TSUBAKI

EHFSU0506010R3

SHOCK RELAY
TSBSU 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 specifications 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.

2014. 7. 1

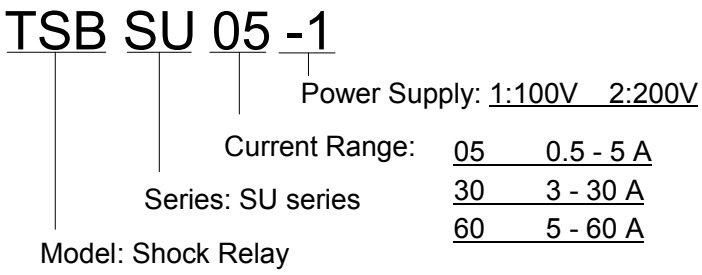
1. Preface

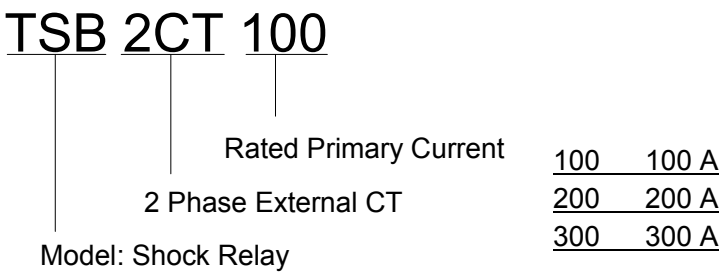
Thank you for purchasing the Shock Relay TSBSU series.

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.

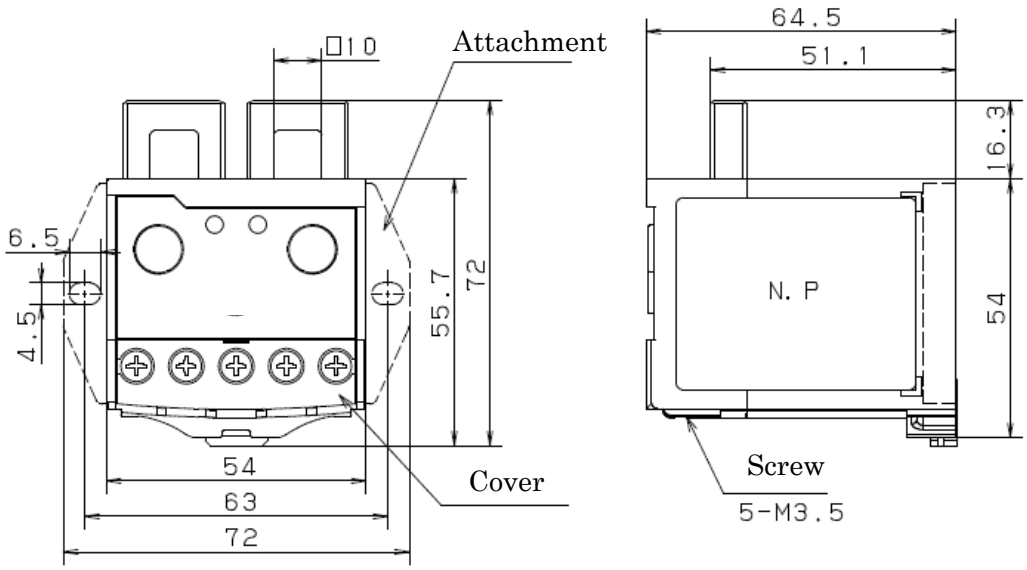
2. TSBSU Model identification

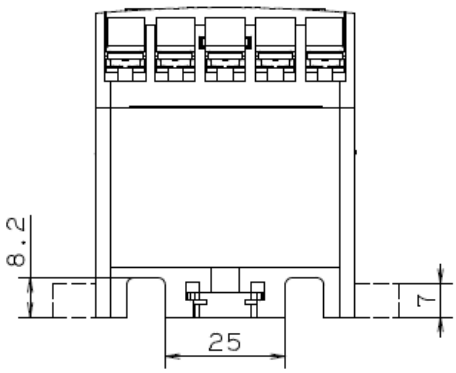




3. Dimensions

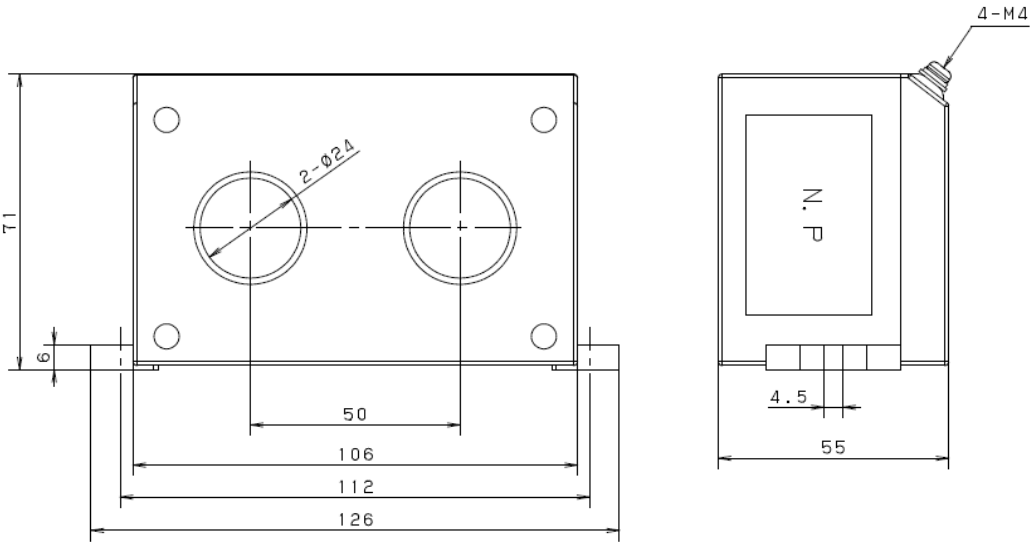
TSBSU



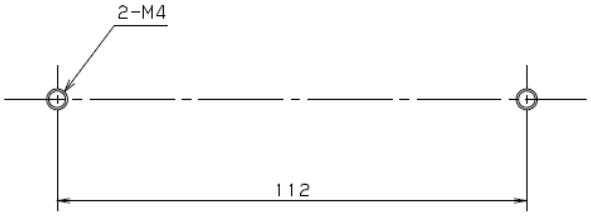


(Unit mm 1inch=25.4 mm)

TSB2CT100
TSB2CT200
TSB2CT300



Details for installation holes



4. Specifications

Model			TSBSU05-＊	TSBSU05-＊	TSBSU05-＊
Current Setting＊[1,2]			0.5-5A	3-30A	5-60A
Shock Time Setting＊[1]			0.2-30s		
Current Accuracy			±10％ (Full scale)		
Control Power Supply (Model-＊)	1		100～120VAC±10%, 50/60Hz		
	2		200～240VAC±10%, 50/60Hz		
Maximum motor voltage			600VAC, 50/60Hz ＊[3]		
Current Sensing method			2 Integral Current Transformer		
Output Relay	Mode		1-SPDT(1c)		
	Contact Rating (max.)		3A / 250VAC cos ϕ =1		
	Contact Rating (min.) ＊[4]		10VDC 10mA		
	Operation		Normally De-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			Less than 2VA		
Material	Case		Upper:PA6, Bottom:PA66		
	Terminal cover		PA6		
Mounting			35mm DIN rail or Panel		
Dimension(W x H x D /Including Integral CT Windows)			54 x 72 x 64.5 mm		
Approximate Weight			0.2 kg		

*1 Current setting and Shock time setting show assignable value and these value don't show upper limit or lower limit.

*2 In case that motor current exceed upper of current setting, all model are acceptable to under current 100A

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

*4 Be careful of the contact detect with the output of shock relay , when the little electric current drive.

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

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.

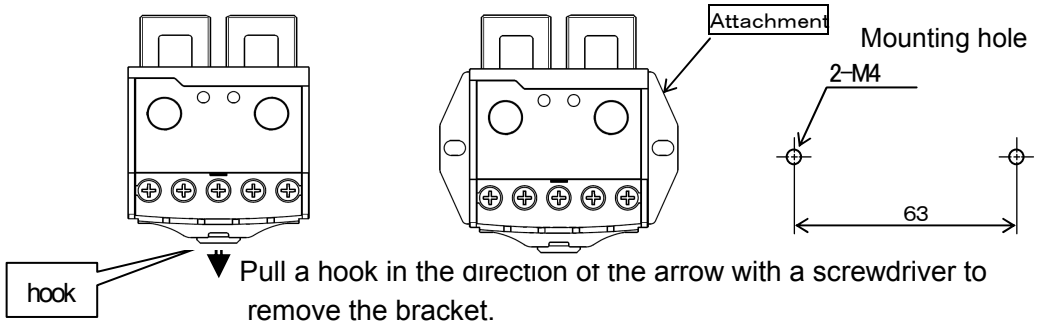
2. Installation to the panel

(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 power source to the terminal A1- A2.

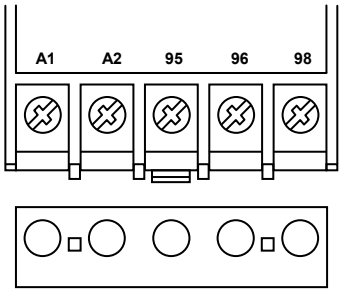
Never connect the output of an inverter or a servo driver to terminals A1-A2.
Install an insulation transformer between the power line and terminals A1-A2 of the SHOCK RELAY when harmonic noise is included in the power line.

(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	commercial power supply is wired
A2		
95	Output Relay	Common
96		Normally close
98		Normally open

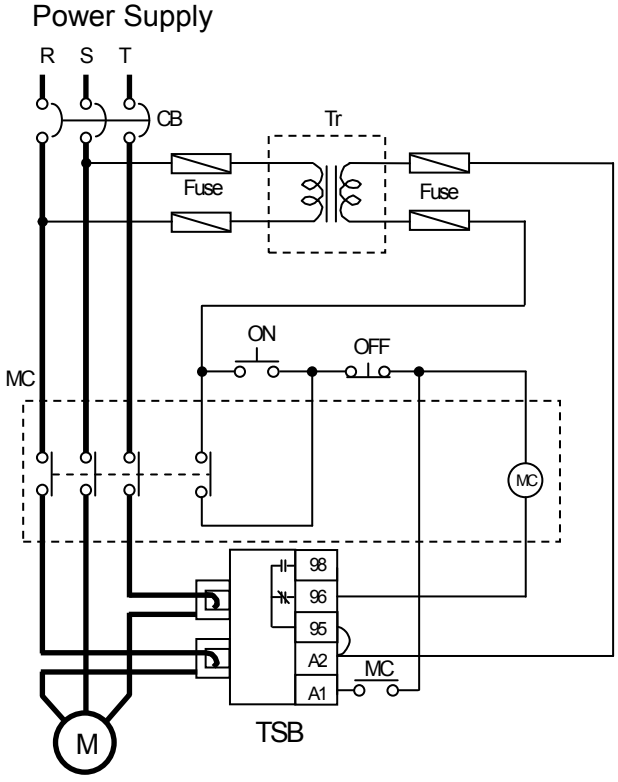
8. Current Transformer

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)	TSBSU TYPE	Wires passing through CT	Motor Capacity (kW)	Motor Capacity (Hp)	TSBSU TYPE	Wires passing through CT
0.1	1/8	TSBSU05-2	4	—	—	—	—
0.2	1/4	TSBSU05-2	3	0.2	1/4	TSBSU05-2	4
0.4	1/2	TSBSU05-2	2	0.4	1/2	TSBSU05-2	3
0.75	1	TSBSU05-2	1	0.75	1	TSBSU05-2	2
1.5	2	TSBSU30-2	3	1.5	2	TSBSU05-2	1
2.2	3	TSBSU30-2	2	2.2	3	TSBSU05-2	1
3.7	5	TSBSU30-2	1	3.7	5	TSBSU30-2	3
5.5	7-1/2	TSBSU30-2	1	5.5	7-1/2	TSBSU30-2	2
7.5	10	TSBSU60-2	1	7.5	10	TSBSU30-2	1
11	15	TSBSU60-2	1	11	15	TSBSU30-2	1
—	—	—	—	15	20	TSBSU60-2	1
—	—	—	—	18.5	25	TSBSU60-2	1
—	—	—	—	22	30	TSBSU60-2	1

9. Basic wiring diagram

1) Basic wiring diagram



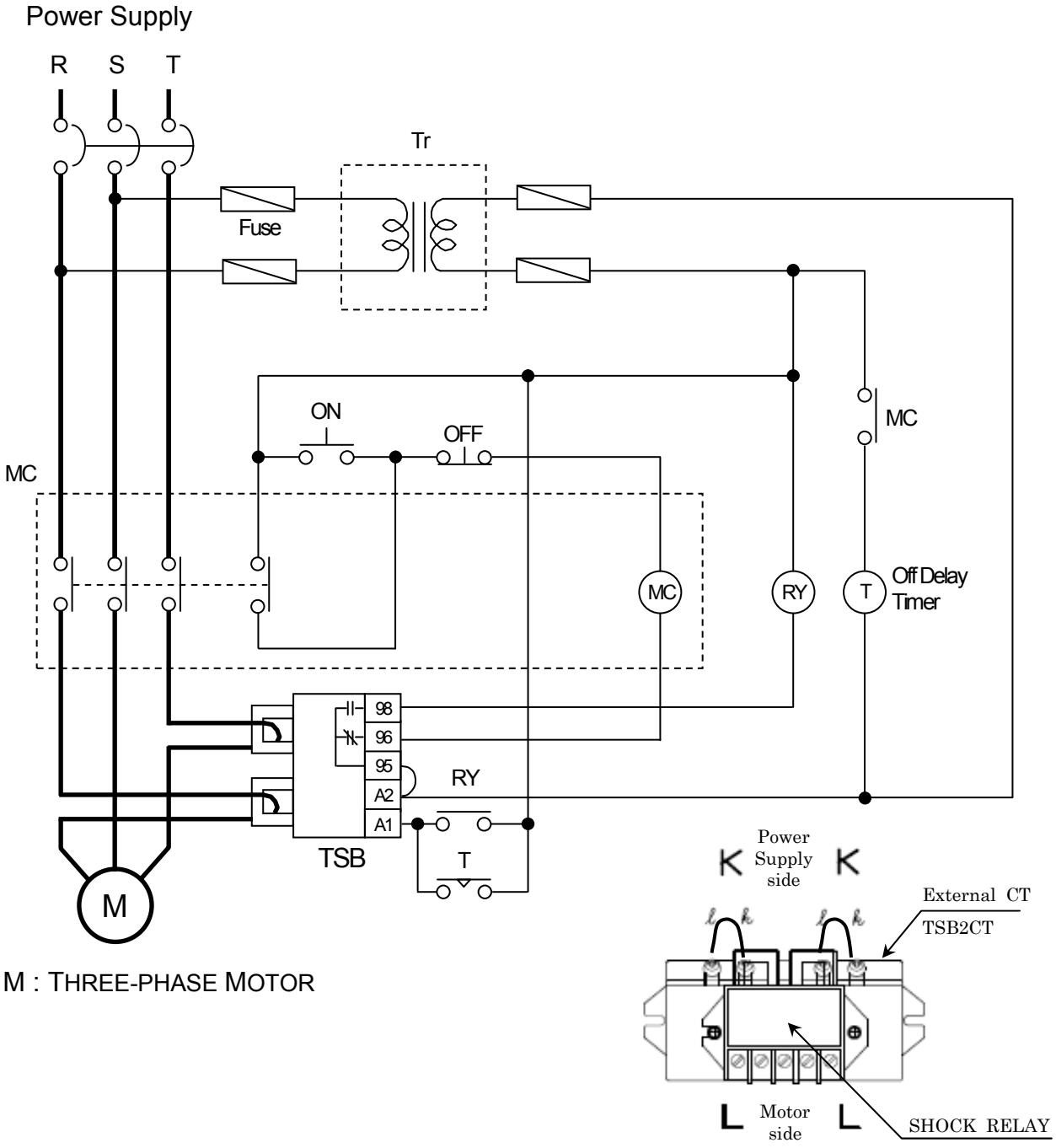
M : THREE-PHASE MOTOR

Note.

1. A transformer may be required, depending on the voltage of Motor (i.e. over 240VAC)
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.
4. Shock relay shall be to be turned on at the same time as MC is turned on.
   In case that Shock time is less than 1.5 seconds, it is possibility that Shock Relay trips.
5. If the capacity of the operating electromagnetic coil of the electromagnetic contactor is above 200VA during closing time or 20VA during holding time, then drive a secondary relay with the relay output, and open and close the electromagnetic contactor with the contacts of the secondary relay.

MC : Magnetic contactor
ON : Start switch
OFF : Stop switch
Fuse : Fuse
Tr : Transformer

2) Wiring diagram for Manual reset.

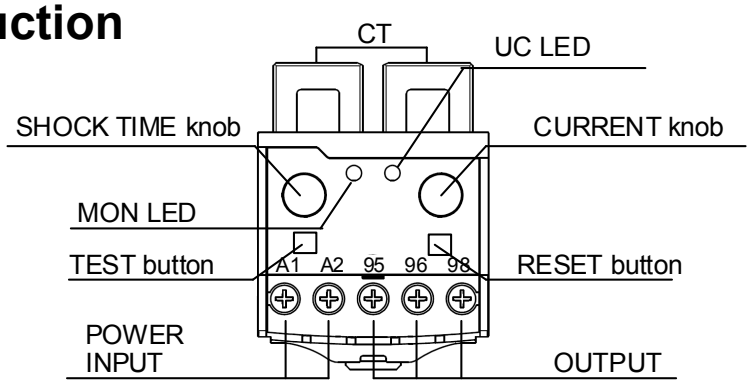


M : THREE-PHASE MOTOR

Note. 1. Set Shock Time setting at more than 3 seconds and set Off Delay Timer at less than 1.5 seconds.

2. In case of using external CT, motor wiring are passed through hole of external CT.

10. Construction



Description

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

Shock Relay SU series detects the under current by comparing the CT-sensed motor current with the trip current that is preset with the CURRENT knob.

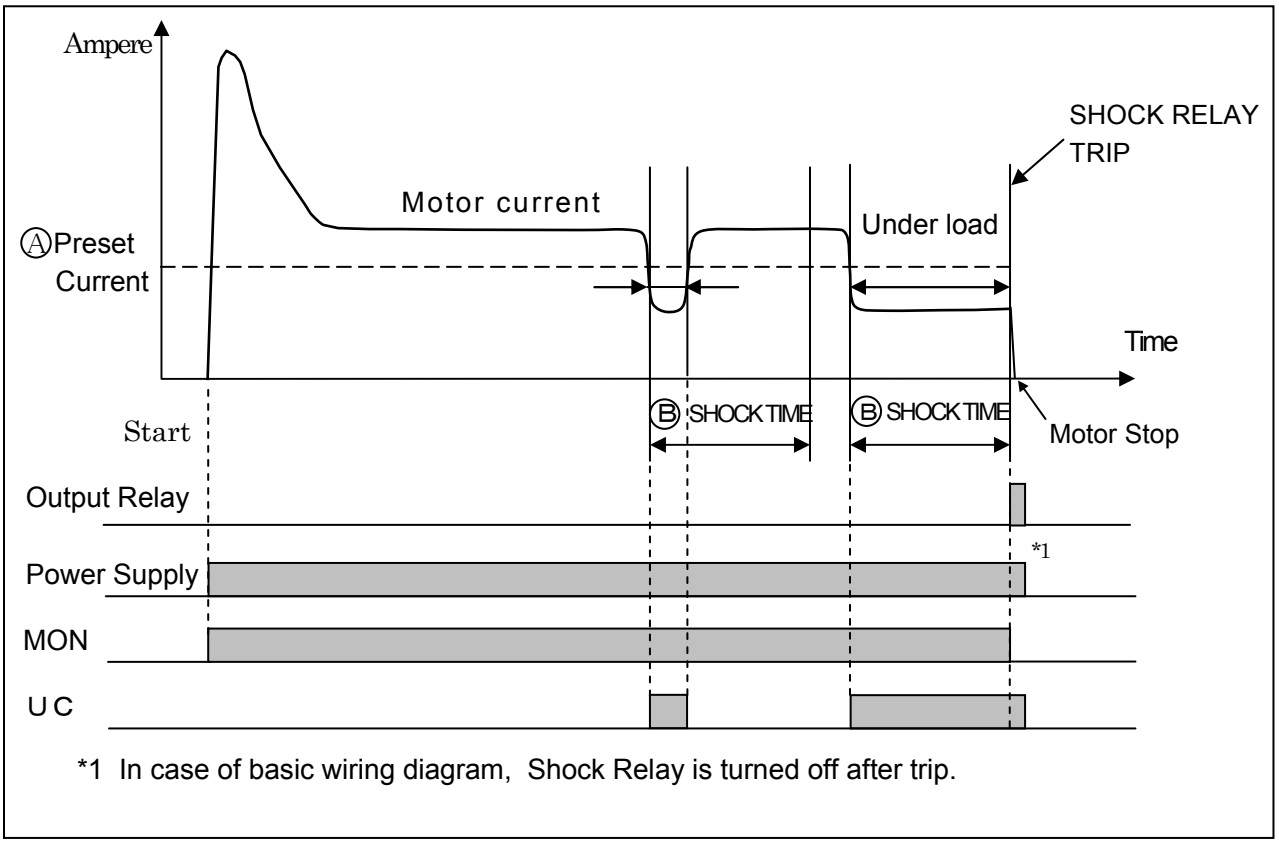
When the motor current falls off the preset trip current level, the Shock Relay trips after the trip delay that is preset with the SHOCK TIME knob.

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

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

Shock Relay lights the UC LED when sensing a smaller current than preset with the CURRENT knob and remains lit after the relay trips.

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



*1 In case of basic wiring diagram, Shock Relay is turned off after trip.

11. Set up

1. Set SHOCK TIME knob (trip delay timer) at the desired trip time.
2. Set CURRENT knob (trip current) at the desired current of the motor.
3. Supply control voltage to the Shock Relay.
4. Start the motor and then slowly turn the CURRENT knob counter counterclockwise until the Shock Relay flashes UC LED. At this point, the CURRENT knob indicates 100% of the motor running current.
5. Set the CURRENT knob at the proper trip current.

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 predefined voltage.	Set predefined voltage
		Predefined voltage	Repair or replace.
Just after starting, the relay begins operating.	Check the value of CURRENT.	Set too high	Set to suitable level.
	Check the value of SHOCK TIME.	Set too short	Set to suitable time.
The relay output does not operate.	Check the Current level setting.	The Current level setting is inappropriate.	Set to suitable level.
	Check the SHOCH TIME setting.	Set too long	Set to suitable time.

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 MON 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.

MEMO

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