Magnetic Motor Starter TECHNICAL NOTES

MS-T Series Magnetic Contactors and Magnetic Motor Starters

This document introduces the types, characteristics and performances (Type test results) of the magnetic motor starter, for the purpose of being generally utilized as a basic document by all the users including the administrators, designers, and those responsible for construction.

- Note a) Note that the described contents are subject to change without notice.
 - b) The described content is only for reference and it cannot be guaranteed.

The units are described in SI units.

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Standard Series Magnetic Motor Starter and Magnetic Contactor

Kinds and Ratings

Type MS-T magnetic motor starter consists of a type S-T magnetic contactor, type TH-T thermal overload relay and an outer case. Type MSO-T magnetic motor starters are also available as a unit for power distributor panels and control panels.

Table 1 Constitutional Elements of Type MS-T Magnetic Motor Starters

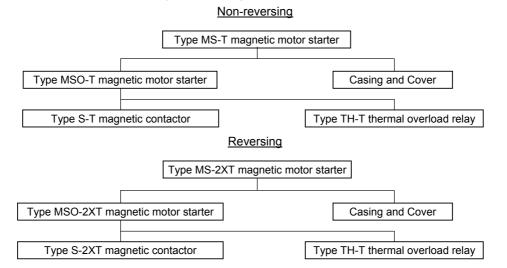


Table 2 Kinds and Composition

			Туре		Constituent elements												
Frame	MS-, with	enclosure		n-out enclosure	S-, magneti	ic contactor											
Traine	Non- reversing	Reversing	Non- reversing Reversing		Non- reversing	Reversing	Thermal overload relay										
T10	MS-T10 (KP)	-	MSO-T10 (KP)	MSO-2xT10 (KP)	S-T10	S-2xT10											
T12	MS-T12 (KP)	-	MSO-T12 (KP)	MSO-2xT12 (KP)	S-T12	S-2xT12	TH-T18(KP)										
T20	-	-	MSO-T20 (KP)	MSO-2xT20 (KP)	S-T20	S-2xT20											
T21	MS-T21 (KP)	MS-2xT21 (KP)	MSO-T21 (KP)	MSO-2xT21 (KP)	S-T21	S-2xT21	TH-T25(KP)										
T25	-	-	MSO-T25 (KP)	MSO-2xT25 (KP)	S-T25	S-2xT25	10-125(KF)										
T32	-	-	-	-	S-T32	S-2xT32	-										
Т35	MS-T	35(KP)	MSO-T35 (KP)	MSO-2xT35 (KP)	S-T35	S-2xT35	TH-T25(KP) (Nominal current of the heater: 22 A or less) TH-T50(KP) (Nominal current of the heater: 29 A)										
T50	MS-T	MS-T50(KP)		MSO-2xT50 (KP)	S-T50	S-2xT50	TH-T25(KP) (Nominal current of the heater: 22 A or less) TH-T50(KP) (Nominal current of the heater: 29 A or higher)										
T65	MS-T	65(KP)	MSO-T65 (KP)	MSO-2xT65 (KP)	S-T65	S-2xT65	TH-T65(KP)										
T80	MS-T80(KP)		MS-T80(KP)		MS-T80(KP)		MS-T80(KP)		MS-T80(KP)) MS-T80(KP)		MSO-T80 (KP)	MSO-2xT80 (KP)	S-T80	S-2xT80	TH-T65(KP) (Nominal current of the heater: 54 A or less) TH-T100(KP) (Nominal current of the heater: 67 A)
T100	MS-T100(KP)		MSO-T100 (KP)	MSO-2xT100 (KP)	S-T100	S-2xT100	TH-T65(KP) (Nominal current of the heater: 54 A or less) TH-T100(KP) (Nominal current of the heater: 67 A or higher)										

Application			Resistance load					
	/ Three-phas	ategory AC-3 [k se squirrel-cage ndard responsib	motor load	/ Three-phase	AC-4 [kW] squirrel-cage d inching sibility	Category AC-1 [kW] (Resistance, heater)		
Frame	220 to 240V	380 to 440V	500V	220 to 240V	500V	220 to 240V	380 to 440V	
T10	2.5	4	4	1.5	2.7(2.2)	7.5	7	
T12	3.5	5.5	7.5	2.2	5.5(4)	7.5	8.5	
T20	4.5	7.5	7.5	3.7	5.5	7.5	8.5	
T21	5.5	11	11	3.7	5.5	12	20	
T25	7.5	15	15	4.5	7.5	12	20	
T32	7.5	15	15	5.5	7.5(11)	12	20	
T35	11	18.5	18.5	5.5	11	20	35	
T50	15	22	25	7.5	15	30	50	
T65	18.5	30	37	11	22	35	65	
T80	22	45	45	15	30	45	78	
T100	30	55	55	19	37	55	90	

Table 3 Rated Capacity

Note a) Brackets () in the inching operation indicate the rating of 380V to 440V.

Table 4 Rated Operation Current

Application			Moto	r load			Resistan	Rated			
	Cat	egory AC- 3	[A]	Cat	egory AC- 4	- [A]	Category	Continuous			
Frame	220 to 240V	380 to 440V	500V	220 to 240V	380 to 440V	500V	220 to 240V	380 to 440∨	current I th [A]		
T10	11	9	7	8	6	6	20	11	20		
T12	13	12	9	11	9	9	20	13	20		
T20	18	18	17	18	13	10	20	13	20		
T21	25	23	17	18	13	10	32	32	32		
T25	30(26)	30(26)	24	20	17	12	32	32	32		
T32	32	32	24	26	24	17	32	32	32		
T35	40	40	32	26	24	17	60	60	60		
T50	55	48	38	35	32	24	80	80	80		
T65	65	65	60	50	47	38	100	100	100		
T80	85	85	75	65	62	45	120	120	120		
T100	105	105	85	80	75	55	150	150	150		

Note a) Rated operational current is the maximum applicable current that satisfies the making capacity, breaking capacity, switching frequency, and life at the rated operational voltage.

Note b) Rated Continuous current is a current that can conduct the electricity for 8 hours without raising the temperature above the stated level for all the parts, without switching the magnetic contactor.

Note c) The values of rated operational current in brackets () apply to the magnetic contactor (without thermal overload relay).

Table 5 DC	Rated		C2, and DC4	Catego			ategory DC-1	
Frame	voltage		r load) [A]	(Resistanc		(L	C coil load) [/	
	DC [V]	2-pole series	3- pole series	2- pole series	3- pole series	Single pole	2- pole series	3- pole series
	24	8	8	10	10	5	8	8
T10	48	4	6	10	10	3	4	6
110	110	2.5	4	6	8	0.6	2	3
	220	0.8	2	3	8	0.2	0.3	0.8
	24	12	12	12	12	7	12	12
T12	48	6	10	12	12	5	6	10
112	110	4	8	10	12	1.2	3	5
	220	1.2	4	7	12	0.2	0.5	2
	24	18	18	18	18	10	14	15
T20	48	15	18	18	18	5	7	12
120	110	8	15	13	18	1.2	3	5
	220	2	8	8	18	0.2	0.5	2
	24	20	20	20	20	12	20	20
T01	48	15	20	20	20	8	12	15
T21	110	8	15	15	20	1.5	3	10
	220	2	8	10	20	0.25	1.2	4
	24	25	25	25	25	15	25	25
TOF TOO	48	20	25	25	25	10	15	25
T25, T32	110	10	20	25	25	1.5	4	12
	220	3	10	12	22	0.25	1.2	4
	24	35	35	35	35	15	35	35
T 0 -	48	20	30	35	35	10	15	25
T35	110	10	20	25	35	1.5	4	12
	220	3	10	12	30	0.25	1.2	4
	24	45	50	50	50	-	-	-
TEO	48	25	35	40	50	-	-	-
T50	110	15	30	35	50	-	-	-
	220	3.5	12	15	40	-	-	-
	24	45	50	50	65	-	-	-
TOF	48	25	35	40	65	-	-	-
T65	110	15	30	35	65	-	-	-
	220	3.5	12	15	50	-	-	-
	24	65	80	80	80	-	-	-
T 00	48	40	60	65	80	-	-	-
T80	110	20	50	50	80	-	-	-
	220	5	20	20	60	-	-	-
	24	93	93	93	93	-	-	-
	48	60	90	93	93	-	-	-
T100	110	40	80	80	93	-	-	_
	220	30	50	50	70	-	-	-

Table 5 DC rated working current

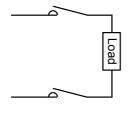
Note a) DC2, DC4, and DC1 are the gradings of JEM1038 that are to be applied for starting and stopping the DC shunt-wound motor, starting and stopping the DC series motor, and resistance load respectively.

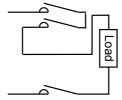
Note b) DC- 13 is the grading of IEC60947-5-1 which is to be applied to the induction (coil) load (time constant L/R = 100ms).

Note c) The Switching of the electrical switch can be done up to 500,000 times.

Note d) The closed current capacity of the DC2 and DC4 is four times of the above table while the frequency is 100 times and the breaking current capacity is four times of the above table while the frequency is 25 times.

Note e) The 2-pole series and 3-pole series connections are shown in the following diagram.





2-pole series

3- pole series

Characteristics and Performance (Type test results)

1. Structure

It is compatible with JISC8201-4-1, IEC60947-4-1, EN60947-4-1, UL60947-4-1, CSA C22.2 No.60947-4-1, and GB14048.4.

2. Type Test

 Applicable Standard
 IEC60947-1
 (2011)
 Low voltage switchgear and control gear Part 1: General Rule

 IEC60947-4-1
 (2012)
 Low voltage switchgear and control gear Part 4: Contactor and Motor Starter Section 1: Electro-mechanical Contactor and Motor Starter

2.1 Type Tests and Test Sequences

Test Sequences	Test Name	Test Conditions							
a) Sequence I	1) Temperature rise	According to the IEC60947-4-1	9.3.3.3 "Temperature Rise".						
	2) Operation and operating limits	According to the IEC60947-4-1	9.3.3.1 "Operation" and 9.3.3.2 "Operating Limits".						
	3) Dielectric properties	According to the IEC60947-4-1	9.3.3.4 "Dielectric Properties".						
b) Sequence II	1) Rated making breaking capacity Switching capacity and reversibility	According to the IEC60947-4-1 Capacity".	9.3.3.5 "Making and Breaking						
	2) Conventional operating performance	According to the IEC60947-4-1 Performance Capability".	9.3.3.6 "Operating						
c) Sequence III	1) Performance under short-circuit conditions	According to the IEC60947-4-1 Short-circuit Conditions".	9.3.4 "Performance under						
d) Sequence IV	 Ability of contactors to withstand overload currents 	According to the IEC60947-4-1 Withstand Overload Currents".	9.3.5 "Ability of Contactors to						
e) Sequence V	 Mechanical properties of terminals 	According to the IEC60947-1 of Terminals".	8.2.4 "Mechanical Properties						

Note a) Tests were conducted with the following coil designation: 200VAC (Rated voltage 200 to 240V 50Hz/60Hz)

2.2 Test Sequence I

2.2.1 Temperature Rise and Dielectric Properties

These tests were conducted according to the test conditions indicated in Table 1 and Note a) to e). The temperature rise of each part met the standard criteria of temperature rise limit. Also the operations and dielectric properties after the temperature tests met the standard criteria.

Item	Combined T	herm	al	-						Res	ults				
\mathbb{N}	Overload	Relav		les	t Cono	litions	Note a)								
			S			5 3									
	lod	eat	ettl	Curre	ent [A]	Main Wire		Tempe	erature R	lise [K]		pe		erties	
	Model Name	er,	ing	7	~	n Circ 9 Size		T	al a a l	0	1 1	Operation			
\setminus	lan	des	ĉ	Лаі	ľ,	ercu	Coil	Tern	r		tact	n	mp	Ŵ	
$\langle \rangle$	le	Heater designation	Settling Current	Main Circuit	Auxiliary Circuit	Main Circuit Connection Wire Size		Main Circuit	Auxiliary Circuit	Main Circuit	Auxiliary Circuit		Impulse	Power Frequency	
$\langle \rangle$		atio	nt	irc	2	Őŋ		in (ilia	în (dilia		æ	-rec	
$\langle \rangle$		n		Jit	Ĩ	lec		Circ	N I	Sirc	7			que	Ľ
$\langle \rangle$					ü÷	tion		uit	Circ	uit	Circ			ncy	gp
						_			cuit		uit				Judgment
		[A]	[A]			[mm ²]	[Resistance								nt
		• •				Note b)	method]						Note d)	Note d)	
\ Stan-						,						Z a ≠		,	
\ dard												Three times opening and dosing thermal No trip	7.3kV		
\backslash							100	65	65			p losir	1.2/50	1890V	
$\langle \rangle$	-	-	-	-	-	-	or less	oo or less	oo or less	Not	e c)	ng ti	μs	5 seconds	
· · · · \							01 1655	01 1655	01 1655			nem	x5	3 3000103	
Model												nal	times		
Name															
MSO-T10 (KP)	TH-T18 (KP)	9	11	11	10	1.5	47	48	39	50	52	OK	OK	OK	OK
MSO-T12 (KP)	TH-T18 (KP)	11	13	13	10	2.5	47	56	41	55	54	OK	OK	OK	OK
MSO-T20 (KP)	TH-T18 (KP)	15	18	18	10	2.5	53	58	42	72	54	OK	OK	OK	OK
MSO-T21 (KP)	TH-T25 (KP)	15	18	18	10	2.5	43	51	41	43	47	OK	OK	OK	OK
MSO-T25 (KP)	TH-T25 (KP)	22	26 34	26 34	10	6	43	53 47	40	57	47 42	OK	OK	OK	OK
MSO-T35 (KP)	TH-T50 (KP)	29	-	34 50	10 10	10 10	67		30 30	58	42	OK OK	OK OK	OK	OK
MSO-T50 (KP) MSO-T65 (KP)	TH-T50 (KP) TH-T65 (KP)	42 54	50 65	50 65	10	10	67 57	58 49	30 25	68 60	43	OK	OK	OK OK	OK OK
MSO-T85 (KP) MSO-T80 (KP)	TH-T65 (KP) TH-T100 (KP)	54 67	80	80	10	25	63	49 58	25 25	75	42	OK	OK	OK	OK
MSO-T100 (KP)	TH-T100 (KP)	82	100	100	10	35	51	56	34	70	42	OK	OK	OK	OK
S-T10	-	-	-	20	10	2.5	45	46	38	70	52	-	OK	OK	OK
S-T12	-	-	-	20	10	2.5	41	55	38	76	52	-	OK	OK	OK
S-T20	-	-	-	20	10	2.5	41	55	38	75	52	_	OK	OK	OK
S-T21	-	-	-	32	10	6	31	34	30	46	47	-	OK	OK	OK
S-T25	-	-	-	32	10	6	31	34	30	46	47	-	OK	OK	OK
S-T32	-	-	-	32	-	6	29	33	-	45	-	-	OK	OK	OK
S-T35	-	-	-	60	10	16	62	35	30	45	46	-	OK	OK	OK
S-T50	-	-	-	80	10	25	64	41	29	58	45	-	OK	OK	OK
S-T65	-	-	-	100	10	35	56	39	25	61	42	-	OK	OK	OK
S-T80	-	-	-	120	10	50	62	45	25	71	42	-	OK	OK	OK
S-T100	-	-	-	150	10	50	43	46	34	83	49	-	OK	OK	OK

Note a) The test of temperature rise and operation was conducted by operating at an ambient temperature of 40°C, in open state with the iron plate mounted and by applying a voltage of 240V and a frequency of 60Hz to the operating coil.

Note b) The connection wire size of the auxiliary circuit: 1.5 mm²

Note c) The temperature rise of the contacts was checked at a temperature that is not harmful to the surrounding components. (In short 100K)

Note d) The application points of the impulse withstand voltage performance and the power frequency withstand voltage performance were as follows. However in the power frequency withstand voltage test, (c) was not implemented. Measurement Points: (a) Between all terminals of the main circuit and grounded metal body when the contact element was closed.

- (b) Between one pole of the main circuit and all other poles connected altogether to the grounded metal body when the contact element was closed.
- (c) Between the supply side terminals and the load side terminals of the main circuit when the contact element was opened.
- (d) Between one circuit of the operating circuit and auxiliary circuit, and all other circuits/grounded metal body.

Note e) Number of Samples: 1 per machine

2.2.2 Operating Limits

(1) Operating Limits of the Magnetic Contactor

The operating voltage (hot condition) and open-circuit voltage after the temperature test met the standard criteria by operating and opening without hindrance in the set voltage.

			Table 2			
	Item		Test Conditions and Re	esults		
		Operating Volt	age (40°C Hot)	Open-circuit Voltage (-5°C Cold)	Judgment	
	Standard	Operation at 85% (170V or	Operation at 110% of the	Open at 20 to 75% of the	Judgment	
Model Name		less) of the coil rated voltage	coil rated voltage Note a)	coil rated voltage Note b)		
	50Hz	129	OK	90	OK	
MSO-T10 (KP)	60Hz	142	OK	107	OK	
MSO-T12 (KP)	50Hz	149	OK	95	OK	
WISO-112 (KP)	60Hz	164	OK	109	OK	
MSO-T20 (KP)	50Hz	151	OK	96	OK	
W30-120 (KF)	60Hz	165	OK	112	OK	
MSO-T21 (KP)	50Hz	144	OK	104	OK	
100-121 (KF)	60Hz	156	OK	115	OK	
MSO-T25 (KP)	50Hz	147	OK	108	OK	
100-125 (KP)	60Hz	159	OK	118	OK	
MSO-T35 (KP)	50Hz	137	OK	107	OK	
100-100 (10)	60Hz	146	OK	117	OK	
MSO-T50 (KP)	50Hz	137	OK	107	OK	
	60Hz	146	OK	117	OK	
MSO-T65 (KP)	50Hz	146	OK	85	OK	
	60Hz	148	OK	77	OK	
MSO-T80 (KP)	50Hz	146	OK	85	OK	
	60Hz	148	OK	77	OK	
MSO-T100 (KP)	50Hz	157	OK	100	OK	
	60Hz	159	OK	93	OK	
S-T10	50Hz	128	OK	89	OK	
0 1 10	60Hz	142	OK	106	OK	
S-T12	50Hz	145	OK	90	OK	
	60Hz	161	OK	107	OK	
S-T20	50Hz	145	OK	90	OK	
	60Hz	161	OK	108	OK	
S-T21	50Hz	130	OK	103	OK	
	60Hz	141	OK	112	OK	
S-T25	50Hz	131	OK	104	OK	
	60Hz	142	OK	114	OK	
S-T32	50Hz	142	OK	96	OK	
	60Hz	156	OK	108	OK	
S-T35	50Hz	135	OK	107	OK	
	60Hz	148	OK	117	OK	
S-T50	50Hz 60Hz	135	OK OK	107 117	OK	
		148	OK		OK	
S-T65	50Hz 60Hz	146 148	OK OK	85 77	OK OK	
	50Hz	148	OK	85	OK	
S-T80	50HZ 60HZ	146	OK	77	OK	
	50Hz	148	OK	98	OK	

Note a) The operation at 110% of the coil rated voltage of standard value was possible at 264V 50Hz/60Hz. Note b) The operation at 20 to 75% of the coil rated voltage of standard value was possible at 48V to 150V 50Hz/60Hz.

Note c) Number of Samples: 1 per machine

<Reference Test>

Coil characteristics (20°C cold condition)

	Input	N/A1	Con-	Operating V	Coil Current		Operating Time [ms]									
Model	input	[[[]]]		Operating v	ollage [v]	[mA]		$Coil\;ON\;\to\;$			Coil OFF \rightarrow					
Name Instant U			sumption Power					Main	Auxiliary	Auxiliary	Main	Auxiliary	Auxiliary			
	Usual	[W]	Operation	Open	Instant	Usual	Contact	Contact a	Contact b	Contact	Contact a	Contact b				
							[**]					ON	ON	OFF	OFF	OFF
S-T10	45	7	2.2	120 to 150	75 to 115	200	30	12 to 18	12 to 18	-	5 to 20	5 to 20	-			
S-T12	45	7	2.2	120 to 150	75 to 115	200	30	12 to 18	12 to 18	9 to 16	5 to 20	5 to 20	7 to 22			
S-T20	45	7	2.2	120 to 150	75 to 115	200	30	12 to 18	12 to 18	9 to 16	5 to 20	5 to 20	7 to 22			
S-T21	75	7	2.4	125 to 155	80 to 115	340	30	13 to 20	13 to 20	8 to 14	5 to 15	5 to 15	8 to 18			
S-T25	75	7	2.4	125 to 155	80 to 115	340	30	13 to 20	13 to 20	8 to 14	5 to 15	5 to 15	8 to 18			
S-T32	55	4.5	1.8	125 to 155	80 to 115	250	20	15 to 22	-	-	5 to 15	-	-			
S-T35	110	10	3.8	120 to 150	80 to 115	500	45	10 to 20	10 to 20	8 to 15	5 to 14	5 to 14	8 to 18			
S-T50	110	10	3.8	120 to 150	80 to 115	500	45	10 to 20	10 to 20	8 to 15	5 to 14	5 to 14	8 to 18			
S-T65	115	20	2.2	110 to 135	60 to 100	520	67	20 to 30	20 to 30	13 to 24	35 to 65	35 to 65	50 to 79			
S-T80	115	20	2.2	110 to 135	60 to 100	520	67	20 to 30	20 to 30	13 to 24	35 to 65	35 to 65	50 to 79			
S-T100	210	23	2.8	110 to 135	60 to 100	950	85	20 to 35	20 to 35	18 to 28	50 to 100	50 to 100	54 to 104			

Note a) The above table shows the standard values of the properties of the 200VAC coil.

Note b) Coil current is the average value when 220V 60Hz was applied.

- (2) Operating Charateristics of Thermal Overload Relay
 - 1) Operations in a Balanced Circuit (Ambient Temperature: 20°C)
 - (a) If the thermal overload relay does not function at 105% of settling current in cold conditions for more than 2 hours, the operation should be performed with 120% of the settling current for less than 2 hours after the constant temperature is maintained.
 - (b) When 150% of the settling current is passed after the settling current is passed and the constant temperature is maintained, the relay should operate within the limits shown in the table below with respect to the corresponding trip class.
 - (c) The operation should be performed within the limits shown in the table below with respect to the corresponding trip class, when 720% of the settling current is passed in cold conditions.

Trip Class	150% of the settling current	720% of the settling current
5	Less than 2 minutes	TP≦5 seconds
10A	Less than 2 minutes	2 <tp≦10 seconds<="" td=""></tp≦10>
10	Less than 4 minutes	4 <tp≦10 seconds<="" td=""></tp≦10>
20	Less than 8 minutes	6 <tp≦20 seconds<="" td=""></tp≦20>
30	Less than 12 minutes	9 <tp seconds<="" td="" ≦30=""></tp>

TP : Operating time at the time of constraint

Result: All the frames satisfy the above conditions.

- 2) Operations in an Unbalanced Circuit (Ambient Temperature: 20°C)
 - (a) If the open phase detection function does not execute when settling current is passed to all poles at thesame time for 2 hours, the operation should be performed within 2 hours when 1-pole is disconnected and 132% of settling current is passed to the other 2-pole after the constant temperature is maintained.
 - (b) If the open phase detection function does not execute when settling current is passed to 2-pole and 90% of settling current to 1 pole for 2 hours, the operation should be performed within 2 hours when 1-pole is disconnected and 115% of settling current is passed to the other 2-pole after the constant temperature is maintained.
 - (c) The operation should be performed within the limits shown in the table below with respect to the corresponding trip class, when 720% of the settling current is passed in cold conditions. Result: MSO-T□KP types satisfy the above conditions.

2.3 Test Sequence II

2.3.1 Test of Making and Breaking Capacities

(1) Test of Making Capacity

These tests were conducted according to the test conditions indicated in Table 4 and Note a) to c). No abnormalities such as welding of contacts were found, and the results met the standard criteria.

					Table 4					
Item	Rated Valu	ue (AC- 3)			Test Cond	itions (making)				
	Voltage Ue [V]	Current le [A]	Voltage U [V]	Current I [A]	Power Factor cosφ	Operation Cycle [Times] Note b)	ON time [seconds]	OFF time [seconds]	Results	nr
Stan- dard Model Name	-	-	1.05 x Ue	10 x le	le≦100A: 0.45±0.05 le>100A: 0.35±0.05	50	0.05	10	Contact Welding	Judgment
S-T10	220	11	231	110	0.45	50	0.05	10	None	OK
3-110	440	9	462	90	0.45	50	0.05	10	None	OK
S-T12	220	13	231	130	0.45	50	0.05	10	None	OK
3-112	440	12	462	120	0.45	50	0.05	10	None	OK
S-T20	220	18	231	180	0.45	50	0.05	10	None	OK
0-120	440	18	462	180	0.45	50	0.05	10	None	OK
S-T21	220	25	231	250	0.45	50	0.05	10	None	OK
0-121	440	23	462	230	0.45	50	0.05	10	None	OK
S-T25	220	30	231	300	0.45	50	0.05	10	None	OK
0 120	440	30	462	300	0.45	50	0.05	10	None	OK
S-T32	220	32	231	320	0.45	50	0.05	10	None	OK
0 102	440	32	462	320	0.45	50	0.05	10	None	OK
S-T35	220	40	231	400	0.45	50	0.05	10	None	OK
0-100	440	40	462	400	0.45	50	0.05	10	None	OK
S-T50	220	55	231	550	0.45	50	0.05	10	None	OK
3-130	440	48	462	480	0.45	50	0.05	10	None	OK
S-T65	220	65	231	650	0.45	50	0.05	10	None	OK
3-103	440	65	462	650	0.45	50	0.05	10	None	OK
S-T80	220	85	231	850	0.45	50	0.05	10	None	OK
0-100	440	85	462	850	0.45	50	0.05	10	None	OK
S-T100	220	105	231	1050	0.35	50	0.05	10	None	OK
5-1100	440	105	462	1050	0.35	50	0.05	10	None	OK

Note a) Main circuit frequency: 60Hz Note b) Among 50 operating cycles, 110% of the rated value (264V 60Hz) was applied to the coil for 25 cycles, and 85% of the rated value (170V 60Hz) was applied to the coil for the other 25 cycles.

Note c) Number of Samples: 1 per machine

(2) Test of Making and Breaking Capacities

These tests were conducted according to the test conditions indicated in Table 5 and Note a) to c) after the making capacity test (1). No abnormalities such as welding of contacts and phase-to-phase short circuits were found, and the results met the standard criteria.

Iten		Value - 3)		Test	Conditions (mak	ing and breaking	g capacity)	Desults	
\backslash	Voltage Ue	Current le	Voltage Ur	Current Ic	Power Factor	Operation Cycle	ON time	OFF time	Results	
	[V]	[A]	[V]	[A]	cosφ	[Times]	[seconds]	[seconds]		
Stan dare			1.05 x 1 15	0.415	le≦100A: 0.45±0.05	50	0.05	lc≦100: 10 100 <lc≦200: 20<br="">200<lc≦300: 30<br="">300<lc≦400: 40<="" td=""><td>Contact Welding and</td><td>Judgment</td></lc≦400:></lc≦300:></lc≦200:>	Contact Welding and	Judgment
Model Name	-	-	1.05 x Ue	8 x le	le>100A: 0.35±0.05		0.05	300 <lc≦400:40 400<lc≦600:60 600<lc≦800:80 800<lc≦1000:100< td=""><td>Phase-to- phase Short-circuits</td><td></td></lc≦1000:100<></lc≦800:80 </lc≦600:60 </lc≦400:40 	Phase-to- phase Short-circuits	
S-T10	220	11	231	88	0.45	50	0.05	10	None	OK
3-110	440	9	462	72	0.45	50	0.05	10	None	OK
S-T12	220	13	231	104	0.45	50	0.05	20	None	OK
0-112	440	12	462	96	0.45	50	0.05	10	None	OK
S-T20	220	18	231	144	0.45	50	0.05	20	None	OK
0 120	440	18	462	144	0.45	50	0.05	20	None	OK
S-T21	220	25	231	200	0.45	50	0.05	20	None	OK
0 121	440	23	462	184	0.45	50	0.05	20	None	OK
S-T25	220 440	30 30	231 462	240 240	0.45	50 50	0.05	30 30	None None	OK OK
	220	32	231	256	0.45	50	0.05	30	None	OK
S-T32	440	32	462	256	0.45	50	0.05	30	None	OK
0 707	220	40	231	320	0.45	50	0.05	40	None	OK
S-T35	440	40	462	320	0.45	50	0.05	40	None	OK
S-T50	220	55	231	440	0.45	50	0.05	60	None	OK
0 100	440	48	462	384	0.45	50	0.05	40	None	OK
S-T65	220	65	231	520	0.45	50	0.05	60	None	OK
0.00	440	65	462	520	0.45	50	0.05	60	None	OK
S-T80	220	85	231	680	0.45	50	0.05	80	None	OK
0.00	440	85	462	680	0.45	50	0.05	80	None	OK
S-T100	220	105	231	840	0.35	50	0.05	100	None	OK
	440	105	462	840	0.35	50	0.05	100	None	OK

Table 5

Note a) Main circuit frequency: 60Hz

Note b) The operation was conducted by applying a voltage of 240V and a frequency 60Hz to the operating coil. Note c) Number of Samples: 1 per machine

(3) The Switching Capacity and Reversibility

These tests were conducted according to the test conditions indicated in Table 6, 7 and Note a) to d). No abnormalities such as welding of contacts and phase-to-phase short circuits were found, and the results met the standard criteria.

	recute n			toria.	Tab	ole 6				
Item	Rated (AC				Test Cond	itions (making)			Results	
\setminus	Voltage Ue	Current le	Voltage Ur	Itage Ur Current Ic Power Factor Operation Cycle ON time OFF time				Results		
	[V]	[A]	[V]	[A]	cosφ	[Times]	[seconds]	[seconds]		۲
Stan- dard Model Name	-	-	1.05 x Ue	12 x le	le≦100A 0.45±0.05 le>100A 0.35±0.05	50	0.05	10	Contact Welding and Phase-to- phase Short-circuits	Judgment
S-2 x T10	220	8	231	96	0.45	50	0.05	10	None	OK
022110	440	6	462	72	0.45	50	0.05	10	None	OK
S-2 x T12	220	11	231	132	0.45	50	0.05	10	None	OK
022112	440	9	462	108	0.45	50	0.05	10	None	OK
S-2 x T20	220	18	231	216	0.45	50	0.05	10	None	OK
0-2 X 120	440	13	462	156	0.45	50	0.05	10	None	OK
S-2 x T21	220	18	231	216	0.45	50	0.05	10	None	OK
0-2 x 121	440	13	462	156	0.45	50	0.05	10	None	OK
S-2 x T25	220	20	231	240	0.45	50	0.05	10	None	OK
02 x 120	440	17	462	204	0.45	50	0.05	10	None	OK
S-2 x T35	220	26	231	312	0.45	50	0.05	10	None	OK
0-2 x 100	440	24	462	288	0.45	50	0.05	10	None	OK
S-2 x T50	220	35	231	420	0.45	50	0.05	10	None	OK
021100	440	32	462	384	0.45	50	0.05	10	None	OK
S-2 x T65	220	50	231	600	0.45	50	0.05	10	None	OK
021100	440	47	462	564	0.45	50	0.05	10	None	OK
S-2 x T80	220	65	231	780	0.45	50	0.05	10	None	OK
0.2 × 100	440	62	462	744	0.45	50	0.05	10	None	OK
S-2 x T100	220	80	231	960	0.45	50	0.05	10	None	OK
021100	440	75	462	900	0.45	50	0.05	10	None	OK

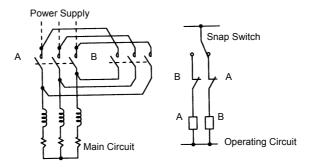
					Table 7	,					
Item	Rated (AC			Test (Conditions (maki	ing and	breaking	capacity)	1		
Stan-	Voltage Ue [V]	Current le [A]	Voltage Ur [V]	Current Ic [A]	Power Factor cosφ		tion Cycle mes] Simulta- neous Excitation Test	ON time [seconds]	OFF time [seconds]	Results	Judgment
Model Name	-	-	1.05 x Ue	10 x le	le≦100A 0.45±0.05 le>100A 0.35±0.05	50	10	0.05	Ic≦100: 10 100 <ic≦200: 20<br="">200<ic≦300: 30<br="">300<ic≦400: 40<br="">400<ic≦600: 60<br="">600<ic≦800: 80<="" td=""><td>Contact Welding and Phase-to- phase Short-circuits</td><td>nt</td></ic≦800:></ic≦600:></ic≦400:></ic≦300:></ic≦200:>	Contact Welding and Phase-to- phase Short-circuits	nt
S-2 x T10	220	8	231	80	0.45	50	10	0.05	10	None	OK
3-2 X 1 10	440	6	462	60	0.45	50	10	0.05	10	None	OK
S-2 x T12	220	11	231	110	0.45	50	10	0.05	20	None	OK
5-2 X 1 12	440	9	462	90	0.45	50	10	0.05	10	None	OK
S-2 x T20	220	18	231	180	0.45	50	10	0.05	20	None	OK
3-2 X 120	440	13	462	130	0.45	50	10	0.05	20	None	OK
S-2 x T21	220	18	231	180	0.45	50	10	0.05	20	None	OK
3-2 X 121	440	13	462	130	0.45	50	10	0.05	20	None	OK
S-2 x T25	220	20	231	200	0.45	50	10	0.05	20	None	OK
3-2 X 125	440	17	462	170	0.45	50	10	0.05	20	None	OK
S-2 x T35	220	26	231	260	0.45	50	10	0.05	30	None	OK
0-2 x 100	440	24	462	240	0.45	50	10	0.05	30	None	OK
S-2 x T50	220	35	231	350	0.45	50	10	0.05	40	None	OK
3-2 X 100	440	32	462	320	0.45	50	10	0.05	40	None	OK
S-2 x T65	220	50	231	500	0.45	50	10	0.05	60	None	OK
3-2 x 100	440	47	462	470	0.45	50	10	0.05	60	None	OK
S-2 x T80	220	65	231	650	0.45	50	10	0.05	80	None	OK
3-2 X 100	440	62	462	620	0.45	50	10	0.05	80	None	OK
S-2 x T100	220	80	231	800	0.45	50	10	0.05	80	None	OK
3-2 X I 100	440	75	462	750	0.45	50	10	0.05	80	None	OK

Note a) The test was conducted using reversible-type magnetic contactor.

Note b) The operation was conducted at main circuit frequency of 60Hz by applying a voltage of 240V and a frequency of 60Hz to the operating coil.
 Note c) Making A → Open circuit A, then immediately making B → Open circuit B → OFF time (above table)

ote c) Making A → Open circuit A, then immediately making B → Open circuit B → OFF time (above table) pause →Making B → Open circuit B, then immediately making A → Open circuit A → OFF time (above table) pause, this makes 1 cycle. 50 cycles were performed in this way. Here, (1) "A" shows the forward rotation contactor and "B" shows the reverse rotation contactor.

(2) "Immediately" refers to the shortest reversible exchange time.



Note d) Number of Samples: 1 per machine

2.3.2 The Operating Performance

(1) Non-reversing

These tests were conducted according to the test conditions indicated in Table 8 and Note a) to c). No abnormalities such as welding of contacts and phase-to-phase short circuits were found, and the results met the standard criteria. After the test, the withstand voltage performance was checked by applying a voltage of 1000V and a frequency of 60Hz for 5 seconds. The results were acceptable.

Item	Rated	Value	Test Conditions (making and breaking capacity) Results									
	(AC-			Test	Conditions (m	aking and break	ing capac	ity)	Res	ults		
	Voltage Ue [V]	Current le [A]	Voltage Ur [V]	Current Ic [A]	Power Factor cosφ	Operation Cycle [Times]	ON time [seconds]	OFF time [seconds]	Making and Breaking Capacity	Withstand Voltage		
Stan- dard Model Name	-	-	1.05 x Ue	2 x le	le≦100A: 0.45±0.05 le>100A: 0.35±0.05	6000	0.05	lc≦100: 10 100 <lc≦200: 20<br="">200<lc≦300: 30<="" td=""><td>Contact Welding and Phase-to-phase Short-circuit</td><td>2 x Ue provided 1000V or higher 5 seconds</td><td>Judgment</td></lc≦300:></lc≦200:>	Contact Welding and Phase-to-phase Short-circuit	2 x Ue provided 1000V or higher 5 seconds	Judgment	
S-T10	220	11	231	22	0.45	6000	0.05	10	None	OK	OK	
0-110	440	9	462	18	0.45	6000	0.05	10	None	OK	OK	
S-T12	220	13	231	26	0.45	6000	0.05	10	None	OK	OK	
0-112	440	12	462	24	0.45	6000	0.05	10	None	OK	OK	
S-T20	220	18	231	36	0.45	6000	0.05	10	None	OK	OK	
0 120	440	18	462	36	0.45	6000	0.05	10	None	OK	OK	
S-T21	220	25	231	50	0.45	6000	0.05	10	None	OK	OK	
0 121	440	23	462	46	0.45	6000	0.05	10	None	OK	OK	
S-T25	220	30	231	60	0.45	6000	0.05	10	None	OK	OK	
0 120	440	30	462	60	0.45	6000	0.05	10	None	OK	OK	
S-T32	220	32	231	64	0.45	6000	0.05	10	None	OK	OK	
0 102	440	32	462	64	0.45	6000	0.05	10	None	OK	OK	
S-T35	220	40	231	80	0.45	6000	0.05	10	None	OK	OK	
0 100	440	40	462	80	0.45	6000	0.05	10	None	OK	OK	
S-T50	220	55	231	110	0.45	6000	0.05	20	None	OK	OK	
	440	48	462	96	0.45	6000	0.05	10	None	OK	OK	
S-T65	220	65	231	130	0.45	6000	0.05	20	None	OK	OK	
0 100	440	65	462	130	0.45	6000	0.05	20	None	OK	OK	
S-T80	220	85	231	170	0.45	6000	0.05	20	None	OK	OK	
0-100	440	85	462	170	0.45	6000	0.05	20	None	OK	OK	
S-T100	220	105	231	210	0.35	6000	0.05	30	None	OK	OK	
			462					30		OK	OK	

Table 8

Note a) Main circuit frequency: 60Hz

Note b) The operation was conducted by applying a voltage of 240V and a frequency of 60Hz to the operating coil.

Note c) Number of Samples: 1 per machine

(2) Reversing

These tests were conducted according to the test conditions indicated in Table 9 and Note a) to e). No abnormalities such as welding of contacts and phase-to-phase short circuits were found, and the results met the standard criteria. After the test, the withstand voltage performance was checked by applying a voltage of 1000V and a frequency of 60Hz for 5 seconds. The results were acceptable. Table 9

Item	Rated (AC			Test Conditions (making and breaking capacity) Results									
	Voltage Ue [V]	Current le [A]	Voltage Ur [V]	Current Ic [A]	Power Factor cosφ	Operation Cycle [Times] Note d)	ON time [seconds]	OFF time [seconds]	Making and Breaking Capacity	Withstand Voltage			
Model Name	-	_	1.05 x Ue	6 x le	le≦100A: 0.45±0.05 le>100A: 0.35±0.05	6000	0.05	lc≦100: 10 100 <lc≦200: 20<br="">200<lc≦300: 30<br="">300<lc≦400: 40<br="">400<lc≦600: 60<="" td=""><td>Contact Welding and Phase-to-phase Short-circuit</td><td>2 x Ue Provided 1000V or higher 5 seconds</td><td>Judgment</td></lc≦600:></lc≦400:></lc≦300:></lc≦200:>	Contact Welding and Phase-to-phase Short-circuit	2 x Ue Provided 1000V or higher 5 seconds	Judgment		
0.0. T10	220	8	231	48	0.45	6000	0.05	10	None	OK	OK		
S-2 x T10	440	6	462	36	0.45	6000	0.05	10	None	OK	OK		
0.0	220	11	231	66	0.45	6000	0.05	10	None	OK	OK		
S-2 x T12	440	9	462	54	0.45	6000	0.05	10	None	OK	OK		
0.0	220	18	231	108	0.45	6000	0.05	20	None	OK	OK		
S-2 x T20	440	13	462	78	0.45	6000	0.05	10	None	OK	OK		
S-2 x T21	220	18	231	108	0.45	6000	0.05	20	None	OK	OK		
5-2 X 121	440	13	462	78	0.45	6000	0.05	10	None	OK	OK		
S-2 x T25	220	20	231	120	0.45	6000	0.05	20	None	OK	OK		
0-2 A 120	440	17	462	102	0.45	6000	0.05	20	None	OK	OK		
S-2 x T32	220	26	231	156	0.45	6000	0.05	20	None	OK	OK		
3-2 x 132	440	24	462	144	0.45	6000	0.05	20	None	OK	OK		
S-2 x T35	220	26	231	156	0.45	6000	0.05	20	None	OK	OK		
3-2 X 133	440	24	462	144	0.45	6000	0.05	20	None	OK	OK		
S-2 x T50	220	35	231	210	0.45	6000	0.05	30	None	OK	OK		
3-2 X 100	440	32	462	192	0.45	6000	0.05	20	None	OK	OK		
S-2 x T65	220	50	231	300	0.45	6000	0.05	30	None	OK	OK		
3-2 X 103	440	47	462	282	0.45	6000	0.05	30	None	OK	OK		
S-2 x T80	220	65	231	390	0.45	6000	0.05	40	None	OK	OK		
3-2 X 100	440	62	462	372	0.45	6000	0.05	40	None	OK	OK		
S-2 x T100	220	80	231	480	0.45	6000	0.05	60	None	OK	OK		
3-2 X 1 100	440	75	462	450	0.45	6000	0.05	60	None	OK	OK		

Note a) The test was conducted using reversible-type magnetic contactor.

Note b) Main circuit frequency: 60Hz

Note c) The operation was conducted by applying a voltage of 240V and frequency of 60Hz to the operating coil. Note d) The operation was performed based on the cycle mentioned in Note c) of 2.3.1 (3).

Note e) Number of Samples: 1 per machine

2.4 Test Sequence III

2.4.1 Performance under Short-circuit Conditions

These tests were conducted according to the test conditions indicated in Table 10 and Note a) to d). There was no damage to the conductors and terminals. The leakage detection fuse was not melted, and the results were acceptable.

Table 10												
\mathbb{N}	Item	Rated	Rated Valu	e (AC- 3)		Test Co	nditions			Results		
Thermal Overload Relay		Current of SCPD [A] Note a)	Voltage Ue [V]	Current le [A]	Voltage [V]	Current I [kA]	Power Factor cosφ	Number of Samples	O or CO Operation	Conductor/ Terminal Damage	Melting of the Leakage Detection Fuse	Judgment
	lel Name Standard nd Nominal Current of the Heater	-	-	-	Ue	Note c)	Note d)	[machine]	Note b)	None	None	int
MSO-T10 (KP)	TH-T18 9A	20	220/440	11/9	440	1	0.95	1 1	0 C0	None None	None None	ОК
MSO-T12 (KP)	TH-T18 11A	25	220/440	13/12	440	1	0.95	1 1	0 C0	None None	None None	ОК
MSO-T20 (KP)	TH-T18 15A	32	220/440	18/18	440	3	0.9	1 1	0 C0	None None	None None	ОК
MSO-T21 (KP)	TH-T25 15A	32	220/440	25/23	440	3	0.9	1 1	0 C0	None None	None None	ОК
MSO-T25 (KP)	TH-T25 22A	50	220/440	30/30	440	3	0.9	1 1	0 CO	None None	None None	ОК
MSO-T35 (KP)	TH-T50 29A	63	220/440	40/40	440	3	0.9	1 1	0 C0	None None	None None	ОК
MSO-T50 (KP)	TH-T50 42A	100	220/440	55/48	440	3	0.9	1	0 C0	None None	None None	ОК
MSO-T65 (KP)	TH-T65 54A	100	220/440	65/65	440	5	0.7	1 1	0 CO	None None	None None	ОК
MSO-T80 (KP)	TH-T100 67A	125	220/440	85/85	440	5	0.7	1 1	0 CO	None None	None None	ОК
MSO-T100 (KP)	TH-T100 82A	160	220/440	105/105	440	5	0.7	1	0 C0	None None	None None	ОК
S-T10	-	40	220/440	11/9	440	1	0.95	1 1	0 CO	None None	None None	ОК
S-T12	-	40	220/440	13/12	440	1	0.95	1 1	0 CO	None None	None None	ОК
S-T20	-	40	220/440	18/18	440	3	0.9	1 1	0 CO	None None	None None	ОК
S-T21	-	80	220/440	25/23	440	3	0.9	1 1	0 CO	None None	None None	ОК
S-T25	-	80	220/440	30/30	440	3	0.9	1 1	0 C0	None None	None None	ОК
S-T32	-	80	220/440	32/32	440	3	0.9	1	0 C0	None None	None None	ОК
S-T35	-	100	220/440	40/40	440	3	0.9	1	0 CO	None	None	ОК
S-T50	-	100	220/440	55/48	440	3	0.9	1	0 C0	None	None None	ОК
S-T65	-	100	220/440	65/65	440	5	0.7	1	0 C0	None	None	ОК
S-T80	-	125	220/440	85/85	440	5	0.7	1	0 C0	None	None	OK
S-T100	-	160	220/440	105/105	440	5	0.7	1	0 C0	None	None	ОК

Note a) SCPD: Short Circuit Protection Device

Note b) O operation: Breaking of the circuit by the SCPD resulting from closing the circuit on the equipment under test which is in the closed position.

CO operation: Breaking of the circuit by the SCPD resulting from closing the circuit by the equipment under test.

Note c) The test current specified in the standards for rated operational current was as follows. (le indicates the maximum current applied to the motor)

When 1<le≦16: 1 kA

When 16<le≦63: 3 kA

When 63<le≦125: 5 kA

Note d) The power factor specified in the standards for test current was as follows.

When I≦1.5 kA: 0.95±0.05

When 1.5 kA<l≦3 kA: 0.9±0.05

When 4.5 kA<I≦6 kA: 0.7±0.05

2.5 Test Sequence IV

2.5.1 Ability of Contactors to Withstand Overload Currents

The current indicated in Table 11 was applied for 10 seconds in making conditions of the magnetic contactor. All the parts met the standard criteria without abnormality.

Table 11 Item **Test Conditions** Rated Current [A] Current Passage Results Current [A] Time [seconds] Stan Judgment Rated Operational le≦630A: 8 x le dard Current 10 Abnormality in the part Model le>630A: 6 x le (AC-3) Name S-T10 11 88 10 OK None S-T12 104 OK 13 10 None S-T20 18 144 10 None OK S-T21 25 200 10 OK None 30 S-T25 240 10 None OK S-T32 32 256 10 None OK S-T35 OK 40 320 10 None S-T50 55 440 10 None OK 520 S-T65 65 10 OK None S-T80 85 680 10 OK None S-T100 105 840 10 None OK

Note a) The test was conducted only for the magnetic contactor. Note b) Number of Samples: 1 per machine

2.6 Test Sequence V

2.6.1 Mechanical Properties of Terminals

(1) Tests of Mechanical Strength of Terminals

The crimp terminal indicated in Table 12 was tightened with the following tightening torques, and was tested by connection and disconnection 5 times. All the parts met the standard criteria without looseness or damage.

			Table 12			
Item	Target Terminal Position	Crimp Terminal Size	Manufacturer Standard Tightening Torque [N·m]	Tested Tightening Torque [N · m]	Results	pnſ
Stan- dard Model Name	-	Conductor of the Maximum Cross-Sectional Area	-	110% of the Manufacturer Standard Tightening Torque Note a)	Looseness or Damage to the Part	Judgment
	S-T10: 1/L1	2-3.5	0.9 to 1.5	1.65	None	OK
MSO-T10(KP)	TH-T18(KP): 6/T3	2-3.5	0.9 to 1.5	1.65	None	OK
	S-T12: 1/L1	2-3.5	0.9 to 1.5	1.65	None	OK
MSO-T12(KP)	TH-T18(KP): 6/T3	2-3.5	0.9 to 1.5	1.65	None	OK
	S-T20: 1/L1	2-3.5	0.9 to 1.5	1.65	None	OK
MSO-T20(KP)	TH-T18(KP): 6/T3	2-3.5	0.9 to 1.5	1.65	None	OK
	S-T21: 1/L1	5.5-4	1.2 to 1.9	2.09	None	OK
MSO-T21(KP)	TH-T25(KP): 6/T3	5.5-4	1.2 to 1.9	2.09	None	OK
	S-T25: 1/L1	5.5-4	1.2 to 1.9	2.09	None	OK
MSO-T25(KP)	TH-T25(KP): 6/T3	5.5-4	1.2 to 1.9	2.09	None	OK
	S-T35: 1/L1	22-S5	2.0 to 3.3	3.63	None	OK
MSO-T35(KP)	TH-T50(KP): 6/T3	14-5	2.0 to 3.3	3.63	None	OK
	S-T50: 1/L1	22-S5	2.0 to 3.3	3.63	None	OK
MSO-T50(KP)	TH-T50(KP): 6/T3	14-5	2.0 to 3.3	3.63	None	OK
	S-T65: 1/L1	60-S6	3.5 to 5.7	6.27	None	OK
MSO-T65(KP)	TH-T65(KP): 6/T3	22-6	3.5 to 5.7	6.27	None	OK
	S-T80: 1/L1	60-S6	3.5 to 5.7	6.27	None	OK
MSO-T80(KP)	TH-T100(KP): 6/T3	38-S6	3.5 to 5.7	6.27	None	OK
MSO-T100(KP)	S-T100: 1/L1	60-6	3.5 to 5.7	6.27	None	OK
MSO-1100(KP)	TH-T100(KP): 6/T3	38-S6	3.5 to 5.7	6.27	None	OK
S-T10	2/T1, 6/T3	2-3.5	0.9 to 1.5	1.65	None	OK
S-T12	2/T1, 6/T3	2-3.5	0.9 to 1.5	1.65	None	OK
S-T20	2/T1, 6/T3	2-3.5	0.9 to 1.5	1.65	None	OK
S-T21	2/T1, 6/T3	5.5-4	1.2 to 1.9	2.09	None	OK
S-T25	2/T1, 6/T3	5.5-4	1.2 to 1.9	2.09	None	OK
S-T32	2/T1, 6/T3	5.5-4	1.2 to 1.9	2.09	None	OK
S-T35	2/T1, 6/T3	22-S5	2.0 to 3.3	3.63	None	OK
S-T50	2/T1, 6/T3	22-S5	2.0 to 3.3	3.63	None	OK
S-T65	2/T1, 6/T3	60-S6	3.5 to 5.7	6.27	None	OK
S-T80	2/T1, 6/T3	60-S6	3.5 to 5.7	6.27	None	OK
S-T100	2/T1, 6/T3	60-6	3.5 to 5.7	6.27	None	OK

Note a) The test was conducted by applying 110% of the maximum value of the manufacturer standard tightening torque.

Note b) Number of Samples: 1 per machine

(2) Flexion and Pull-out Tests

In the flexion tests, the wire was rotated 135 times continuously by placing weight on its pointed end under the conditions (the following tightening torques were checked by using the minimum value of the manufacturer standard tightening torque) indicated in Table 13-1 and 13-2. The results met the standard criteria without pullout or breaking of the conductor. Then, the pull-out strength indicated in Table 13-1 and 13-2 was applied for 1 minute. The results met the standard criteria without pullout or breaking of the conductor. Table 13-1

							Table 13-	1				
Item	Target Terminal Position	Screw Size	Wire Spe Type	cifications Size	Number of Connections	Manufacturer Standard Tightening Torque [N⋅m]	Tested Tightening Torque [N ⋅ m]	Bushing Hole Diameter [mm]	Height [mm]	Weight [kg]	Pulling Force [N]	Judgment
Model Name	-	-	-	-	Maximum Number of Connections	-	Specified Tightening Torque	$\begin{array}{c} 0.75mm^2: 6.5\\ 1.25mm^2: 9.5\\ 2.5mm^2: 9.5\\ 4mm^2: 9.5\\ 6mm^2: 9.5\\ 14mm^2: 13.0\\ 16mm^2: 13.0\\ \phi 1.6: 9.5\\ \phi 2: 9.5\\ \phi 26: 9.5\\ \phi 3.6: 13.0 \end{array}$	0.75mm ² : 260 1.25mm ² : 280 2.5mm ² : 280 4mm ² : 280 6mm ² : 280 14mm ² : 300 16mm ² : 300 φ1.6: 280 φ2: 280 φ26: 280 φ3.6: 300	$\begin{array}{c} 0.75mm^2: 0.4\\ 1.25mm^2: 0.4\\ 2.5mm^2: 0.7\\ 4mm^2: 0.9\\ 6mm^2: 1.4\\ 14mm^2: 2.9\\ 16mm^2: 2.9\\ 16mm^2: 2.9\\ \phi 1.6: 0.7\\ \phi 2: 0.9\\ \phi 2.6: 1.4\\ \phi 3.6: 2.9 \end{array}$	$\begin{array}{c} 0.75mm^2{\rm :}\;30\\ 1.25mm^2{\rm :}\;40\\ 2.5mm^2{\rm :}\;50\\ 4mm^2{\rm :}\;50\\ 4mm^2{\rm :}\;80\\ 14mm^2{\rm :}\;80\\ 14mm^2{\rm :}\;100\\ 16mm^2{\rm :}\;100\\ \phi1.6{\rm :}\;50\\ \phi2{\rm :}\;60\\ \phi2{\rm :}\;60\\ \phi2{\rm .}6{\rm :}\;80\\ \phi3{\rm .}6{\rm :}\;100\\ \end{array}$	Pullout or Breaking of Conductor
				0.75mm ²	2	0.9 to 1.5	0.9	6.5	260	0.4	30	OK
MCO T40	2/T1 (S-T10)	M3.5	Wire Single	2.5mm ² φ1.6	2 2	0.9 to 1.5 0.9 to 1.5	0.9	9.5 9.5	280 280	0.7	50 50	ОК ОК
MSO-T10 (KP)			Wire Stranded	0.75mm ²	2	0.9 to 1.5	0.9	6.5	260	0.4	30	ОК
` <i>'</i>	6/T3 (TH-T18	M3.5	Wire	2.5mm ²	2	0.9 to 1.5	0.9	9.5	280	0.7	50	OK
	(KP))		Single Wire	φ1.6	2	0.9 to 1.5	0.9	9.5	280	0.7	50	OK
	2/T1		Stranded Wire	0.75mm ² 2.5mm ²	2	0.9 to 1.5 0.9 to 1.5	0.9 0.9	6.5 9.5	260 280	0.4	30 50	OK OK
MSO-T12	(S-T12)	M3.5	Single Wire	φ1.6	2	0.9 to 1.5	0.9	9.5 9.5	280	0.7	50	OK
(KP)	0/70		Stranded	0.75mm ²	2	0.9 to 1.5	0.9	6.5	260	0.4	30	ОК
	6/T3 (TH-T18	M3.5	Wire	2.5mm ²	2	0.9 to 1.5	0.9	9.5	280	0.7	50	OK
	(KP))		Single Wire	φ1.6	2	0.9 to 1.5	0.9	9.5	280	0.7	50	OK
	2/T1		Stranded Wire	0.75mm ² 2.5mm ²	2	0.9 to 1.5 0.9 to 1.5	0.9	6.5 9.5	260 280	0.4	30 50	OK OK
MSO-T20	(S-T20)	M3.5	Single Wire	φ1.6	2	0.9 to 1.5	0.9	9.5	280	0.7	50	OK
(KP)	0/70		Stranded	0.75mm ²	2	0.9 to 1.5	0.9	6.5	260	0.4	30	ОК
	6/T3 (TH-T18 (KP))	M3.5	Wire Single	2.5mm ² φ1.6	2 2	0.9 to 1.5 0.9 to 1.5	0.9 0.9	9.5 9.5	280 280	0.7 0.7	50 50	OK OK
	(((())))		Wire	φ1.0 1.25mm ²	2	1.2 to 1.9	1.2	6.5	260	0.4	40	OK
	2/T1		Stranded Wire	6mm ²	2	1.2 to 1.9	1.2	9.5	280	1.4	80	OK
	(S-T21)	M4	Single	φ1.6	2	1.2 to 1.9	1.2	9.5	280	0.7	50	OK
MSO-T21			Wire	φ2.6	2	1.2 to 1.9	1.2	9.5	280	1.4	80	OK
(KP)	6/T3		Stranded Wire	1.25mm ² 6mm ²	2	1.2 to 1.9 1.2 to 1.9	1.2 1.2	6.5 9.5	260 280	0.4	40 80	OK OK
	(TH-T25 (KP))	M4	Single	φ1.6	2	1.2 to 1.9	1.2	9.5	280	0.7	50	OK
	(111))		Wire	φ2.6	2	1.2 to 1.9	1.2	9.5	280	1.4	80	OK
	2/T1		Stranded Wire	1.25mm ² 6mm ²	2	1.2 to 1.9 1.2 to 1.9	1.2 1.2	6.5 9.5	260 280	0.4	40 80	OK OK
	(S-T25)	M4	Single	φ1.6	2	1.2 to 1.9	1.2	9.5	280	0.7	50	OK
MSO-T25	. ,		Wire	φ2.6	2	1.2 to 1.9	1.2	9.5	280	1.4	80	OK
(KP)	6/T3		Stranded Wire	1.25mm ² 6mm ²	2	1.2 to 1.9 1.2 to 1.9	1.2 1.2	6.5 9.5	260 280	0.4	40 80	OK OK
	(TH-T25	M4	Single	φ1.6	2	1.2 to 1.9	1.2	9.5	280	0.7	50	OK
	(KP))		Wire	φ2.6	2	1.2 to 1.9	1.2	9.5	280	1.4	80	OK
	0/74			1.25mm ²	2	2.0 to 3.3	2.0	6.5	260	0.4	40	OK
	2/T1 (S-T35)	M5	Wire Single	16mm ² φ1.6	2	2.0 to 3.3 2.0 to 3.3	2.0 2.0	13.0 9.5	300 280	2.9 0.7	100 50	OK OK
MSO-T35	(0.00)		Wire	φ1.0 φ3.6	2	2.0 to 3.3	2.0	13.0	300	2.9	100	OK
(KP)	6/T3		Stranded	4mm ²	2	2.0 to 3.3	2.0	9.5	280	0.9	60	OK
	(TH-T50	M5	Wire	14mm ²	2	2.0 to 3.3	2.0	13.0	300	2.9	100	OK
	(KP))		Single Wire	φ2 φ3.6	2	2.0 to 3.3 2.0 to 3.3	2.0 2.0	9.5 13.0	280 300	0.9 2.9	60 100	OK OK
	1		Stranded	1.25mm ²	2	2.0 to 3.3	2.0	6.5	260	0.4	40	OK
	2/T1	M5	Wire	16mm ²	2	2.0 to 3.3	2.0	13.0	300	2.9	100	OK
MSO-T50	(S-T50)		Single Wire	φ1.6 φ3.6	2	2.0 to 3.3 2.0 to 3.3	2.0 2.0	9.5 13.0	280 300	0.7 2.9	50 100	OK OK
(KP)		1	Stranded	φ3.6 4mm ²	2	2.0 to 3.3	2.0	9.5	280	0.9	60	OK
	6/T3 (TH-T50	M5	Wire	14mm ²	2	2.0 to 3.3	2.0	13.0	300	2.9	100	OK
	(TH-150 (KP))	IVIJ	Single	φ2	2	2.0 to 3.3	2.0	9.5	280	0.9	60	OK
	. "		Wire	φ3.6	2	2.0 to 3.3	2.0	13.0	300	2.9	100	OK

Note a) Since MSO-T65(KP) higher models cannot be connected to the unprocessed exposed conductor, this evaluation is not applicable.

Jerminal Basino Size Type Size Size Type Size		<u>. </u>			2	Table 13-							
dard Model Specifie For planeing of the solution of	prce Judgment	Pulling Force [N]	U U	0	Hole Diameter	Tightening Torque	Standard Tightening Torque	Number of Connections				Terminal	
S-T10 M3.5 Braded (FT3) Wire bind (FT3) Single (FT3) Wire (FT3) 20.910.15 (FT3) 0.9 (FT3) 9.5 (FT3) 280 (FT3) 0.7 (FT3) 6.5 (FT3) S-T10 6/T3 M3.5 (FT3) Single (FT3) Q.910.15 (FT3) 0.9 (FT3) 0.7 (FT3) 0.9 (FT3) 0.7 (FT3) <td>2: 40 50 100 Breaking of Conductor</td> <td>0.75mm²: 30 1.25mm²: 40 2.5mm²: 50 16mm²: 100 φ1.6: 50 φ3.6: 100</td> <td>1.25mm²: 0.4 2.5mm²: 0.7 16mm²: 2.9 φ1.6: 0.7 φ3.6: 2.9</td> <td>1.25mm²: 260 2.5mm²: 280 16mm²: 300 φ1.6: 280 φ3.6: 300</td> <td>1.25mm²: 6.5 2.5mm²: 9.5 16mm²: 13.0 φ1.6: 9.5 φ3.6: 13.0</td> <td>Tightening Torque</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>dard</td>	2: 40 50 100 Breaking of Conductor	0.75mm ² : 30 1.25mm ² : 40 2.5mm ² : 50 16mm ² : 100 φ1.6: 50 φ3.6: 100	1.25mm ² : 0.4 2.5mm ² : 0.7 16mm ² : 2.9 φ1.6: 0.7 φ3.6: 2.9	1.25mm ² : 260 2.5mm ² : 280 16mm ² : 300 φ1.6: 280 φ3.6: 300	1.25mm ² : 6.5 2.5mm ² : 9.5 16mm ² : 13.0 φ1.6: 9.5 φ3.6: 13.0	Tightening Torque	-	-	-	-	-	-	dard
S-T10 2/11 M3.5 Single Wire Wire Single 0.9 9.5 280 0.7 56 6/T3 M3.5 Stranded 0.75mm ² 2 0.910.15 0.9 0.5 280 0.7 55 6/T3 M3.5 Stranded 0.75mm ² 2 0.910.15 0.9 9.5 280 0.7 55 S-T12 M3.5 Stranded 0.75mm ² 2 0.910.15 0.9 9.5 280 0.7 55 S-T12 M3.5 Stranded 0.75mm ² 2 0.910.15 0.9 9.5 280 0.7 55 6/T3 M3.5 Stranded 0.75mm ² 2 0.910.15 0.9 9.5 280 0.7 55 8-710 M3.5 Stranded 0.75mm ² 2 0.910.15 0.9 9.5 280 0.7 55 8-711 M3.5 Stranded 0.75mm ² 2 0.910.15 0.9 9.5 280 0.7 55 8-711 M3.5 Stranded 0.75mm ² 2 0.910.15 0.9 9.5 280 <td< td=""><td>OK OK</td><td>30</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	OK OK	30	-										
Strande 0./5/mm ² 2 0.910.15 0.99 9.5 280 0.74 35.3 S.T12 2.01 M3.5 Strande 0 0.75mm ² 0.910.15 0.99 9.5 280 0.77 56 S.T12 M3.5 Stranded 0.75mm ² 0.910.15 0.99 9.5 280 0.77 56 S.T12 M3.5 Wire Z.Smm ² 0.910.15 0.99 9.5 280 0.77 56 S.T12 6/T3 M3.5 Stranded 0.75mm ² 0.910.15 0.99 9.5 280 0.77 56 S.T12 2.01 M3.5 Stranded 0.75mm ² 0.910.15 0.99 9.5 280 0.77 56 S.T20 2.711 M3.5 Stranded 0.75mm ² 0.910.15 0.99 9.5 280 0.77 56 S.T20 2.711 M3.5 Stranded 0.75mm ² 0.910.15 0.99 9.5 280 0.77 56 G/T3 M3 Stranded 0.7	OK	50								Single	M3.5	2/T1	0 740
S-T21 Single Wire (1.5) Wire (1.5) Single (1.5) 0.9 9.5 280 0.7 55 S-T12 M3.5 Stranded (7.5mm ²) 2 0.9 to 1.5 0.9 6.5 280 0.7 55 S-T12 M3.5 Stranded (7.5mm ²) 2 0.9 to 1.5 0.9 9.5 280 0.7 55 6/T3 M3.5 Stranded (7.5mm ²) 2 0.9 to 1.5 0.9 9.5 280 0.7 55 S.T20 Mine 2.5mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 55 S.T21 M3.5 Stranded 0.75mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 55 S.T21 M3.5 Stranded 0.75mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 55 S.T21 M3.5 Stranded 0.75mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 55 <	OK OK	30 50								Stranded	M3 5	6/T3	S-110
S-T12 2/T1 M3.5 Wire Single Wire Wire 2.5mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 55 6/T3 M3.6 Stranded Wire 0.76mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 6/T3 M3.6 Stranded Wire 0.76mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 S-T20 Attranded 0.75mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 S-T20 Mire 2.51mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 M3.5 Stranded 0.75mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 M3.5 Stranded 0.75mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 Mire 2.5mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 <td< td=""><td>OK</td><td>50</td><td></td><td></td><td></td><td></td><td></td><td></td><td>•</td><td>Wire</td><td>10.5</td><td>0/13</td><td></td></td<>	OK	50							•	Wire	10.5	0/13	
S-T12	OK OK	30 50											
S-112 and formation of the second secon	ОК	50			9.5					Single	M3.5	2/T1	S T10
b/13 M3.5 Single Wire \$\u03c9 (-1.6) 2 0.9 to 1.5 0.9 9.5 280 0.7 55 S-T20 M3.5 Single Wire 2.5mm ² 0.9 to 1.5 0.9 9.5 280 0.7 55 S-T20 M3.5 Stranded 0.75mm ² 0.9 to 1.5 0.9 9.5 280 0.7 55 6/T3 M3.5 Stranded 0.75mm ² 0.9 to 1.5 0.9 9.5 280 0.7 55 6/T3 M3.5 Stranded 0.75mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 55 8.721 M4 Stranded 0.75mm ² 2 0.9 to 1.5 0.9 9.5 280 0.7 55 8.721 M4 Stranded 1.25mm ² 1.2 to 1.9 1.2 9.5 280 0.7 55 8.721 M4 Stranded 1.25mm ² 1.2 to 1.9 1.2 9.5 280 0.7 55	OK	30											5-112
S-T20 2/T1 M3.5 Stranded Wire Single (1.6) 2.0.9 to 1.5 0.9 6.5 260 0.4 33 6/T3 M3.5 Stranded 0.75mm² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 6/T3 M3.5 Stranded 0.75mm² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 6/T3 M3.5 Stranded 0.75mm² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 S-T21 M3.5 Wire 2.5mm² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 S-T21 M4 Stranded 1.25mm² 1.2 to 1.9 1.2 9.5 280 0.7 56 Wire Gmm² 2 1.2 to 1.9 1.2 9.5 280 0.7 56 Wire Gmm² 2 1.2 to 1.9 1.2 9.5 280 1.4 80 S-T25 Kanaded	OK OK	50 50							-	Single	M3.5	6/T3	
S-T20 2/T1 M3.5 Wire Single Wire Wire 2.5mm² 2 0.9 to 1.5 0.9 9.5 280 0.7 56 S-T20 A3.5 Stranded Wire Wire 0.75mm² 2 0.9 to 1.5 0.9 9.5 280 0.7 55 6/T3 M3.5 Stranded Wire 2.5mm² 2 0.9 to 1.5 0.9 9.5 280 0.7 55 S-T21 A3.5 Stranded 1.25mm² 2 0.9 to 1.5 0.9 9.5 280 0.7 55 S-T21 M3.5 Stranded 1.25mm² 2 1.2 to 1.9 1.2 0.5 280 0.7 65 S-T21 M4 Wire Gmm² 2 1.2 to 1.9 1.2 9.5 280 0.7 65 S-T21 M4 Stranded 1.25mm² 2 1.2 1.2 9.5 280 0.7 65 S-T25 M4 M4 Stranded 1.25mm² 1.2 <	ОК	30	0.4	260	6.5	0.9	0.9 to 1.5	2	0.75mm ²				
S-T20 wire 6/T3 wire M3.5 wire Stranded Stranded Wire M3.5 2 0.9 to 1.5 2 0.9 to 1.5 0.9 0.9 6.5 6.5 260 260 0.4 33 33 33 S-T21 M3.5 Stranded Wire Mire 6/T3 0.75mm² 2 0.9 to 1.5 0.9 0.9 to 1.5 0.9 0.9 9.5 280 0.7 56 S-T21 M4 Stranded Wire 6/T3 2.5mm² 2 0.1 to 1.2 1.2 to 1.9 1.2 to 1.9 1.2 0.9 to 1.5 0.9 0.5 280 0.7 56 S-T21 M4 Stranded Wire 6/T3 2.1.2 to 1.9 0.1.2 to 1.9 1.2 0.5 0.5 280 0.7 56 S-T21 M4 Stranded Vire 92.6 2.1.2 to 1.9 1.2 0.5 280 0.7 56 S-T25 Stranded 6/T3 M4 Stranded Vire 92.6 2.1.2 to 1.9 1.2 0.5 280 1.4 88 S-T25 6/T3 M4 Stranded Vire 92.6 2.1.2 to 1.9 1.2 0.5 9.5 280 1.4 88 S-T25 6/T3 M4 Stranded Vire 92.6 2.1.2 to 1.9 1.2 0.5 280 1.4 <td>OK</td> <td>50</td> <td>0.7</td> <td>280</td> <td>9.5</td> <td>0.9</td> <td>0.9 to 1.5</td> <td>2</td> <td>2.5mm²</td> <td>Wire</td> <td>M3.5</td> <td>2/T1</td> <td></td>	OK	50	0.7	280	9.5	0.9	0.9 to 1.5	2	2.5mm ²	Wire	M3.5	2/T1	
	OK								•	Wire			S-T20
B/13 Wi3.5 Single Wire Wire \$\overline{41.6}{2}\$ 0.9 to 1.5 0.9 9.5 280 0.7 56 S-T21 M4 Stranded 1.25mm² 2 1.2 to 1.9 1.2 9.5 280 0.4 400 S-T21 M4 Stranded 1.25mm² 2 1.2 to 1.9 1.2 9.5 280 0.4 400 6/T3 M4 Stranded 1.2 to 1.9 1.2 9.5 280 0.7 55 6/T3 M4 Stranded 1.2 to 1.9 1.2 9.5 280 0.7 55 8 Stranded 1.2 to 1.9 1.2 9.5 280 0.7 55 9 0.16 2 1.2 to 1.9 1.2 9.5 280 0.7 55 9 0.16 2 1.2 to 1.9 1.2 9.5 280 0.7 55 9 0.7 1.2 1.2 1.2 1.2 9.5 280 0.7	OK OK	30 50											
$ S-T21 = \begin{cases} 2/T1 \\ S-T21 \end{cases} \begin{array}{ c c c c c c c c c c c c c c c c c c c$	ОК	50								Single	M3.5	6/T3	
$S-T21 = \begin{bmatrix} 2/11 \\ M4 \end{bmatrix} M4 \begin{bmatrix} single \\ Q2.6 \\ Wire \\ Q2.6 \\$	OK OK	40 80								Stranded			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	OK	50			9.5		1.2 to 1.9	2	φ1.6	Single	M4	2/T1	
	OK OK	80											S-T21
$ S-T35 = \begin{cases} Single & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 50 \\ Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Single & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Single & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Single & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 1.4 & 86 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ \hline Wire & 0.6 & 2 & 1.2 \text{ to } 1.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ \hline Wire & 0.6 & 2 & 2.0 \text{ to } 3.3 & 2.0 & 13.0 & 300 & 2.9 & 100 \\ \hline Wire & 0.6 & 2 & 2.0 \text{ to } 3.3 & 2.0 & 13.0 & 300 & 2.9 & 100 \\ \hline Wire & 0.6 & 2 & 2.0 \text{ to } 3.3 & 2.0 & 13.0 & 300 & 2.9 & 100 \\ \hline Single & 0.6 & 2 & 2.0 \text{ to } 3.3 & 2.0 & 13.0 & 300 & 2.9 & 100 \\ \hline Single & 0.6 & 2 & 2.0 \text{ to } 3.3 & $	OK	80										C/T2	
$ S-T25 = \begin{cases} 2/T1 \\ S-T25 \end{cases} \begin{array}{c c c c c c c c c c c c c c c c c c c $	OK	50									1014	6/13	
$ S-T25 = \begin{cases} 2/T1 \\ S-T25 \end{cases} \begin{array}{c c c c c c c c c c c c c c c c c c c $	OK OK	80 40											
$ S-T25 = \begin{cases} Single & (1.6) & (2 & 1.2 & 1.9 & 1.2 & 9.5 & 280 & 0.7 & 50 \\ Wire & (2.6) & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 1.4 & 80 \\ Stranded & 1.25mm^2 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 260 & 0.4 & 44 \\ Wire & 6mm^2 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 1.4 & 80 \\ Wire & (91.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (92.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 1.2 & 10.9 & 1.2 & 9.5 & 280 & 0.7 & 56 \\ Wire & 16mm^2 & (2 & 2.0 & 10.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & 16mm^2 & (2 & 2.0 & 10.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 2.0 & 0.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 2.0 & 0.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 2.0 & 0.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 2.0 & 0.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 2.0 & 0.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 2.0 & 0.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 2.0 & 0.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 2.0 & 0.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 2.0 & 0.3 & 2.0 & 0.5 & 280 & 0.7 & 56 \\ Wire & (91.6 & (2 & 2.0 & 0.3 & 2.0 & 0.5 & 280 $	OK	80	1.4	280	9.5	1.2	1.2 to 1.9	2	6mm ²		MA	2/T1	
$ S-T32 = \begin{cases} 6/T3 \\ 6/T3 \\ 8-T32 \end{cases} \begin{array}{c c c c c c c c c c c c c c c c c c c $	OK OK	50	-								1114	2/11	
	OK	40											S-T25
S-T32 2/T1 M4 Stranded Wire φ2.6 1.2 to 1.9 2 1.2 1.2 to 1.9 9.5 1.2 280 9.5 0.7 280 50 8.07 50 5.05 S-T32 2/T1 M4 Stranded Wire 1.25mm² 2 1.2 to 1.9 1.2 9.5 280 0.7 50 8.0 S-T32 2/T1 M4 Single Wire 91.6 2 1.2 to 1.9 1.2 9.5 280 0.4 40 Wire 6/T3 Wire 91.6 2 1.2 to 1.9 1.2 9.5 280 0.7 55 6/T3 M4 Stranded 1.25mm² 2 1.2 to 1.9 1.2 9.5 280 0.7 55 6/T3 M4 Wire 6mm² 2 1.2 to 1.9 1.2 9.5 280 0.4 44 Wire 6m² 2 1.2 to 1.9 1.2 9.5 280 0.7 55 8/T3 M4 Single 91.6 2 1.2 to 1.9 1.2 9.5 280 0.7	OK	80			9.5	1.2	1.2 to 1.9	2			M4	6/T3	
$ S-T32 = \begin{cases} 2/T1 \\ S-T32 \end{cases} \begin{array}{c c c c c c c c c c c c c c c c c c c $	OK OK	50 80					1.2 to 1.9	2		Single Wire			
$ S-T32 = \begin{cases} 2/11 \\ S-T32 \end{cases} \begin{array}{ c c c c c c c c c c c c c c c c c c c$	OK	40											
$ S-T32 \\ \begin{array}{c c c c c c c c c c c c c c c c c c c $	OK	80									M4	2/T1	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	OK OK	80	-										0 700
$ S-T35 \begin{array}{ c c c c c c c c c c c c c c c c c c c$	OK	40											5-132
S-T35 2/T1 M5 Stranded (Mire) 1.2 (2.0 to 3.3) 2.0 6.5 280 1.4 80 S-T35 2/T1 M5 Stranded 1.25mm² 2 2.0 to 3.3 2.0 6.5 260 0.4 40 Wire 16mm² 2 2.0 to 3.3 2.0 13.0 300 2.9 10 Single φ1.6 2 2.0 to 3.3 2.0 13.0 300 2.9 10 Wire 93.6 2 2.0 to 3.3 2.0 13.0 300 2.9 10 Wire 93.6 2 2.0 to 3.3 2.0 13.0 300 2.9 10 Wire 1.25mm² 2 2.0 to 3.3 2.0 6.5 260 0.4 40 Wire 16mm² 2 2.0 to 3.3 2.0 13.0 300 2.9 10 Single φ1.6 2 2.0 to 3.3 2.0 9.5 280 0.7 50	OK OK										M4	6/T3	
S-T35 M5 Wire Single Wire 16mm ² 2 2.0 13.0 300 2.9 10 S-T35 M5 Wire 16mm ² 2 2.0 to 3.3 2.0 13.0 300 2.9 10 S-T35 M5 Ø1.6 2 2.0 to 3.3 2.0 9.5 280 0.7 56 Wire Ø3.6 2 2.0 to 3.3 2.0 13.0 300 2.9 10 Stranded 1.25mm ² 2.0 to 3.3 2.0 6.5 260 0.4 40 Wire 16mm ² 2 2.0 to 3.3 2.0 13.0 300 2.9 10 Single Ø1.6 2 2.0 to 3.3 2.0 13.0 300 2.9 10	OK	80											
S-T35 Single Wire φ1.6 2 2.0 to 3.3 2.0 9.5 280 0.7 50 S-T35 6/T3 M5 Single Wire φ1.6 2 2.0 to 3.3 2.0 9.5 280 0.7 50 6/T3 M5 Stranded 1.25mm² 2 2.0 to 3.3 2.0 13.0 300 2.9 10 Single φ1.6 2 2.0 to 3.3 2.0 13.0 300 2.9 10 Single φ1.6 2 2.0 to 3.3 2.0 13.0 300 2.9 10	OK	40	0.4	260	6.5	2.0	2.0 to 3.3		1.25mm ²	Stranded			
S-T35 Wire φ3.6 2 2.0 to 3.3 2.0 13.0 300 2.9 10 6/T3 M5 Stranded 1.25mm² 2 2.0 to 3.3 2.0 6.5 260 0.4 40 % in point 16mm² 2 2.0 to 3.3 2.0 13.0 300 2.9 10 % in point 16mm² 2 2.0 to 3.3 2.0 13.0 300 2.9 10 % in point 16mm² 2 2.0 to 3.3 2.0 9.5 280 0.7 50	OK OK	100 50									M5	2/T1	
S-135 Stranded 1.25mm² 2 2.0 to 3.3 2.0 6.5 260 0.4 40 6/T3 M5 M5 I6mm² 2 2.0 to 3.3 2.0 13.0 300 2.9 10 Single φ1.6 2 2.0 to 3.3 2.0 9.5 280 0.7 50	OK	100											C T25
$6/13$ MS Single $\phi 1.6$ 2 2.0 to 3.3 2.0 9.5 280 0.7 50	OK	40	0.4		6.5	2.0	2.0 to 3.3		1.25mm ²				3-135
J	OK OK	100 50									M5	6/T3	
	OK	100	2.9	300	13.0	2.0	2.0 to 3.3	2	φ1.6 φ3.6	Wire			
Stranded 1.25mm ² 2 2.0 to 3.3 2.0 6.5 260 0.4 40	OK	40	0.4	260	6.5	2.0	2.0 to 3.3	2	1.25mm ²	Stranded			
	OK	100									M5	2/T1	
	OK OK	50 100											
S-T50 Stranded 1.25mm ² 2 2.0 to 3.3 2.0 6.5 260 0.4 40	OK	40	0.4	260	6.5	2.0	2.0 to 3.3	2	1.25mm ²	Stranded			S-T50
	OK	100									M5	6/T3	
Single (\$1.6 2 2.0 to 3.3 2.0 9.5 280 0.7 50	OK OK	50 100											

Note a) Since S-T65 or higher models cannot be connected to the unprocessed exposed conductor, this evaluation is not applicable.