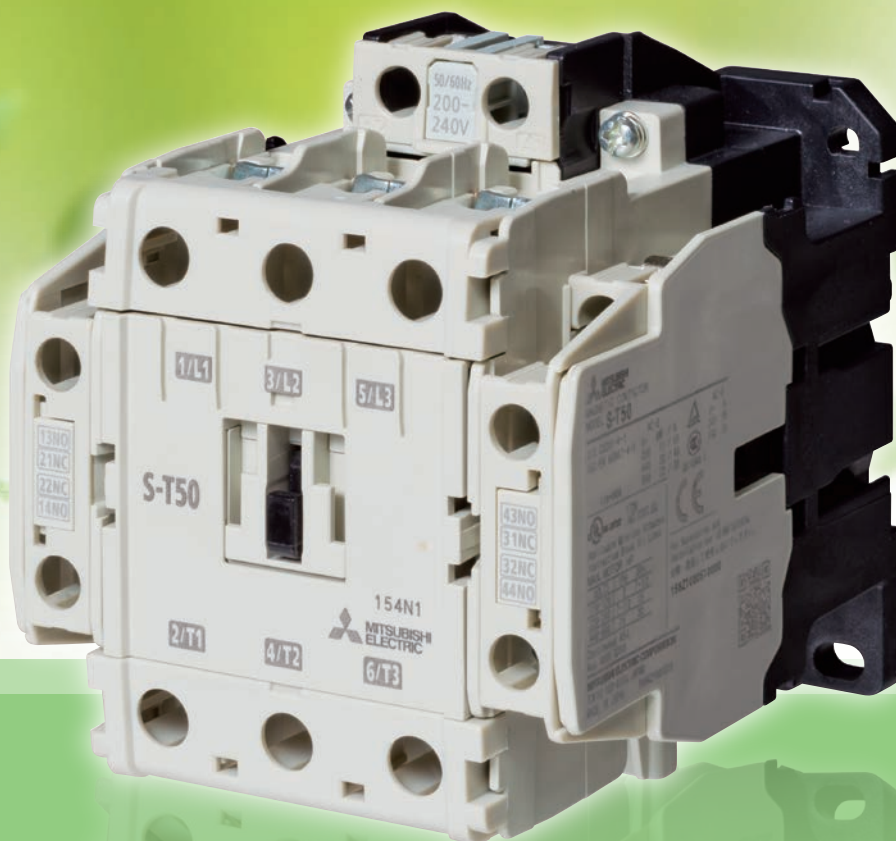


Mitsubishi Electric Magnetic Contactors and Magnetic Starters

Exceed your expectations

Mitsubishi Electric's Magnetic Contactors and Magnetic Starters, continuously pushing the boundaries.



MS-T Series

Mitsubishi Electric Magnetic Contactors and Magnetic Starters

About Handling

Note

Connection

● Applicable electric wire size and tightening torque and terminal dimension of terminal screw

⚠ This may cause overheating or fire. Be sure to properly keep the tightening torque and periodically re-tighten the screw.

However, please note that tightening the screw under the status where oil is adhered to the terminal portion may damage the terminal screw even within the existing tightening torque. Electric wires should be properly connected according to the electric wiring diagram. Tightening the terminal screw should be properly conducted within the tightening torque shown in the right table. Insufficient tightening of the terminal screw may cause overheating or cause the electric wire to drop off. Excessive tightening torque may damage the tightening screw. Adhesion of rock paint, thermo label, etc. to electric wire connection or contact may cause heat generation due to defective continuity, so this is very dangerous.

The main circuit terminals for the T10 to T50 and TH-T18 to T50 types can be wired connected by single wire, stranded wire or crimp lug. The main circuit terminals and operating circuit terminals of the T10 to T50 and TH-T18 to T50 types are self-lifting terminals that are easy to connect.

Model	Terminal dimension and size/type of screw				Applicable electric wire size [φmm, mm]		Connection conductor thickness (D) [mm]	Applicable crimp lug size (JST Cat No.)		Tightening torque of terminal screw [N·m]	
Standard type Contactor Relays Magnetic Contactors Thermal Overload Relays (Note 1)	Main circuit			Operating circuit							
	Dimension of terminal portion A x B x C [mm] (Note 2)	Screw size	Screw type	cross slot screw with pressure plate	Main circuit	Operating circuit	Main circuit (Note 2)	Main circuit	Operating circuit	Main circuit	Operating circuit
SR-T5, T9	—	—	—	M3.5×7.6	—	—	—	—	—	—	—
S-T10, T12, T20	7.5×3.7×4.5	M3.5×7.6	cross slot screw with pressure plate	M3.5×7.6	φ1.6 0.75 to 2.5	φ1.6 0.75 to 2.5	1.6	1.25-3.5 to 2-3.5 5.5-S3 (Note 7, Note 8)	1.25-3.5 to 2-3.5	0.9 to 1.5	0.9 to 1.5
S-T21, T25, T32	10.5×5.2×5.5	M4×10.5		M3.5×7.6	φ1.6 to 2.6 1.25 to 6		3	1.25-4 to 5.5-4		1.2 to 1.9	
S-T35, T50	13.3×5.5×6.9	M5×14.8		M3.5×7.6	φ1.6 to 3.6 1.25 to 16		6	1.25-5 to 14-5 22-S5 (Note 8)		2.0 to 3.3	
S-T65, T80 (Note 9)	15×7×8.5	M6×12	cross-head/slot-head screw	M4×10	(2 to 22)	φ1.6 0.75 to 2.5	3.7	1.25-6 to 22-6 38-S6 (Note 8) 60-S6 (Note 8)	1.25-4 to 2-4 5.5-S4	3.5 to 5.7	1.2 to 1.9
S-T100	15×7.5×11.5				(2 to 38)		4	1.25-6 to 60-6			
TH-T18 (Load side)	7.5×4×4	M3.5×7.6	cross slot screw with pressure plate	M3.5×7.6	φ1.6 0.75 to 2.5		2	1.25-3.5 to 2-3.5 5.5-S3 (Note 7, Note 8)	1.25-3.5 to 2-3.5	0.9 to 1.5	0.9 to 1.5
TH-T25 (Power side/Load side)	10.2×6.8×5/10.2×5.7×5	M4×10.5/ M4×10.5			φ1.6 to 2.6 1.25 to 6		2.5	1.25-4 to 5.5-4		1.2 to 1.9	
TH-T50 (Load side)	13.3×5.8×6.9	M5×14.8			φ2 to 3.6 4 to 14		8	5.5-5 to 14-5		2.0 to 3.3	
TH-T65	17×7.5×8.5	M6×12	cross-head/slot-head screw	M4×10	(2 to 22) (Note 3)	φ1.6 1.25 to 2	4	5.5-6 to 22-6	1.25-4 to 2-4 5.5-S4	3.5 to 5.7	1.2 to 1.9
TH-T100 (Load side)	15×7.5×10	M6×12			(8 to 38) (Note 3)		3.7	14-6 to 22-6 38-S6 (Note 8)		3.5 to 5.7	

Note 1: The dimension of the main circuit terminal is a dimension for board conductor wiring. (See the right diagram) The board conductor thickness (D dimension) must be below the allowable connection conductor thickness stated above because of the length of the terminal screw. In case of wiring with two boards used, the total value of two boards must be below the value (D dimension) shown in the table.

Note 2: Two wires or two crimp lugs can be connected to each terminal. (One wire or one crimp lug can also be connected.)

Note 3: The cross slot screws with pressure plate of T Series and those of N or other Series are same in size but different in pressure plate dimension, so please avoid the mixed use of such screws. This may break the insulation barrier or make the wire likely to fall out.

Note 4: When using an IEC60529-based finger safe specification Magnetic Contactor/Starter (MSO/S-T10(BC) to T50(BC)), be sure to insulate the crimped part of the crimp lug. However, apply additional insulation to 5.5-S3 crimp lugs.

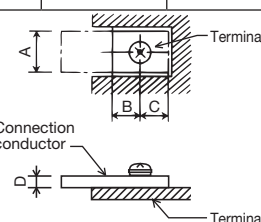
Note 5: Tightening the 3 terminal screw excessively without wiring may break the screw and consequently disable the tightening, so please avoid such excessive tightening.

Note 6: Operational circuits are coil terminals of Magnetic Contactors and control circuit terminals of Thermal Overload Relays.

Note 7: When two crimp lugs are used for wiring of the T10 to T20BC, and TH-T18BC, the F dimension must be at least 6mm.

Note 8: Typical applicable crimp lugs are listed and they are the model numbers of JST (Japan Solderless Terminals).

Note 9: Ring crimp lugs cannot be connected to the auxiliary contact terminals of T65CW and T80CW.

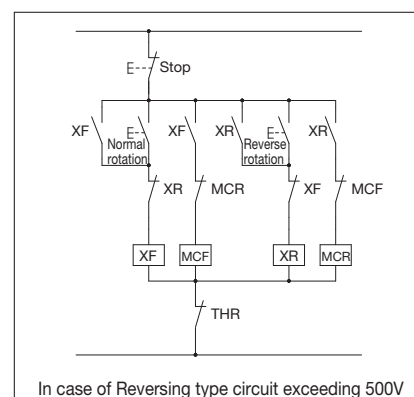


● Application to a circuit exceeding 380V

- Insulate the crimped part of the crimp lug and wire when applying the MSO/S-T10, T12, T20, MSOD/SD-T12, T20, SR(D)-T5, T9, or TH-T18 to a circuit exceeding 380V. However, apply additional insulation to 5.5-S3 crimp lugs.
- When applying such parts to a Reversing type circuit exceeding 500V, please use an SR-T type Contactor Relays (XF, XR) as shown in the right figure to set the switching time allowance.
- Be sure to use a 22-S5 crimp lug with an insulation sleeve attached when applying the MS/MSO/S-T35, or T50 to a circuit exceeding 380V. Be sure to use a 60-S6 crimp lug with an insulation sleeve attached when applying the MS/MSO/S-T65, or T80 to a circuit exceeding 380V.

● Wiring direction

Although the upper terminal side is usually set to the power supply side when wiring, the lower terminal side may be set to the power supply side when it is unavoidable due to some reason of the board wiring. However, the mounting direction must be in accordance with the description on Page 14.



Operating circuit

- ⚠ Applying a low voltage that does not operate the Magnetic Contactors to the operating circuit may cause overcurrent to the coil, which may cause the coil to be burned in a short time.
- ⚠ If the operating circuit wiring is too long, when the coil's instantaneous current flows, the wiring impedance may cause a reduction in the coil voltage, so that the operating circuit may fail to be activated. And, the stray capacitance of the wired line may cause the coil's excitation not to be released even when releasing the excitation.
- ⚠ Use in a circuit (inverter) with high harmonics and high frequency levels can burn the operation coil or surge absorber with CR in the S-T65 to T100 type Magnetic Contactors.

Power supply voltage fluctuation range for operating circuit

- (1) Operating voltage
When the rated voltage and frequency are applied to the coil at an ambient temperature of 40°C (Inside temperature of the board: 55°C), the device operates without any problem at 85 to 110% of the rated voltage of the coil after the temperature increases and becomes saturated.
- (2) Voltage/Frequency and coil rating of operating circuit
The voltage/frequency of the operating circuit and the same of the operation coil must be matched.
Applying a voltage exceeding 100% of the rated voltage to the operating circuit when using the coil may acceleratedly deteriorate the coil insulation and consequently reduce mechanical durability, so set the coil's average voltage to 95 to 100% of the rated voltage when using the coil.

Driving Magnetic Contactor with Triac control

The electromagnet in the S-T65 to T100 type Magnetic Contactor incorporates the capacitor-drop type AC operated DC excited method using the capacitor drop. Thus, a Triac with voltage resistance that is $2\sqrt{2}$ -fold the circuit voltage must be selected. If the Triac voltage resistance is low, use of a varistor in parallel with the Triac is recommended.

Using with square wave power supply

The electromagnet in the S-T65 to T100 type Magnetic Contactor incorporates the AC operated DC exciting method using the capacitor drop. It cannot be used with a square wave as the coil's exciting current will increase greatly.

Application to special environment

- ⚠ Please note that the operating characteristics of the Magnetic Contactor and Thermal Overload Relay may vary with the ambient temperature.

High temperature

When using Magnetic Starters or Magnetic Contactors at high ambient temperature, the temperature may mainly affect the insulation life (continuous electric conduction life) of the operation coil and the aging variation of the molding component.
MSO and S-T type without a box are standard products available even at the inside temperature of 55°C.

Low temperature

Standard S-T type Magnetic Contactors (AC operated type) can be used under the following conditions. There are cases of Magnetic Contactors being incorporated into switchboards and transported to or used in cold regions, or being used in extremely cold conditions such as those found in refrigerators. In addition, MSO-T type Magnetic Starters and TH-T type Thermal Overload Relays of low temperature specification are not manufactured.

Low-temperature-based products: S-T□, S-2xT□ types

Applicable temperature range of low-temperature product: Operating temperature -50 to 55°C, Storage temperature -60 to 65°C

Corrosive gas

S-T10 to T32 and SD-T12 to T32 type Magnetic Contactors have increased corrosion resistance as standard.

Corrosive gases that exist in an environment with an Magnetic Starters or Magnetic Contactors used are gases such as sulfurous acid (SO₂), hydrogen sulfide (H₂S), chlorine (Cl₂), and ammonia (NH₃), and conductive portions can be protected by plating a metal resistant to such gases on the portion. However, because there is no adequate corrosion prevention method for the contact, such gases may increase the contact resistance, resulted in increased temperature.

Additionally, if the environment contains some corrosive gas but is under dry condition, this may delay the progression of corrosion, so using the switchboard with the inside kept as dry as possible is also one of the corrosion prevention methods.

In the Magnetic Starters and Thermal Overload Relays, corrosion-prevented products (MSO-T□YS, TH-T□YS) of the specification with increased corrosion resistance to such corrosive gases are also manufactured.

Dust

Magnetic Starters and Magnetic Contactors used in an iron foundry, construction site, or powder conveying machine tend to be subject to a relatively large amount of dust. When using the control board in such locations, the board must be dust-prevention-structured. Also, using the board under hermetically-sealed condition for a long period may cause contact failure.

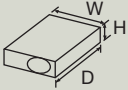
Export of the products to tropical regions

The environment of exported products which pass through tropical regions tends to be of high temperature and high humidity, and humidity is the environmental factor that affects the Magnetic Starters and Magnetic Contactors most severely. Humidity is the biggest rust-generating factor and the exported products must be in a structure resistant to humidity.

Therefore, it is recommended to put a moisture absorbent (Silica gel) in an amount of 3kg or more per m³; so as to lower the humidity.

Specification List

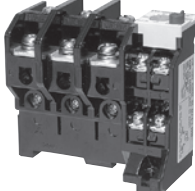
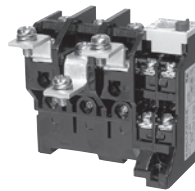
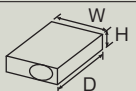
Model list

Frame			T18	T25
Appearance				
Model name	with 2-elements	For Magnetic Starters	TH-T18	TH-T25
	with 3-elements	For independent mounting	UT-HZ18 + TH-T18	
	with 2-elements	For Magnetic Starters	TH-T18KP	TH-T25KP
	with 3-elements	For independent mounting	UT-HZ18 + TH-T18KP	
	Outside dimensions [mm]	For Magnetic Starters	46×55×76.5	63×51×79
	W×H×D	For independent mounting	46×63×82.4	
	Product weight [kg]	For Magnetic Starters	0.11	0.16
		For independent mounting	0.16	
Applicable standard			IEC60947-4-1, EN60947-4-1, JIS C8201-4-1, GB14048.4	
Use condition		Ambient temperature [°C]	-10 to +40 (Standard: 20°C; maximum temperature on the board: 55°C)	
		Frequency [Hz]	0(DC) to 400	
Main circuit specifications	Rated insulation voltage [V]		690	
	Rated impulse withstand voltage [kV]		6	
	Pollution degree		3	
	Heater designation (adjustable range of stabilized current) [A] (Rated operational voltage : 550V maximum)		0.12 (0.1 to 0.16)	0.24 (0.2 to 0.32)
			2.1 (1.7 to 2.5)	2.5 (2 to 3)
			0.17 (0.14 to 0.22)	0.35 (0.28 to 0.42)
			2.5 (2 to 3)	3.6 (2.8 to 4.4)
			0.24 (0.2 to 0.32)	0.5 (0.4 to 0.6)
			3.6 (2.8 to 4.4)	5 (4 to 6)
			0.35 (0.28 to 0.42)	0.7 (0.55 to 0.85)
			5 (4 to 6)	6.6 (5.2 to 8)
	Power consumption [VA/element] at minimum/maximum stabilization		0.8 / 1.8	1.5 / 3.0
Operation circuit (contact) specifications	Terminal screw size		M3.5	M4
	Compatible with terminal	Electric wire size [mm ²]	φ 1.6, 0.75 to 2.5	φ 1.6 to 2.6, 1.25 to 6
		Crimp lug size	1.25-3.5 to 2-3.5, 5.5-S3	1.25-4 to 5.5-4
	Contact arrangement		1a1b	1a1b
	Conventional free air thermal current Ith [A]		2	5
	Rating Operational Current [A] Category AC-15 (AC operated Magnetic Contactors) Coil opening and closing a contact/b contact The value in brackets indicates the rating for automatic reset. Category DC-13 (DC operated Magnetic Contactors) Coil opening and closing The value in brackets indicates the rating for automatic reset.	24VAC	2(0.5) / 2(0.5)	2(0.5) / 3(0.5)
		120VAC	2(0.5) / 2(0.5)	2(0.5) / 3(0.5)
		240VAC	1(0.5) / 1(0.5)	1(0.5) / 2(0.5)
		550VAC	0.3(0.3) / 0.3(0.3)	0.3(0.3) / 0.3(0.3)
		24VDC	0.5(0.3)	1(0.3)
		110VDC	0.2(0.2)	0.2(0.2)
		220VDC	0.1(0.1)	0.1(0.1)
		Minimum applicable load level	20V 5mA	20V 5mA
Characteristics/Functions	Terminal screw size		M3.5	M3.5
	Compatible with terminal	Electric wire size [mm ²]	φ 1.6, 0.75 to 2.5	φ 1.6, 0.75 to 2.5
		Crimp lug size	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5
	Trip class		10A	
	Operating characteristic curve description page		Page 27	
	Vibration resistance (vibration resistance malfunction performance)		10 to 55 Hz, 19.6 m/s ²	
	Trip-free		○	○
	Reset method		Manual/Automatic switchable	Manual/Automatic switchable
	Operation indication (lever indication)		○	○
	Manual trip check		○	○
Applied products	With saturable reactor		TH-□SR	○
	With 3-element (2E) thermal saturable reactor		TH-□KPSR	○
	2-element quick-acting characteristics thermal		TH-□FS	○
	With 3-element (2E) thermal quick-acting characteristics		TH-□FSKP	○

Note 1: The ambient temperature compensator is mounted on all types.

Thermal Overload Relays

Model list

Frame			T50	T65	T100
Appearance					
Model name	with 2-elements	For Magnetic Starters	TH-T50	TH-T65	TH-T100
	with 3-elements	For Magnetic Starters	TH-T50KP	TH-T65KP	TH-T100KP
	Outside dimensions [mm] W×H×D	For Magnetic Starters	74.3×74×88	89×57×83.5	89×68.5×83.5
	Product weight [kg]	For Magnetic Starters	0.2	0.26	0.32
Applicable standard			IEC60947-4-1, EN60947-4-1, JIS C8201-4-1, GB14048.4		
Use condition		Ambient temperature [°C]	-10 to +40 (Standard: 20°C; maximum temperature on the board: 55°C)		
		Frequency [Hz]	0(DC) to 400		
Main circuit specifications	Rated insulation voltage [V]		690		
	Rated impulse withstand voltage [kV]		6		
	Pollution degree		3		
	Heater designation (adjustable range of stabilized current) [A] (Rated operational voltage : 550V maximum)		29 (24 to 34) 35 (30 to 40) 42 (34 to 50)	15 (12 to 18) 22 (18 to 26) 29 (24 to 34) 35 (30 to 40) 42 (34 to 50) 54 (43 to 65)	67 (54 to 80) 82 (65 to 100) 95 (85 to 105)
	Power consumption [VA/element] at minimum/maximum stabilization		1.6/3.2	2.4/5.5	2.5/6.0
	Terminal screw size		M5	M6	M6
	Compatible with terminal	Electric wire size [mm ²]	φ5.5 to 14	—	—
		Crimp lug size	5.5-5 to 14-5	5.5-6 to 22-6	14-6 to 22-6, 38-S6
	Contact arrangement		1a1b	1a1b	1a1b
	Conventional free air thermal current Ith [A]		5	5	5
Operation circuit (contact) specifications	Rating Operational Current [A]	Category AC-15 (AC operated Magnetic Contactors) (Coil opening and closing) a contact/b contact	24VAC	2(0.5) / 3(0.5)	2(0.5) / 3(0.5)
			120VAC	2(0.5) / 3(0.5)	2(0.5) / 3(0.5)
			240VAC	1(0.5) / 2(0.5)	1(0.5) / 2(0.5)
			550VAC	0.3(0.3) / 0.3(0.3)	0.5(0.5) / 1(0.5)
	Category DC-13 (DC operated Magnetic Contactors) (Coil opening and closing)	24VDC	1(0.3)	1(0.3)	1(0.3)
		110VDC	0.2(0.2)	0.2(0.2)	0.2(0.2)
		220VDC	0.1(0.1)	0.1(0.1)	0.1(0.1)
		Minimum applicable load level	20V 5mA	20V 5mA	20V 5mA
	Terminal screw size		M3.5	M4	M4
	Compatible with terminal	Electric wire size [mm ²]	φ 1.6, 1.25 to 2	φ 1.6, 1.25 to 2	φ 1.6, 1.25 to 2
		Crimp lug size	1.25-3.5 to 2-3.5	1.25-4 to 2-4, 5.5-S4	1.25-4 to 2-4, 5.5-S4
Characteristics/Functions	Trip class		10A	15 to 42A:10 54A:10A	67A:10 82A:10A
	Operating characteristic curve description page		Page 27		
	Vibration resistance (vibration resistance malfunction performance)		10 to 55Hz 19.6m/s ²		
	Trip-free		○	○	○
	Reset method		Manual/Automatic switchable	Manual/Automatic switchable	Manual/Automatic switchable
	Operation indication (lever indication)		○	○	○
	Manual trip check		○	○	○
Applied products	With saturable reactor		TH-□SR	○(TH-T50SR)	○(TH-T100SR)
	With 3-element (2E) thermal saturable reactor		TH-□KPSR	○(TH-T50KPSR)	○(TH-T100KPSR)
	2-element quick-acting characteristics thermal		TH-□FS	○(TH-T50FS)	○(TH-T100FS)
	With 3-element (2E) thermal quick-acting characteristics		TH-□FSKP	○(TH-T50FSKP)	○(TH-T100FSKP)

Note 1: The ambient temperature compensator is mounted on all types.

Selection Table

Thermal Overload Relays

Application to standard three-phase motor of Thermal Overload Relays

Thermal Overload Relays				Standard three-phase motor capacity [kW]		Magnetic Contactors that can be combined																																					
Heater designation(A)	Setting range(A)	Short-circuit protector rating (A) * Fuse gG (IEC60269-1/2)		Frame	220-240V	380-440V	TH-T18	TH-T25	TH-T50	TH-T65	TH-T100																																
		Main circuit	Auxiliary circuit																																								
0.12	0.1-0.16	2	6	T18			S-T10	S(D)-T12	S(D)-T20	S(D)-T21	S-T25																																
0.17	0.14-0.22	2	6									S(D)-T35	S(D)-T25	S(D)-T35	S(D)-T50																												
0.24	0.2-0.32	2	6		0.03	0.05										S(D)-T65	S(D)-T80	S(D)-T100	S(D)-T80																								
0.35	0.28-0.42	2	6		0.05	0.1														S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																				
0.5	0.4-0.6	2	6		0.07																			S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																
0.7	0.55-0.85	4	6		0.1	0.18, 0.2																						S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80												
0.9	0.7-1.1	4	6			0.25																										S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80								
1.3	1.0-1.6	4	6		0.2	0.37, 0.55																														S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80				
1.7	1.4-2.0	6	6			0.75																																		S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80
2.1	1.7-2.5	6	6		0.4																																						
2.5	2.0-3.0	10	6		1.1	S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																																		
3.6	2.8-4.4	10	6	0.75	1.5					S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																														
5	4.0-6.0	16	6	1	2.2									S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																										
6.6	5.2-8.0	20	6	1.5	3, 3.7													S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																						
9	7.0-11	20	6	2.2	3, 3.7																	S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																		
11	9.0-13	25	6		5.5																					S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80														
15	12-18	32	6	3.7	7.5, 9																									S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80										
22	18-26	50	6	5.5	11																													S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80						
29	24-34	63	6	7.5	15																																	S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80		
35	30-40	100	6		18.5, 19																																					S(D)-T100	S(D)-T80
42	34-50	100	6	11	22	S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																																		
54	43-65	100	6	15	30					S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																														
67	54-80	125	6	18.5, 19	37									S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																										
82	65-100	160	6	22	45													S(D)-T100	S(D)-T80	S(D)-T100	S(D)-T80																						

Precautions for Use

Thermal Overload Relays

Disassembly

The Thermal Overload Relays are adjusted at the time of assembly. Do not disassemble it.

Ambient temperature compensation

The TH-T type Thermal Overload Relays are adjusted with the Magnetic Starters in the standard box (the MS type) relative to the ambient temperature of 20°C (The temperature on the control board of the MSO type Magnetic Starters is 35°C). The ambient temperature compensator is mounted on the TH-T type Thermal Overload Relays. Therefore, the ambient temperature less affects the operational characteristic change. The minimum operating current change according to the ambient temperature change relative to the ambient temperature of 20°C (the temperature on the control board of 35°C) generally depends on the characteristics in the diagrams 1 and 2.

The Thermal Overload Relays have a characteristic that the operating current becomes high when the ambient temperature is low and becomes low when the ambient temperature is high. If the ambient temperature of the installation site is significantly different from 20°C (the temperature on the control board of 35°C), the setting current of the Thermal Overload Relays needs to be corrected as shown in diagrams 1 and 2. In addition, note that the compensation factor has a characteristic to be the minimum scale>middle scale>maximum scale at the adjustment knob location. (Note that the Thermal Overload Relays may operate at a current of less than 100% stabilized current if in use at temperatures exceeding the allowable working temperature of 40°C (55°C).)

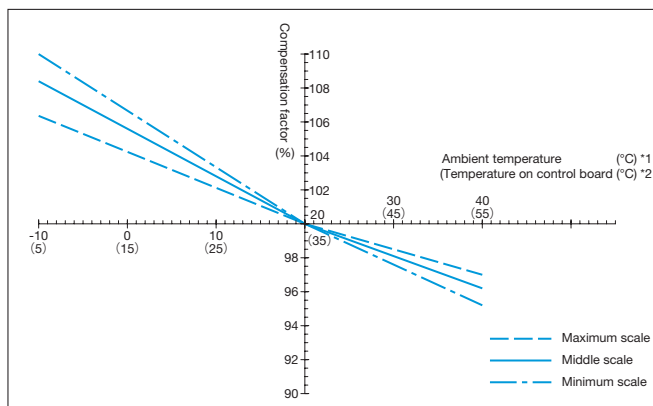


Diagram 1. Ambient temperature compensation curve (T18 frame)

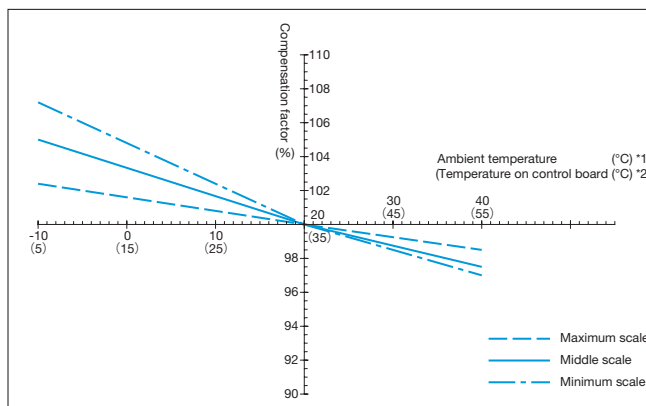


Diagram 2. Ambient temperature compensation curve (T25, T50, T65, T100 frame)

Compensation factor: Percentage of the minimum operating current at the ambient temperature of 20°C (the temperature on the control board of 35°C)

<Compensation procedure of setting current>

Determine the compensation factor of the working ambient temperature according to the curves in diagrams 1 and 2 and use the value of all load currents of the motor divided by the determined compensation factor as the stabilization value.

Example: The ambient temperature compensation factor for TH-T25 at the ambient temperature of 40°C (the temperature on the control board of 55°C) is 97% at the minimum scale according to diagram 2. If the motor rated current is 15A, the stabilization value is 15.5A (=15/0.97).

Note 1: [*1] The ambient temperature applied to the MS type indicates the outside temperature of the box.

[*2] The temperature including temperature increase on the control board applied to the MSO type is indicated.

Connecting electric wire size and operating current

The TH-T type adjusts the minimum operating current with the standard electric wire size shown in the following table. If the electric wire is thicker or thinner than this standard electric wire size, the operating current becomes high or low, respectively. Therefore, correct the stabilized current (divide it by the change rate of the minimum operating current) to use a size different from the standard connecting electric wire size.

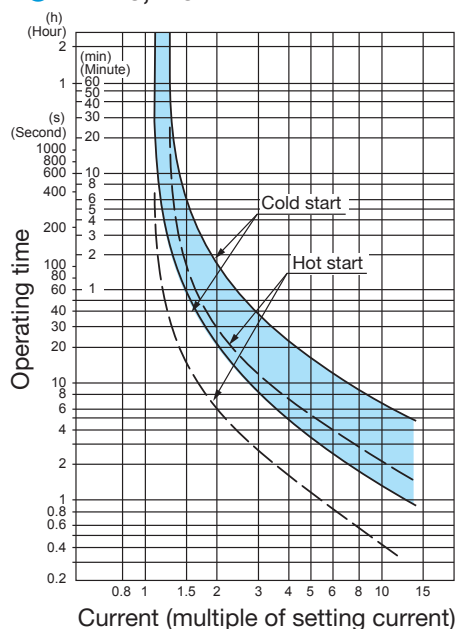
Model name	Heater designation [A]	Standard electric wire size [mm ²]	Connecting electric wire size [mm ²]	Change rate of minimum operating current [%]
TH-T18(KP)	0.12 to 15	2	1.25 2.5	98 103
TH-T25(KP)	0.24 to 11	3.5	2 6	97 104
TH-T25(KP)	15, 22	8	5.5 14	96 104
TH-T50(KP)	29	14	8	95
	35	3.5	2 5.5	95 105
	42	5.5	3.5 8	96 105
TH-T65(KP)	22, 29	8	5.5 14	95 105
	35	14	8 22	95 104
	42	22	14 30	96 104
TH-T100(KP)	67	22	14 30	97 103
	82	38	30	97

Operating Characteristic of Thermal Overload Relays (Ambient Temperature of 20°C)

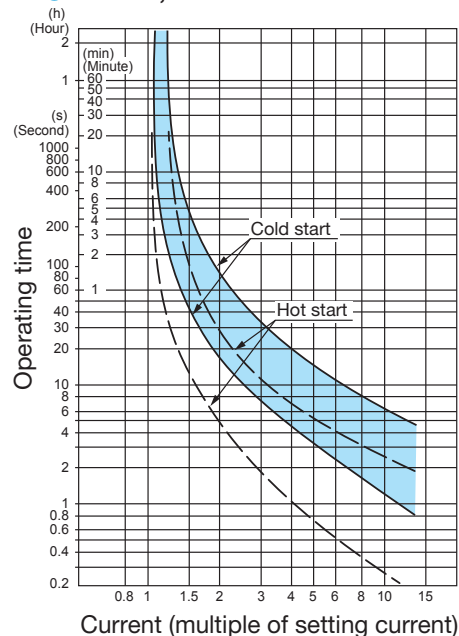
Thermal Overload Relays

For the information on the connecting electric wire size, refer to page 16.

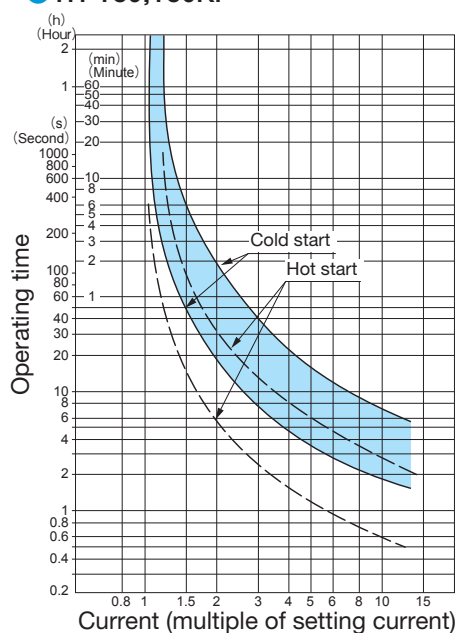
● TH-T18,T18KP



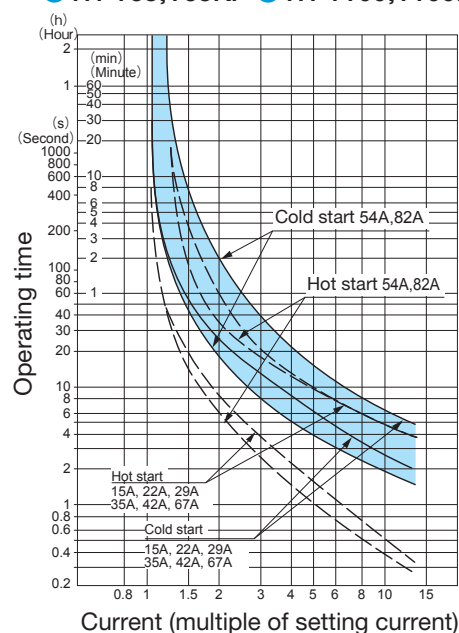
● TH-T25,T25KP



● TH-T50,T50KP



● TH-T65,T65KP ● TH-T100,T100KP



Thermal Overload Relays T Series

 (File No. E58968)

Model	Applicable	Heater Designation [Adjustment Range (RC Value) (A) of Settling Current]	Auxiliary contact
TH-T18(BC)KP	○	0.12A(0.1~0.16), 0.17(0.14~0.22), 0.24A(0.2~0.32), 0.35A(0.28~0.42), 0.5A(0.4~0.6), 0.7A(0.55~0.85), 0.9A(0.7~1.1), 1.3A(1~1.6), 1.7A(1.4~2), 2.1A(1.7~2.5), 2.5A(2~3), 3.6A(2.8~4.4), 5A(4~6), 6.6A(5.2~8), 9A(7~11), 11A(9~13), 15A(12~18)*1	Rated Code C600 AC600Vmax Making Breaking 1800VA(15A max) 180VA(1.5A max)
TH-T25(BC)KP	○	0.24A(0.2~0.32), 0.35A(0.28~0.42), 0.5A(0.4~0.6), 0.7A(0.55~0.85), 0.9A(0.7~1.1), 1.3A(1~1.6), 1.7A(1.4~2), 2.1A(1.7~2.5), 2.5A(2~3), 3.6A(2.8~4.4), 5A(4~6), 6.6A(5.2~8), 9A(7~11), 11A(9~13), 15A(12~18), 22A(18~26)	
TH-T50(BC)KP	○	29A(24~34), 35A(30~40), 42A(34~50)	Rated Code B600 AC600Vmax
TH-T65(CW)KP	○	15A(12~18), 22A(18~26), 29A(24~34), 35A(30~40), 42A(34~50), 54A(43~65)	Making Breaking 3600VA(30A max) 360VA(3A max)
TH-T100KP	○	67A(54~80), 82A(65~100)	

Note 1. Applicable:.....○: standard product

Note 2. The available maximum current rating is 16A.

For the heater designation other than 15A, the available maximum current rating is the highest value of adjustment range (RC value) (A) specified for each settling current.

Contactor Relays T Series

 (File No. E58968)

Model				Rated			Remarks
AC operating		DC operating					
	SR-T5(BC)(SA)		SRD-T5(BC)(SA)	A600 AC600V max Making 7200VA Breaking 720VA	Q300 DC250V max	R300 DC250V max Making 69VA Breaking 69VA	The standard product is certified with  .
	SR-T5(BC)(SA)		SRD-T9(BC)(SA)				

Optional Units T Series (File No. E58969)

Model	
UT-AX2(BC),AX4(BC),AX11(BC)	○
UT-ML11(BC),ML20(BC)	①
UT-SA21,SA23,SA25	○

Note1.○:Standard Product and Displayed on the Product.

①:Certified as a contactor component.(mark not displayed on the product)

■ Applicable wire size, lug size and tightening torque

Model	S-T10/S(D)-T12/T20			S(D)-T21	S-T25	S(D)-T21/T25	S-T21/T25	S(D)-T32	
Terminal	Main	Auxiliary	Control	Main		Auxiliary	Control	Main	Control
Screw size	M3.5	M3.5	M3.5	M4		M3.5	M3.5	M4	M3.5
Wire strip length	10mm	10mm	9mm	11.5mm		11.5mm	9mm	11.5mm	9mm
Wire size (60/75°C) (copper only) (Sol./Str.)	14 - 12 AWG	14 AWG	14 AWG	14 - 10 AWG	14 - 8 AWG	14 AWG	14 AWG	14 - 10 AWG 8 AWG *1	14 AWG
Recommended Crimp Lug Size (JST Cat No.) *2	1.25-3.5~2-3.5 5.5-S3	1.25-3.5~2-3.5	1.25-3.5~2-3.5	1.25-4~5.5-4	1.25-4~5.5-4 8-4NS	1.25-3.5~ 2-3.5	1.25-3.5~ 2-3.5	1.25-4~5.5-4 8-4NS	1.25-3.5~2-3.5
Connection to terminal Max. qty.	2 Wires or 2 Lugs per terminal *3								
Tightening torque	10.3 lb-in (1.17N · m)	10.3 lb-in (1.17N · m)	10.3 lb-in (1.17N · m)	15 lb-in (1.69N · m)		10.3 lb-in (1.17N · m)	10.3 lb-in (1.17N · m)	15 lb-in (1.69N · m)	10.3 lb-in (1.17N · m)

*1. When using 8AWG with a 3-phase AC200 to 208V, use a copper wire with wire temperature rating of 75°C.

*2. Please use swaging tool which is recommended by JST.

*3. Two conductors of the same size can be connected.

Model	S(D)-T35/T50			S(D)-T65	S(D)-T80	S(D)-T65/T80		S(D)-T100		
Terminal	Main	Auxiliary	Control	Main		Auxiliary	Control	Main	Auxiliary	Control
Screw size	M5	M3.5	M3.5	M6		M4	M4	M6	M4	M4
Wire strip length	15mm	11.5mm	9mm	—		11mm	11mm	—	11mm	11mm
Wire size (60/75°C) (copper only) (Sol./Str.)	14-6 AWG *1	14 AWG	14 AWG	14-2 AWG	14-1 AWG *2	14 AWG	14 AWG	14-1/0 AWG *3	14 AWG	14 AWG
Recommended Crimp Lug Size (JST Cat No.)	1.25-5~14-5	1.25-3.5~2-3.5	1.25-3.5~2-3.5	1.25-6~22-6	1.25-6~22-6 38-S6	1.25-4~2-4	1.25-4~2-4	1.25-6~22-6 38-S6, 60-6	1.25-4~2-4	1.25-4~2-4
Connection to terminal Max. qty.	2 Wires or 2 Lugs per terminal *4									
Tightening torque	22.5 lb-in (2.54N · m)	10.3 lb-in (1.17N · m)	10.3 lb-in (1.17N · m)	39.1 lb-in (4.41N · m)		15 lb-in (1.69N · m)	15 lb-in (1.69N · m)	39.1 lb-in (4.41N · m)	15 lb-in (1.69N · m)	15 lb-in (1.69N · m)

*1. When using 6AWG, use a copper wire with wire temperature rating of 75° C.

*2. When using 1AWG, use a copper wire with wire temperature rating of 75° C.

*3. When using 1/0AWG, use a copper wire with wire temperature rating of 75° C.

*4. Two conductors of the same size can be connected.

Model	TH-T18KP		TH-T25KP		TH-T50KP		TH-T65KP		TH-T100KP		SR(D)-T5/T9	
Terminal	Main	Auxiliary	Main	Auxiliary	Main	Auxiliary	Main	Auxiliary	Main	Auxiliary	Auxiliary	Main
Screw size	M3.5	M3.5	M4	M3.5	M5	M3.5	M6	M4	M6	M4	M3.5	M3.5
Wire strip length	10.5mm	10.5mm	10mm	10.5mm	13.5mm	10.5mm	—	11mm	—	11mm	10mm	9mm
Wire size (60/75°C) (copper only) (Sol./Str.)	14 - 12 AWG *1	14 AWG	14 - 8 AWG	14 AWG	14-6 AWG *2	14 AWG	14-3 AWG	14 AWG	14-1 AWG *3	14 AWG	14 AWG	14 AWG
Recommended Crimp Lug Size (JST Cat No.) *4	1.25-3.5~ 2-3.5 5.5-S3	1.25-3.5~ 2-3.5	1.25-4~5.5-4 8-NK4	1.25-3.5~ 2-3.5	1.25-5~14-6	1.25-3.5~2-3.5	2-6~22-6	1.25-4~2-4	2-6~22-6	1.25-4~2-4	1.25-3.5~ 2-3.5	1.25-3.5~ 2-3.5
Connection to terminal Max. qty.	2 Wires or 2 Lugs per terminal *5				2 Wires or 2 Lugs per terminal						2 Wires or 2 Lugs per terminal *5	
Tightening torque	10.3 lb-in (1.17N · m)	10.3 lb-in (1.17N · m)	15 lb-in (1.69N · m)	10.3 lb-in (1.17N · m)	22.5 lb-in (2.54N · m)	10.3 lb-in (1.17N · m)	39.1 lb-in (4.41N · m)	15 lb-in (1.69N · m)	39.1 lb-in (4.41N · m)	15 lb-in (1.69N · m)	10.3 lb-in (1.17N · m)	10.3 lb-in (1.17N · m)

*1. The applicable current for the heater nominal 15A is 16A or less.

*2. When using 6AWG, use a copper wire with wire temperature rating of 75° C.

*3. Use a copper wire with wire temperature rating of 75° C.

*4. Please use swaging tool which is recommended by JST.

*5. Two conductors of the same size can be connected.

Order Procedure

Note

For orders, specify products as shown below. Insert a space where ▲ is present. If adding multiple two-character codes (such as SA, BC, and KP) after a frame size (T10 or others) of type name, specify them in alphabetical order of the first letters. (Example: MSO-T10BCKPSA)
(If they are not in alphabetical order, the type code is automatically changed.)

Enclosed Magnetic Starters

●MS-(2×)T type

Model name	motor capacity	Main circuit voltage	Operation coil designation or operation circuit voltage	Auxiliary contact
MS-T21	▲ 3.7kW	▲ 200V	▲ AC200V	▲
MS-T10		▲ 200V	▲ AC200V	▲ 1B
Refer to page 18,50.	Select from page 18,26.	Do not add AC to the main circuit voltage. (To distinguish it from the operation circuit voltage)	Select coil designation from pages 22 or specify the working operation circuit voltage.	Select the auxiliary contact arrangements. from page 18.

Standard (AC operated) Magnetic Starters

●MSO-(2×)T type

Model name	Heater designation (setting current)	Main circuit voltage	Operation coil designation or operation circuit voltage	Auxiliary contact
MSO-T21	▲ 3.7kW	▲ 200V	▲ AC200V	▲
MSO-T10	▲ 9A	▲ 200V	▲ AC200V	▲ 1B
Refer to page 18,20,50.	Select from page 18,20,26.	Do not add AC to the main circuit voltage. (To distinguish it from the operation circuit voltage)	Select coil designation from pages 22 or specify the working operation circuit voltage.	Select the auxiliary contact arrangements. from page 18,20.

Standard (AC operated) Magnetic Contactors

●S-(2×)T types

Model name	Operation coil designation or operation circuit voltage	Auxiliary contact
S-T20	▲ AC200V	▲ 2A
S-T20	▲ AC100V50Hz	
Refer to page 18,20,50.	Select coil designation from pages 22 or specify the working operation circuit voltage.	Select the auxiliary contact arrangements. from page 18,20.

Contactors Relays

●SR-T types

Model name	Operation coil designation	Contact arrangement
SR-T5	▲ AC200V	▲ 3A2B
SR-T5	▲ AC100V50Hz	▲ 4A1B
Refer to page 34.	Select coil designation from pages 22 or specify the working operation circuit voltage.	Designate the contact arrangement listed on page 34.