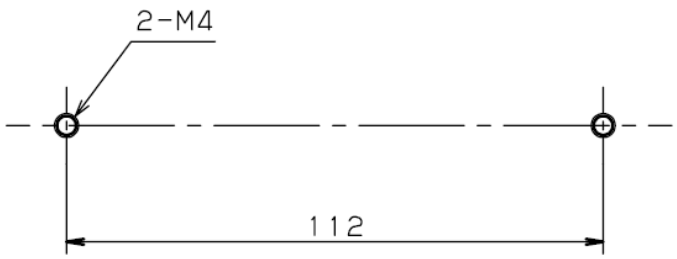


(Unit mm 1inch=25.4 mm)

· External 2-phase CT



Details for installation holes



4. Specifications

Series			TSB SA
Current Setting ✻1		Type	Range
		05	0.5 - 5A
		10	1 – 10A
		30	3 – 30A
		60	5 – 60A
Time Setting ✻1	Starting Trip Delay	Start Time	0.2 - 10s
	Trip Time	Shock Time	0.2 - 5s
Accuracy		Current	±10% (full scale)
Control Power Supply			100～240VAC, 50/60Hz ✻2
Rated Voltage			600VAC, 50/60Hz
Current Sensing			2 Integral Current Transformer
Output Relay	Mode		1-SPDT(1-C)
	Rating		3A / 250VAC, Resistive
	Minimum applicable load ✻3		DC10V, 10mA
	Status		Normally De-Energized
Expected Output Relay Life	Mechanical		10,000,000 Operations
	Electrical		100,000 Operations
Display			Monitor(MON,green), Over Current(OC,red)
Reset			Auto Reset after 1s
Ambient Environment	Temperature	Operating	-20 - +60℃ (-4 - +158 F)
		Storage	-30 - +70℃ (-22 - +176 F)
	Humidity		45 - 85% RH without Condensation
Insulation	Between casing and circuit		Over 10MΩ with 500 VDC Megger
Dielectric Strength	Between casing and circuit		AC 2000V, 5mA, 60Hz, 1min
	Between contacts		AC 1000V, 5mA, 60Hz, 1min
	Between circuits		AC 2000V, 5mA, 60Hz, 1min
Power Consumption		115VAC	2.70 VA(0.35W)
		230VAC	11.00 VA(1.2W)
Material	Case		Upper:PA6, Bottom:PA66
	Terminal cover		PA6
Mounting			35mm DIN rail or Panel
Dimension(WxHxD /Including Integral CT Windows)			54x60x65mm
Weight			Less than 200g (0.445LBS) 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.

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 t dust, corrosion gas, and oil mist.
- Height: 2000m or less above sea level.
- Vibration: 5.9m/s^2 and under.

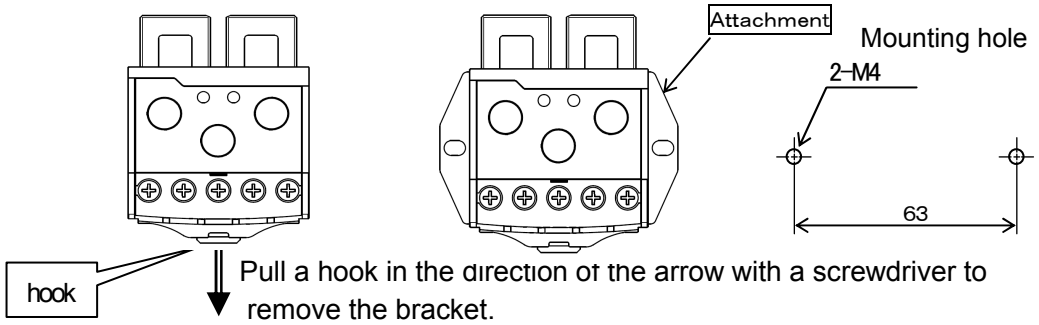
2. Installation to the panel

(1) Installation with 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.

(2) Installation with screw

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



3. Installation to the DIN rail

(1) Pull the hook on the Shock Relay in the direction of the arrow to remove the mounting bracket.

(2) Install the Shock Relay to the DIN rail.

6. Wiring

(1) Connect 90－250VAC power source to the terminal A1, A2.

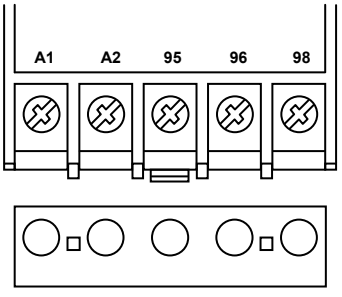
Never connect the output of an inverter or a servo driver to terminals A1-A2.
Install an insulation transformer between the power line and terminals A1-A2 of the SHOCK RELAY when harmonic noise is included in the power line.

(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



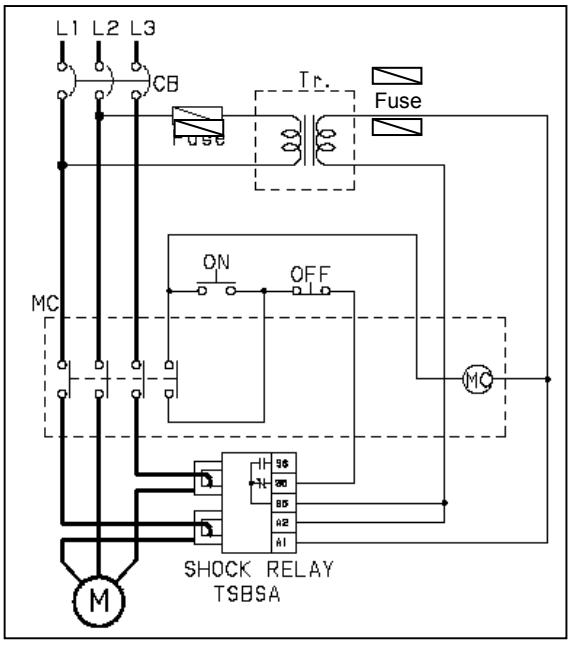
Terminal	Function	Contents.
A1	Power Supply	100 – 240VAC commercial power supply is wired
A2		
95	Output Relay	Common
96		Normally close (Tripped: open)
98		Normally open (Tripped: close)

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.

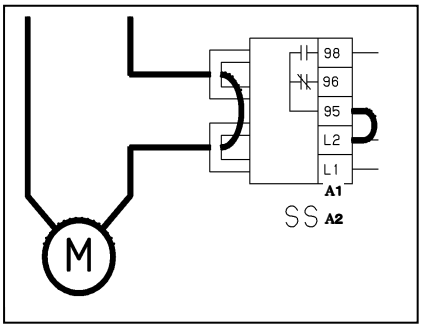
AC 200 ~ 230 Volt Motor				AC 400 ~ 460 Volt Motor			
Motor Capacity (kW)	Motor Capacity (Hp)	TSBSS TYPE	Wires passing through CT	Motor Capacity (kW)	Motor Capacity (Hp)	TSBSS TYPE	Wires passing through CT
0.1	1/8	TSBSA05	4	—	—	—	—
0.2	1/4	TSBSA05	3	0.2	1/4	TSBSA05	4
0.4	1/2	TSBSA05	2	0.4	1/2	TSBSA05	3
0.75	1	TSBSA05	1	0.75	1	TSBSA05	2
1.5	2	TSBSA10	1	1.5	2	TSBSA05	1
2.2	3	TSBSA10	1	2.2	3	TSBSA05	1
3.7	5	TSBSA30	1	3.7	5	TSBSA10	1
5.5	7-1/2	TSBSA30	1	5.5	7-1/2	TSBSA30	1
7.5	10	TSBSA60	1	7.5	10	TSBSA30	1
11	15	TSBSA60	1	11	15	TSBSA30	1
—	—	—	—	15	20	TSBSA60	1
—	—	—	—	18.5	25	TSBSA60	1
—	—	—	—	22	30	TSBSA60	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 250VAC)
2. Output relay is normally de-energized. 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

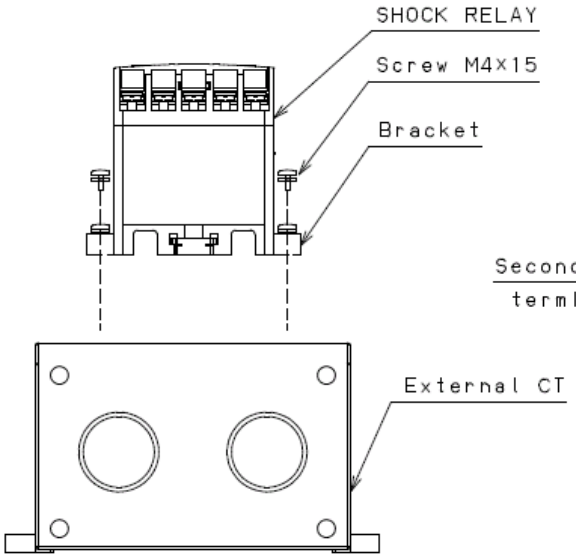


Figure 1

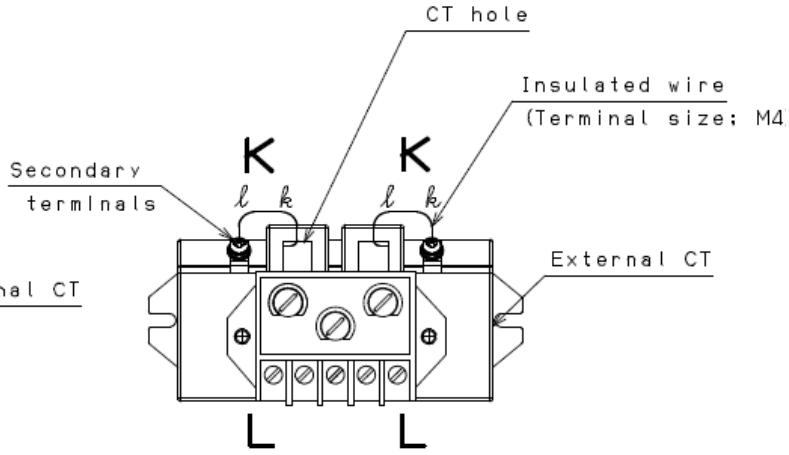
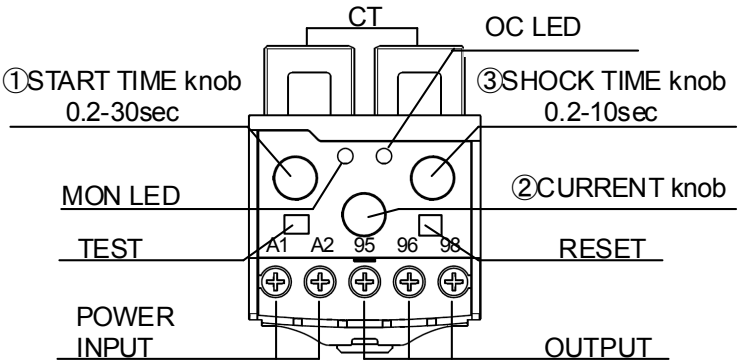


Figure 2

Procedure

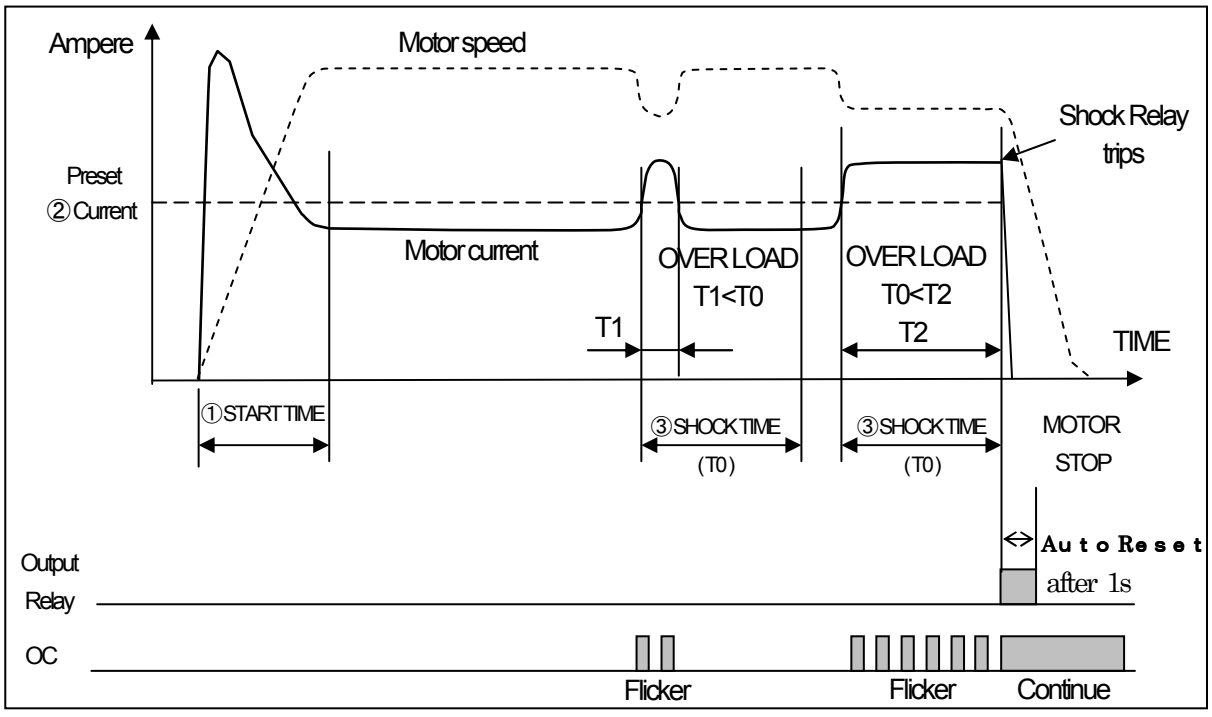
1. Install the SHOCK RELAY on the External CT with screws according to Figure 1.
2. Connect the wire between "ℓ" and "λ" after passing the wire through CT hole According to Figure 2.

10. construction



Description

Two of three phases of the motor current are monitored by integral current transformers (External current transformers are required for current more than 60 Amps).
The internal solid state circuitry compares the monitored motor (or load) currents with the preset current level.
When motor current exceeds the preset trip current level, the “OC” LED illuminates and indicates that an overload has been detected.
The relay will trip after the preset trip time (SHOCK TIME) and the “OC” LED remains illuminated indicating an overload trip has occurred.
When the motor currents decrease, the relay reverts after one second.
If the motor current drops back down below the preset current level before the preset trip time delay has elapsed, Shock Relay will return to normal condition.
MON lamp (green) shows monitor condition.
It is turned on under the normal monitor condition, and the relay turns off the lights while it is outputted.
With the visual aid of the “OC” LED flashing when motor current becomes 100% of the preset current actual load current can be determined without aid of an ammeter.
The TEST button provides the means of testing service-worthiness and integrity.
Since the Shock Relay has definite time characteristics, the start trip delay may be adjusted with a minimum setting of 0.2 through a maximum of 10 seconds.
The trip time adjustment range is from 0.2 through 5 seconds. The relay may be used as an electronic shear-pin by setting the SHOCK TIME to minimum.
If the Shock Relay trips, always investigate to determine the cause and correct prior to restarting.



11. Set up

1) When installing, set the start delay timer (START TIME knob) to the known motor run-up time or the maximum if the time is not known.
2) Set the trip delay timer (SHOCK TIME knob) to the desired trip time.
3) Set the load current (CURRENT knob) at the rated full load or the desired value.
4) With connections made and control power on, depress the TEST button and hold.
   Verify that the red LED illuminates and the internal relay should switch contacts after the sum of start time and shock time.
5) Start the equipment and notice the run-up time, then slowly turn the CURRENT knob counter clock-wise until the LED flashes, This indicates 100% of the load current.
   Set the CURRENT knob to the desired trip setting. A setting of 110% of the running current is commonly used.
6) Reset the START TIME knob to match the normal run-up time.
7) Periodic testing by using the TEST button is suggested to ensure the full protection through preventive maintenance.

12. Troubleshooting

Symptom	Check	Result	Treatment
"MON" lamp isn't turned on.	Check the operation power supply wiring. （between terminals A1 and A2）	Incorrect wiring.	Wire correctly
	Measure the voltage of the operation power supply with a tester. （between terminals A1 and A2）	Not between 100～240VAC.	Set the voltage between 100 ～240VAC.
		Between 100～240VAC.	Repair or replace.
Just after starting, the relay begins operating.	Check the value of START TIME.	Short	Set a longer.
		Long (It is obvious that relay is operating within the set time).	Repair or replace.
The relay output does not operate.	Examine the Current level setting.	The Current level setting is inappropriate.	Set to suitable level.
	Examine the SHOCH TIME setting.	Long.	Set a shorter.

13. Maintenance and testing

During performance of any maintenance or testing, be sure to go the following.

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

(2) When performing tests on the Shock Relay mounting or connections, be sure that the power supply is disconnected, that the instrument is completely stopped, and that “MON” lamp isn’t turned on. Also, make sure that the power supply cannot be accidentally reconnected.

(3) Observe the guidelines listed in the Labor Safety and Health Regulation.

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 product.

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

16. Guarantee.

1 Range of guarantee

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 guarantee, 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 guarantee 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 guarantee is often complex.

2 Guarantee period

The guarantee 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 guarantee 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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