

2. UL Approved Equipment

UL was established in 1894 by William Henry Merrill for the testing of products' safety against fire and other dangers related to electricity for the purposes of U.S. insurance companies. The institute has since been testing materials, apparatuses, products, equipment, buildings, systems, etc., concerning the danger to life and property under the auspices of American Insurance Association. It is not directly related with the association but is a completely independent non-profit-making organization, which is known as the world-oldest and greatest authority for safety testing.

To ensure the safety of life and property against fire, electric shock or other dangers which may arise in using equipment, UL assumes the following missions from the consumers' point of view:

- (1) To establish safety standards
- (2) To test products based on those established standards
- (3) To make the test results known to insurers, government agencies, related organizations and general consumers

UL executes tests for above purposes, approves the products which clear applicable standards, and makes them known to the public. There are two methods for indicating UL approval:

(1) Listing service

This is generally referred to as "listing" and is applied to the products and parts which are manufactured so as to ensure safety under any working conditions. Considering that they are used by general consumers, comprehensive investigation and testing are made as to their safety. When accepted, they are given the "listing mark" and made known to the public by means of the categorized products list (Green Book) which is published by UL.

(2) Recognition service

This is applied mainly to the materials or parts which are assembled in final products in manufacturers' factories. When accepted, they are included in the registered parts list (Yellow Book).

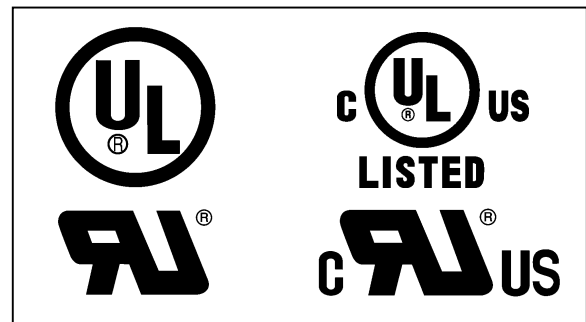


Table 1 Indication of UL approval







Indication of UL approval	Publication method		
	Indication on product	Publication by UL	
Listing	Listing mark 	Categorized products list (Green Book)	White card
Recognition	Recognition mark 	Registered parts list (Yellow Book)	Yellow card

Table 2 Indication of UL-CSA approval

Indication of UL-CSA approval	Indication on product	Outline
Listing	Listing mark 	- Listing for USA and Canada - UL and CSA certification by testing organization UL
Recognition	Recognition mark 	- Listing for USA and Canada - UL and CSA certification by testing organization UL



■ Contactors and Starters

- Standard magnetic contactors and starters (non-reversing, open type)

Series Standard	Magnetic contactors Type	Magnetic starters Type	Max. motor capacity [HP]						Continuous current [A]	Auxiliary contact arrangement		UL File No.
			Single-phase		3-phase squirrel-cage					Standard	On request	
			110-120V	220-240V	200V	220-240V	400-480V	550-600V				
NEW SC Series 	SC-03, 03Y	SW-03/3H, 03Y/3H	1/3	1	2	2	5	5	11	1NO	1NC	E42419
	SC-0, 0Y	SW-0/3H, 0Y/3H	1/3	1	3	3	5	5	13	1NO	1NC	
	SC-05, 05Y	SW-05/3H, 05Y/3H	1/3	1	3	3	5	5	13	1NO+1NC	2NO, 2NC	
	SC-4-0	SW-4-0/3H	1	2	5	5	7 1/2	7 1/2	20	1NO	1NC	
	SC-4-1	SW-4-1/3H	1	2	5	5	10	10	20	1NO	1NC	
NEO SC Series 	SC-5-1, 5-1Y	SW-5-1/3H, 5-1Y/3H	1	2	5	5	10	10	20	1NO+1NC	2NO, 2NC	
	SC-N1	SW-N1/3H	2	5	7 1/2	10	25	25	50	2NO+2NC	4NO+4NC	
	SC-N2	SW-N2/3H	3	7 1/2	10	15	30	30	60	2NO+2NC	4NO+4NC	
	SC-N2S	SW-N2S/3H	3	10	15	20	40	40	80	2NO+2NC	4NO+4NC	
	SC-N3	SW-N3/3H	5	15	20	25	50	50	100	2NO+2NC	4NO+4NC	
	SC-N4	SW-N4/3H	7 1/2	15	25	30	60	60	135	2NO+2NC	4NO+4NC	
	SC-N5	SW-N5/3H	7 1/2	15	30	30	60	75	150	2NO+2NC	4NO+4NC	
	SC-N6	SW-N6/3H	10	20	40	40	75	100	150	2NO+2NC	4NO+4NC	
	SC-N7	SW-N7/3H	15	25	50	50	100	125	200	2NO+2NC	4NO+4NC	
	SC-N8	SW-N8/3H	-	-	60	60	150	150	260	2NO+2NC	4NO+4NC	
	SC-N10	SW-N10/3H	-	-	75	75	150	200	260	2NO+2NC	4NO+4NC	
	SC-N11	SW-N11/3H	-	-	100	100	200	250	350	2NO+2NC	4NO+4NC	
	SC-N12	SW-N12/3H	-	-	125	150	300	350	450	2NO+2NC	4NO+4NC	
	SC-N14	SW-N14/3H	-	-	200	200	500	600	660	2NO+2NC	4NO+4NC	
	SC-N16	-	-	-	250	300	600	700	800	2NO+2NC	4NO+4NC	

Note 1: Contactor ratings refer to the continuous current value.



● Reversing standard contactors and starters (reversing open type)

Series Standard	Magnetic contactors	Magnetic starters	Max. motor capacity [HP]				Continuous current [A]	UL File No.		
			Type	Type	3-phase squirrel-cage					
					200V	220-240V			440-480V	550-600V
NEW SC Series 	SC-03RM	SW-03RM/3H	2	2	5	5	11	E42419		
	SC-0RM	SW-0RM/3H	3	3	5	5	13			
	SC-05RM	SW-05RM/3H	3	3	5	5	13			
	SC-4-0RM	SW-4-0RM/3H	5	5	7 1/2	7 1/2	20			
	SC-4-1RM	SW-4-1RM/3H	5	5	10	10	20			
SC-5-1RM	SW-5-1RM/3H	5	5	10	10	20				
NEO SC Series 	SC-N1RM	SW-N1RM/3H	7 1/2	10	25	25	50			
	SC-N2RM	SW-N2RM/3H	10	15	30	30	60			
	SC-N2SRM	SW-N2SRM/3H	15	20	40	40	80			
	SC-N3RM	SW-N3RM/3H	20	25	50	50	100			
	SC-N4RM	SW-N4RM/3H	25	30	60	60	135			
	SC-N5RM	SW-N5RM/3H	30	30	60	75	150			
	SC-N6RM	SW-N6RM/3H	40	40	75	100	150			
	SC-N7RM	SW-N7RM/3H	50	50	100	125	200			
	SC-N8RM	SW-N8RM/3H	60	60	150	150	260			
	SC-N10RM	SW-N10RM/3H	75	75	150	200	260			
SC-N11RM	SW-N11RM/3H	100	100	200	250	350				
SC-N12RM	SW-N12RM/3H	125	150	300	350	450				
SC-N14RM	SW-N14RM/3H	200	200	500	600	660				

Notes 1: Contactor ratings refer to the continuous current value.



2: To use type -03 to -N3 "reversing" magnetic contactors or starters as UL or CSA approved equipment, it is necessary to replace the operation circuit wires with UL or CSA approved ones.

● DC operated magnetic contactors and starters (non-reversing, open type)

Series Standard	Magnetic contactors	Magnetic starters	Max. motor capacity [HP]						Continuous current [A]	UL File No.	
			Type	Type	Single-phase		3-phase squirrel-cage				
					110-120V	220-240V	200V	220-240V			440-480V
NEW SC Series 	SC-03/G, 03Y/G	SW-03/G3H, 03Y/G3H	1/3	1	2	2	5	5	11	E42419	
	SC-0/G, 0Y/G	SW-0/G3H, 0Y/G3H	1/3	1	3	3	5	5	13		
	SC-05/G, 05Y/G	SW-05/G3H, 05Y/G3H	1/3	1	3	3	5	5	13		
	SC-4-0/G	SW-4-0/G3H	1	2	5	5	7 1/2	7 1/2	20		
	SC-4-1/G	SW-4-1/G3H	1	2	5	5	10	10	20		
SC-5-1/G, 5-1Y/G	SW-5-1/G3H, 5-1Y/G3H	1	2	5	5	10	10	20			
NEO SC Series 	SC-N1/G	SW-N1/G3H	2	5	7 1/2	10	25	25	50		
	SC-N2/G	SW-N2/G3H	3	7 1/2	10	15	30	30	60		
	SC-N2S/G	SW-N2S/G3H	3	10	15	20	40	40	80		
	SC-N3/G	SW-N3/G3H	5	15	20	25	50	50	100		
	SC-N1/SE	SW-N1/SE3H	2	5	7 1/2	10	25	25	50		
	SC-N2/SE	SW-N2/SE3H	3	7 1/2	10	15	30	30	60		
	SC-N2S/SE	SW-N2S/SE3H	3	10	15	20	40	40	80		
	SC-N3/SE	SW-N3/SE3H	5	15	20	25	50	50	100		
	SC-N4/SE	SW-N4/SE3H	7 1/2	15	25	30	60	60	135		
	SC-N5	SW-N5/3H	7 1/2	15	30	30	60	75	150		
	SC-N6	SW-N6/3H	10	20	40	40	75	100	150		
	SC-N7	SW-N7/3H	15	25	50	50	100	125	200		
	SC-N8	SW-N8/3H	-	-	60	60	150	150	260		
	SC-N10	SW-N10/3H	-	-	75	75	150	200	260		
	SC-N11	SW-N11/3H	-	-	100	100	200	250	350		
	SC-N12	SW-N12/3H	-	-	125	150	300	350	450		
SC-N14	SW-N14/3H	-	-	200	200	500	600	660			
SC-N16	-	-	-	250	300	600	700	800			

Note 1: Contactor ratings refer to the continuous current value.

● Magnetic starters with 2E thermal overload relay (open type)


Series Standard	Non reversing Type	Reversing Type	DC operated (non reversing) Type	Max. motor capacity [HP] ^{*1}				Continuous current [A]	UL File No.
				3-phase squirrel-cage					
				200V	220-240V	440-480V	550-600V		
NEW SC Series 	SW-03/2E, 03Y/2E	SW-03RM/2E	SW-03/G2E, 03Y/G2E	2	2	5	5	11	E42419
	SW-0/2E, 0Y/2E	SW-0RM/2E	SW-0/G2E, 0Y/G2E	3	3	5	5	13	
	SW05/2E, 05Y/2E	SW-05RM/2E	SW-05/G2E, 05Y/G2E	3	3	5	5	13	
	SW-4-0/2E	SW-4-0RM/2E	SW-4-0/G2E	5	5	7 1/2	7 1/2	20	
	SW-4-1/2E	SW-4-1RM/2E	SW-4-1/G2E	5	5	10	10	20	
	SW-5-1/2E, 5-1Y/2E	SW-5-1RM/2E	SW-5-1/G2E, 5-1Y/G2E	5	5	10	10	20	
NEO SC Series 	SW-N1/2E	SW-N1RM/2E	SW-N1/G2E, SW-N1/SE2E	7 1/2	10	25	25	50	
	SW-N2/2E	SW-N2RM/2E	SW-N2/G2E, SW-N2/SE2E	10	15	30	30	60	
	SW-N2S/2E	SW-N2SRM/2E	SW-N2S/G2E, SW-N2S/SE2E	15	20	40	40	80	
	SW-N3/2E	SW-N3RM/2E	SW-N3/G2E, SW-N3/SE2E	20	25	50	50	100	
	SW-N4/2E	SW-N4RM/2E	SW-N4SE/2E	25	30	60	60	135	
	SW-N5/2E	SW-N5RM/2E	SW-N5/2E	30	30	60	75	150	
	SW-N6/2E	SW-N6RM/2E	SW-N6/2E	40	40	75	100	150	
	SW-N7/2E	SW-N7RM/2E	SW-N7/2E	50	50	100	125	200	
	SW-N8/2E	SW-N8RM/2E	SW-N8/2E	60	60	150	150	260	
	SW-N10/2E	SW-N10RM/2E	SW-N10/2E	75	75	150	200	260	
	SW-N11/2E	SW-N11RM/2E	SW-N11/2E	100	100	200	250	350	
	SW-N12/2E	SW-N12RM/2E	SW-N12/2E	125	150	300	350	450	
	SW-N14/2E	SW-N14RM/2E	SW-N14/2E	200	200	500	600	660	

Notes 1: Contactor ratings refer to the continuous current value.

2: To use type -03 to -N3 "reversing" magnetic contactors or starters as UL or CSA approved equipment, it is necessary to replace the operation circuit wires with UL or CSA approved ones.


*1 Max. motor capacity for single-phase motors is the same as that for standard magnetic starters.

● Standard auxiliary relays

Series Standard	Type	Poles	Contact arrangement	Continuous current [A]	Operational current [A]						Code		UL File No.
					AC			DC			AC	DC	
					Volts [V]	Make	Break	Volts [V]	Make	Break			
NEW SC Series 	SH-4, SH-4Y	4	4NO, 3NO+1NC, 2NO+2NC	10	120	60	6	125	0.55	0.55	A600	Q300	E44592
					240	30	3						
					480	15	1.5						
					600	12	1.2						
		8 ^{*1}	4NO, 3NO+1NC, 2NO+2NC, 5NO+3NC, 4NO+4NC	10	120	60	6	125	0.55	0.55			
					240	30	3						
					480	15	1.5						
					600	12	1.2						
	SH-5	5	5NO, 4NO+1NC, 3NO+2NC, 2NO+3NC, 1NO+4NC, 5NC	10	120	60	6	125	0.55	0.55			
					240	30	3						
					480	15	1.5						
					600	12	1.2						

*1 8-contact products of SH-4(Y) type are a combination of SH-4(Y) (4 contacts) and auxiliary contact block SZ-A□(Y) (Front mounting, 4 contacts).

● DC operated auxiliary relays

Series Standard	Type	Poles	Contact arrangement	Continuous current [A]	Operational current [A]						Code		UL File No.
					AC			DC			AC	DC	
					Volts [V]	Make	Break	Volts [V]	Make	Break			
NEW SC Series 	SH-4/G, SH-4Y/G	4	4NO, 3NO+1NC, 2NO+2NC	10	120	60	6	125	0.55	0.55	A600	Q300	E44592
					240	30	3						
					480	15	1.5						
					600	12	1.2						
		8 ^{*1}	8NO, 7NO+1NC, 6NO+2NC, 5NO+3NC, 4NO+4NC	10	120	60	6	125	0.55	0.55			
					240	30	3						
					480	15	1.5						
					600	12	1.2						
	SH-5/G	5	5NO, 4NO+1NC, 3NO+2NC, 2NO+3NC, 1NO+4NC, 5NC	10	120	60	6	125	0.55	0.55			
					240	30	3						
					480	15	1.5						
					600	12	1.2						

*1 8-contact products of SH-4(Y)/G type are a combination of SH-4(Y)/G (4 contacts) and auxiliary contact block SZ-A□(Y) (Front mounting, 4 contacts).

- Standard application of built-in thermal overload relays of magnetic contactors
(protection coordination with over current relay)

Type of magnetic contactor	SW-03/3H, 03Y/3H	SW-0/3H, 0Y/3H	SW-05/3H, 0Y/3H	SW-4-0/3H	SW-4-1/3H	SW-5-1/3H, 5-1Y/3H	SW-N1/3H	SW-N2/3H	SW-N2S/3H	SW-N3/3H	
Type of built-in thermal overload relay	TR-0N/3, 0NY/3			TR-5-1N/3, 5-1NY/3			TR-2N/3		TR-3N/3		
Heat element ratings of built-in thermal overload relay [A]	0.1 - 0.15	0.1 - 0.15		0.1 - 0.15							
	0.13 - 0.2	0.13 - 0.2		0.13 - 0.2							
	0.15 - 0.24	0.15 - 0.24		0.15 - 0.24							
	0.2 - 0.3	0.2 - 0.3		0.2 - 0.3							
	0.24 - 0.36	0.24 - 0.36		0.24 - 0.36							
	0.3 - 0.45	0.3 - 0.45		0.3 - 0.45							
	0.36 - 0.54	0.36 - 0.54		0.36 - 0.54							
	0.48 - 0.72	0.48 - 0.72		0.48 - 0.72							
	0.64 - 0.96	0.64 - 0.96		0.64 - 0.96							
	0.8 - 1.2	0.8 - 1.2		0.8 - 1.2							
	0.95 - 1.45	0.95 - 1.45		0.95 - 1.45							
	1.4 - 2.2	1.4 - 2.2		1.4 - 2.2							
	1.7 - 2.6	1.7 - 2.6		1.7 - 2.6							
	2.2 - 3.4	2.2 - 3.4		2.2 - 3.4							
	2.8 - 4.2	2.8 - 4.2		2.8 - 4.2							
	4 - 6	4 - 6		4 - 6							
	5 - 8	5 - 8		5 - 8							
		6 - 9		6 - 9							
		7 - 11		7 - 11							
				9 - 13							
				12 - 18							
							4 - 6	4 - 6			
							5 - 8	5 - 8			
							6 - 9	6 - 9			
							7 - 11	7 - 11	7 - 11	7 - 11	
							9 - 13	9 - 13	9 - 13	9 - 13	
							12 - 18	12 - 18	12 - 18	12 - 18	
							18 - 26	18 - 26	18 - 26	18 - 26	
							24 - 36	24 - 36	24 - 36	24 - 36	
									28 - 40	28 - 40	
								32 - 42			
									34 - 50	34 - 50	
									45 - 65	45 - 65	
										48 - 68	

¹ Use UL or CSA approved fuses. However, the current values for current limiting fuses are when time-delay fuses (rated current of heat element of thermal overload relay: max. 2.8 to 4.2A) or instantaneous fuses (rated current of heat element of thermal overload relay: min. 4 to 6A) is used. Figures in [] are the rating of CSA approved fuses.

² Use UL or CSA approved molded case circuit breakers. However, the working voltage is 480V or less when combined with SW-03(Y)/3H to -05(Y)/3H types; 600V or less when combined with SW-4-0/3H or greater starters.

SW-N4/3H	SW-N5/3H	SW-N6/3H	SW-N7/3H	SW-N8/3H	SW-N10/3H	SW-N11/3H	SW-N12/3H	SW-N14/3H	max ¹ Current limiting fuses	max ² Molded case circuit breaker	
TR-4N/UL	TR-6N/UL			TR-8N/UL	TR-10N/UL	TR-11N/UL	TR-12N/UL	TR-N14/3	Operational current [A]	Operational current [A]	UL approved FUJI auto breaker types
									1 [15]	15	BU-3EHC
									1 [15]	15	BU-3EHC
									1 [15]	15	BU-3EHC
									1 [15]	15	BU-3EHC
									2 [15]	15	BU-3EHC
									2 [15]	15	BU-3EHC
									3 [15]	15	BU-3EHC
									3 [15]	15	BU-3EHC
									3 [15]	15	BU-3EHC
									5 [15]	15	BU-3EHC
									5 [15]	15	BU-3EHC
									10 [15]	15	BU-3EHC
									10 [15]	15	BU-3EHC
									15	15	BU-3EHC
									15	15	BU-3EHC
									15	15	BU-3EHC
									20	15	BU-3EHC
									30	15	BU-3EHC
									30	15	BU-3EHC
									30	20	BU-3EHC
									50	40	BU-ESB
									20	60	BU-ESB
									20	60	BU-ESB
									20	60	BU-ESB
									20	60	BU-ESB
									20	60	BU-ESB
									50	60	BU-ESB
18 - 26	18 - 26								50	60	BU-ESB
24 - 36	24 - 36								50	60	BU-ESB
28 - 40	28 - 40								70	70	BU-ESB
									70	70	BU-ESB
34 - 50	34 - 50								70	70	BU-ESB
45 - 65	45 - 65								125	125	BU-FSB
									125	125	BU-FSB
53 - 80	53 - 80								150	125	BU-FSB
	65 - 95								150	125	BU-FSB
	85 - 105								150	125	BU-FSB
		45 - 65	45 - 65						150	175	BU-JSB
		53 - 80	53 - 80						150	175	BU-JSB
		65 - 95	65 - 95						150	175	BU-JSB
		85 - 125	85 - 125						150	175	BU-JSB
			110 - 160						200	225	BU-JSB
				65 - 95					225	400	BU-KSB
				85 - 125					225	400	BU-KSB
				110 - 160					225	400	BU-KSB
				125 - 185					225	400	BU-KSB
					85 - 125				300	400	BU-KSB
					110 - 160	110 - 160	110 - 160		300	400	BU-KSB
					125 - 185	125 - 185	125 - 185		300	400	BU-KSB
					160 - 240	160 - 240	160 - 240		300	400	BU-KSB
						200 - 300	200 - 300		450	600	BU-LSB
							240 - 360		450	600	BU-LSB
							300 - 450		450	600	BU-LSB
								240 - 360	800	800	BU-MSB
								300 - 450	800	800	BU-MSB
								400 - 600	800	800	BU-MSB

● Standard thermal overload relays (with 3 heat elements), 2E thermal overload relays

Series	Type	No. of heat elements	Reset	Auxiliary contact	Heat element rating [A] ^{*1}	Protection coordination		Applicable magnetic starter types	UL File No.	
						Max. rated current of current limiting fuse [A] ^{*2}	Max. rated current of molded case circuit breaker [A]			
NEW SC Series	TR-0N/3, TR-0NY/3 ^{*4} TK-0N ^{*4} TK-0NY ^{*4}	3	Manual/Auto	1NO+1NC	0.1 - 0.15 (0.1)	1 (15)	15	SW-0/3H, 03Y/3H ^{*3} [SW-0/2E, 03Y/2E]	E44592	
					0.13 - 0.2 (0.13)	1 (15)	15			
					0.15 - 0.24 (0.15)	1 (15)	15			
					0.2 - 0.3 (0.2)	1 (15)	15			
					0.24 - 0.36 (0.24)	2 (15)	15			
					0.3 - 0.45 (0.3)	2 (15)	15			
					0.36 - 0.54 (0.36)	3 (15)	15			
					0.48 - 0.72 (0.48)	3 (15)	15			
					0.64 - 0.96 (0.64)	3 (15)	15			
					0.8 - 1.2 (0.8)	5 (15)	15			
					0.95 - 1.45 (0.95)	5 (15)	15			
					1.4 - 2.2 (1.4)	10 (15)	15			
					1.7 - 2.6 (1.7)	10 (15)	15			
					2.2 - 3.4 (2.2)	15	15			
					2.8 - 4.2 (2.8)	15	15			
					4 - 6 (4)	15	15			
					5 - 8 (5)	20	15			
					0.1 - 0.15 (0.1)	1 (15)	15			SW-0/3H, 0Y/3H ^{*3} SW-05/3H, 05Y/3H ^{*3} [SW-0/2E, 0Y/2E] [SW-05/2E, 05Y/2E]
					0.13 - 0.2 (0.13)	1 (15)	15			
					0.15 - 0.24 (0.15)	1 (15)	15			
					0.2 - 0.3 (0.2)	1 (15)	15			
	0.24 - 0.36 (0.24)	2 (15)	15							
	0.3 - 0.45 (0.3)	2 (15)	15							
	0.36 - 0.54 (0.36)	3 (15)	15							
	0.48 - 0.72 (0.48)	3 (15)	15							
	0.64 - 0.96 (0.64)	3 (15)	15							
	0.8 - 1.2 (0.8)	5 (15)	15							
	0.95 - 1.45 (0.95)	5 (15)	15							
	1.4 - 2.2 (1.4)	10 (15)	15							
	1.7 - 2.6 (1.7)	10 (15)	15							
	2.2 - 3.4 (2.2)	15	15							
	2.8 - 4.2 (2.8)	15	15							
	4 - 6 (4)	15	15							
	5 - 8 (5)	20	15							
	6 - 9 (6)	30	15							
	7 - 11 (7)	30	15							
	TR-5-1N/3 TR-5-1NY/3 ^{*4} TK-5-1N ^{*4} TK-5-1NY ^{*4}	3	Manual/Auto	1NO+1NC	0.1 - 0.15 (0.1)	1 (15)	15	SW-4-0/3H, SW-4-1/3H, SW-5-1/3H, 5-1Y/3H [SW-4-0/2E SW-4-1/2E SW-5-1/2E, 5-1Y/2E]		
	0.13 - 0.2 (0.13)	1 (15)	15							
	0.15 - 0.24 (0.15)	1 (15)	15							
	0.2 - 0.3 (0.2)	1 (15)	15							
	0.24 - 0.36 (0.24)	2 (15)	15							
	0.3 - 0.45 (0.3)	2 (15)	15							
0.36 - 0.54 (0.36)	3 (15)	15								
0.48 - 0.72 (0.48)	3 (15)	15								
0.64 - 0.96 (0.64)	3 (15)	15								
0.8 - 1.2 (0.8)	5 (15)	15								
0.95 - 1.45 (0.95)	5 (15)	15								
1.4 - 2.2 (1.4)	10 (15)	15								
1.7 - 2.6 (1.7)	10 (15)	15								
2.2 - 3.4 (2.2)	15	15								
2.8 - 4.2 (2.8)	15	15								
4 - 6 (4)	15	15								
5 - 8 (5)	20	15								
6 - 9 (6)	30	15								
7 - 11 (7)	30	15								
9 - 13 (9)	30	20								
12 - 18 (12)	50	40								
NEO SC Series	TR-N2/3 ^{*4} TK-N2 ^{*4}	3	Manual	1NO+1NC	4 - 6 (4)	20	60	SW-N1/3H [SW-N1/2E]	E42419	
					5 - 8 (5)	20	60			
					6 - 9 (6)	20	60			
					7 - 11 (7)	20	60			
					9 - 13 (9)	20	60			
					12 - 18 (12)	50	60			
					18 - 26 (18)	50	60			
					24 - 36 (24)	50	60			

Series	Type	No. of heat elements	Reset	Auxiliary contact	Heat element rating [A] ¹	Protection coordination		Applicable magnetic starter types	UL File No.
						Max. rated current of current limiting fuse [A] ²	Max. rated current of molded case circuit breaker [A]		
NEO SC Series	TR-N2/3 ⁴ [TK-N2] ⁴	3	Manual	1NO+1NC	4 - 6 (4)	20	60	SW-N2/3H [SW-N2/2E]	E42419
					5 - 8 (5)	20	60		
					6 - 9 (6)	20	60		
					7 - 11 (7)	20	60		
					9 - 13 (9)	20	60		
					12 - 18 (12)	50	60		
					18 - 26 (18)	50	60		
					24 - 36 (24)	50	60		
					32 - 42 (32)	70	70		
					7 - 11 (7)	20	60		
	9 - 13 (9)	20	60						
	12 - 18 (12)	50	60						
	18 - 26 (18)	50	60						
	24 - 36 (24)	50	60						
	28 - 40 (28)	70	70						
	34 - 50 (34)	70	70						
	45 - 65 (45)	125	125						
	7 - 11 (7)	20	60	SW-N3/3H [SW-N3/2E]					
	9 - 13 (9)	20	60						
	12 - 18 (12)	50	60						
	18 - 26 (18)	50	60						
	24 - 36 (24)	50	60						
	28 - 40 (28)	70	70						
	34 - 50 (34)	70	70						
	45 - 65 (45)	125	125						
	48 - 68 (48)	125	125						
	7 - 11 (7)	20	60		SW-N4/3H [SW-N4/2E]				
	9 - 13 (9)	20	60						
	12 - 18 (12)	50	60						
	18 - 26 (18)	50	60						
	24 - 36 (24)	50	60						
	28 - 40 (28)	70	70						
	34 - 50 (34)	70	70						
	45 - 65 (45)	125	125						
	53 - 80 (53)	150	125						
	7 - 11 (7)	20	60	SW-N5/3H [SW-N5/2E]					
	9 - 13 (9)	20	60						
	12 - 18 (12)	50	60						
	18 - 26 (18)	50	60						
	24 - 36 (24)	50	60						
	28 - 40 (28)	70	70						
	34 - 50 (34)	70	70						
	45 - 65 (45)	125	125						
	53 - 80 (53)	150	125						
	65 - 95 (65)	180	125						
	45 - 65 (45)	150	175	SW-N6/3H [SW-N6/2E]					
	53 - 80 (53)	150	175						
	65 - 95 (65)	150	175						
85 - 125 (85)	150	175							
45 - 65 (45)	150	175	SW-N7/3H [SW-N7/2E]						
53 - 80 (53)	150	175							
65 - 95 (65)	150	175							
85 - 125 (85)	150	175							
110 - 160 (110)	200	225	SW-N8/3H [SW-N8/2E]						
53 - 80 (53)	225	400							
65 - 95 (65)	225	400							
85 - 125 (85)	225	400							
110 - 160 (110)	225	400							
125 - 185 (125)	225	400	SW-N10/3H [SW-N10/2E]						
85 - 125 (85)	300	400							
110 - 160 (110)	300	400							
125 - 185 (125)	300	400							
160 - 240 (160)	300	400							
110 - 160 (110)	300	400	SW-N11/3H [SW-N11/2E]						
125 - 185 (125)	300	400							
160 - 240 (160)	300	400							
200 - 300 (200)	450	600							
110 - 160 (110)	300	400	SW-N12/3H [SW-N12/2E]						
125 - 185 (125)	300	400							
160 - 240 (160)	300	400							
200 - 300 (200)	450	600							
240 - 360 (240)	450	600							
300 - 450 (300)	450	600	SW-N14/3H ³ [SW-N14/2E]						
240 - 360 (240)	800	800							
300 - 450 (300)	800	800							
400 - 600 (400)	800	800							


¹ Parenthesized values in the "Heat element rating" column are the nominal rating to be specified at order placement.

² Parenthesized values in the "Fuse rating" column are for CSA approved starters.

³ 480V or less for a combination of SW-03(Y)/3H, -0(Y)/3H or -05(Y)/3H, SW-N14/3H and molded case circuit breaker

⁴ Separate mounting is available.

● SC and SW series optional units

Series Standard	Name	Type	Specification	Applicable types	UL File No.
NEW SC Series NEO SC Series 	Auxiliary contact block (Front mounting)	SZ-A40	4NO	SC-03, 0, 05, 4-0, 4-1, 5-1 ^{*1} , SH-4 ^{*3} , 5	E42419
		SZ-A31	3NO+1NC	SC-N1, N2, N2S, N3	
		SZ-A22	2NO+2NC		
		SZ-A20	2NO		
		SZ-A11	1NO+1NC		
	SZ-A02	2NC			
	Auxiliary contact block (Side mounting)	SZ-AS1	1NO+1NC	SC-03, 0, 05, 4-0, 4-1, 5-1, N1, N2, N2S, N3, SH-4, 5	
		SZ-AS2	(mounted on both left and right sides)	SC-N4, N5, N6, N7, N8, N10, N11, N12	
	Interlock unit	SZ-RM	A set of interlock and joint block	SC-03, 0, 05, 4-0, 4-1, 5-1, N1, N2, N2S, N3	
	Coil surge suppression unit	SZ-Z1	Varistor 24 - 48V AC/DC	SC-03 - 5-1, SH-4, 5	
		SZ-Z2	Varistor 100 - 240V AC/DC	SC-03/G - 5-1/G, SH-4/G, 5/G	
		SZ-Z3	Varistor 380 - 440V AC	SC-03 - 5-1, SH-4, 5	
		SZ-Z6	Varistor 24 - 48V AC/DC LED	SC-03 - 5-1, SH-4, 5	
		SZ-Z7	Varistor 100 - 240V AC/DC LED	SC-03/G - 5-1/G, SH-4/G, 5G	
		SZ-Z31	Varistor 24 - 48V AC/DC	SC-N1 - N3	
		SZ-Z32	Varistor 100 - 250V AC/DC	SC-N1/G - N3/G	
		SZ-Z33	Varistor 380 - 440V AC	SC-N1 - N3	
		SZ-Z41	Varistor 24 - 48V AC	SC-N4	
		SZ-Z42	Varistor 100 - 250V AC		
		SZ-Z43	Varistor 380 - 440V AC		
		SZ-Z4	CR 24 - 48V AC/DC	SC-03 - 5-1, SH-4, 5	
		SZ-Z5	CR 100 - 240V AC/DC		
		SZ-Z8	CR 24 - 48V AC/DC LED		
		SZ-Z9	CR 100 - 240V AC/DC LED		
		SZ-Z34	CR 24 - 48V AC	SC-N1 - N3	
		SZ-Z35	CR 100 - 250V AC		
		SZ-Z36	CR 24 - 48V DC	SC-N1/G - N3/G	
		SZ-Z37	CR 100 - 250V DC		
		SZ-Z44	CR 24 - 48V AC	SC-N4	
	SZ-Z45	CR 100 - 250V AC			
	Main circuit surge suppression unit	SZ-ZM1	Front mounting 3-phase CR 250V AC	SC-03 - 5-1 ^{*2}	
		SZ-ZM2	Side mounting 3-phase CR 250V AC		
		SZ-ZM3		SC-N1 - N3	
		SZ-ZM4			
	Terminal covers	SZ-T5	For auxiliary contact block (front mounting:) 4 poles	SZ-A40, A31, A22, A20, A11, A02	
		SZ-T6	For auxiliary contact block (front mounting:) 3 poles		
		SZ-T7	For auxiliary contact block (front mounting:) 2 poles	SZ-AL, AR, AS1, AS2	
		SZ-T1	For contactors (main terminals and coil terminals)	SC-03, 0, SH-4	
		SZ-T2		SC-05, SH-5	
		SZ-T3		SC-4-0, 4-1, 5-1	
		SZ-T4		SC-5-1	
		SZ-T22		SC-N1, N2	
		SZ-T23		SC-N2S, N3	
		SZ-T10	For thermal overload relay separate mounting unit	SZ-HB	
		SZ-T11		SZ-HC	
SZ-T12		For thermal overload relays	TR-0N		
SZ-T13			TR-5-1N		
SZ-T14		For separate mounting thermal overload relay	TR-N2H		
SZ-T15			TR-N3H		
SZ-T16		For thermal overload relays	TR-N2		
SZ-T17			TR-N3		
SZ-N4T		For magnetic contactors (Terminal on power supply side)	SC(SW)-N4, N5		
SZ-N6T			SC(SW)-N6		
SZ-N7T		For magnetic contactors (Terminal on load side)	SC(SW)-N7		
SZ-N8T		For magnetic starters (Terminal on power supply side)	SC(SW)-N8, N10		
SZ-N11T			SC(SW)-N11, N12		
SZ-WN4T		For magnetic starters (Terminal on load side)	SW-N4, N5		
SZ-WN6T			SW-N6		
SZ-WN7T			SW-N7		
SZ-WN8T			SW-N8		
SZ-WN10T			SW-N10		
SZ-WN11T		SW-N11, N12			
Separate mounting unit	SZ-HB	Separate mounting thermal overload relay assembly	TR-0N		
	SZ-HC		TR-5-1N		
	SZ-HD		TR-N2		
	SZ-HE		TR-N3		
Reset release button	SZ-R1	For resetting thermal overload relay (L=300mm)	TR-0N, 5-1N		
	SZ-R2	For resetting thermal overload relay (L=500mm)			
	SZ-R3	For resetting thermal overload relay (L=700mm)			
Dial cover	SZ-DA	For locking the current setting dial of thermal overload relay	TR-0N, 5-1N		

Note 1: The main unit is approved to satisfy the UL/CSA standard when it is combined with operation counter (SZ-J□) and/or live-section cover (SZ-JC□, or JW□).


*1 Can not be mounted on 5-1(Y) type of 2NO+2NC auxiliary contacts.

*2 SZ-ZM1 type can not be mounted on 5-1(Y) type of 2NO+2NC auxiliary contacts.


*3 Can not be mounted on SH-4 type of 8 auxiliary contacts.

● Contactors / SC-M series


- AC operated non-reversing magnetic contactors

Series Standard	Type	Max. motor capacity [HP] (): Rated operational current						Continuous current [A]	UL File No.
		Single-phase		3-phase squirrel-cage					
		110-120V	220-240V	200V	220-240V	400-480V	550-600V		
SC-M Series 	SC-M01	1/3 (7.2A)	1 (4.2A)	1.5 (6.9A)	1.5 (6A)	3 (4.8A)	3 (3.9A)	20	E42419
	SC-M02	1/2 (9.8A)	1.5 (6A)	3 (11A)	3 (9.6A)	5 (7.6A)	5 (6.1A)	20	


- DC operated non-reversing magnetic contactors

Series Standard	Type	Max. motor capacity [HP] (): Rated operational current						Continuous current [A]	UL File No.
		Single-phase		3-phase squirrel-cage					
		110-120V	220-240V	200V	220-240V	400-480V	550-600V		
SC-M Series 	SC-M01/G	1/3 (7.2A)	1 (4.2A)	1.5 (6.9A)	1.5 (6A)	3 (4.8A)	3 (3.9A)	20	E42419
	SC-M01/G1	1/3 (7.2A)	1 (4.2A)	1.5 (6.9A)	1.5 (6A)	3 (4.8A)	3 (3.9A)	20	
	SC-M01/G2	1/3 (7.2A)	1 (4.2A)	1.5 (6.9A)	1.5 (6A)	3 (4.8A)	3 (3.9A)	20	
	SC-M02/G	1/2 (9.8A)	1.5 (6A)	3 (11A)	3 (9.6A)	5 (7.6A)	5 (6.1A)	20	
	SC-M02/G1	1/2 (9.8A)	1.5 (6A)	3 (11A)	3 (9.6A)	5 (7.6A)	5 (6.1A)	20	
	SC-M02/G2	1/2 (9.8A)	1.5 (6A)	3 (11A)	3 (9.6A)	5 (7.6A)	5 (6.1A)	20	


- AC operated reversing magnetic contactors

Series Standard	Type	Max. motor capacity [HP] (): Rated operational current				Continuous current [A]	UL File No.
		3-phase					
		200V	220-240V	400-480V	550-600V		
SC-M Series 	SC-M01RM	1.5 (6.9A)	1.5 (6A)	3 (4.8A)	3 (3.9A)	20	E42419
	SC-M02RM	3 (11A)	3 (9.6A)	5 (7.6A)	5 (6.1A)	20	


-DC operated reversing magnetic contactors

Series Standard	Type	Max. motor capacity [HP] (): Rated operational current				Continuous current [A]	UL File No.
		3-phase					
		200V	220-240V	400-480V	550-600V		
SC-M Series 	SC-M01/GRM	1.5 (6.9A)	1.5 (6A)	3 (4.8A)	3 (3.9A)	20	E42419
	SC-M01/G1RM	1.5 (6.9A)	1.5 (6A)	3 (4.8A)	3 (3.9A)	20	
	SC-M01/G2RM	1.5 (6.9A)	1.5 (6A)	3 (4.8A)	3 (3.9A)	20	
	SC-M02/GRM	3 (11A)	3 (9.6A)	5 (7.6A)	5 (6.1A)	20	
	SC-M02/G1RM	3 (11A)	3 (9.6A)	5 (7.6A)	5 (6.1A)	20	
	SC-M02/G2RM	3 (11A)	3 (9.6A)	5 (7.6A)	5 (6.1A)	20	

- 2E thermal overload relay


Series Standard	Type	No. of heat elements	Reset	Auxiliary contact	Heat element rating [A]	Applicable magnetic contactor types	Protection coordination Fuse rating [A] Class K-5	UL File No.
SC-M Series 	TK-M0	3	Manual/Auto	1NC	0.11-0.17	SC-M01	1	E44592
					0.17-0.26	SC-M01/G□	1	
					0.26-0.43	SC-M01RM	1	
					0.43-0.65	SC-M01/G□RM	1	
					0.65-1.0	SC-M02	3	
					0.85-1.3	SC-M02/G□	3	
					1.1-16	SC-M02RM	6	
					1.35-2.0	SC-M02/G□RM	6	
					1.7-2.4		6	
					2.2-3.2		10	
					2.5-4.0		15	
					3.0-4.7		15	
					4.0-6.3		20	
					5.5-8.0		30	
	7.5-10.5		40					
	TK-M0Q	3	Manual/Auto	1NC	1.35-2.0		6	
					1.7-2.4		10	
					2.2-3.2		15	
					3.0-4.7		15	
					4.0-6.3		20	
5.5-8.0						30		
7.4-10.5		40						

- SC-M Series optional accessories


Series Standard	Model	Type	Specification	Applications	UL File No.	
 SC-M Series	Auxiliary contact block (Front mounting)	SZ-MA40	4NO, A600, Q600	SC-M01 SC-M01/G□ SC-M02 SC-M02/G□	E44592	
		SZ-MA31	3NO+1NC, A600, Q600			
		SZ-MA22	2NO+2NC, A600, Q600			
		SZ-MA13	1NO+3NC, A600, Q600			
		SZ-MA04	4NC, A600, Q600			
		SZ-MA20	2NO, A600, Q600			
		SZ-M11	1NO+1NC, A600, Q600			
		SZ-MA02	2NC, A600, Q600			
		Auxiliary contact block (Side mounting)	SZ-MAS10			1NO, A600, Q600
			SZ-MAS01			1NC, A600, Q600
	Coil surge suppression unit	SZ-MZ1	CR 12 - 60V AC/DC 50/60Hz			
		SZ-MZ2	CR 72 - 250V AC/DC 50/60Hz			
		SZ-MZ3	Built-in diode (6 - 250V DC)			
	Interlock unit	SZ-MRM	A set of interlock and joint block			
	Reversing connection kit	SZ-MRWC	Reversing circuit wiring kit			
	Solid-state time-delay unit	SZ-MT2	ON delay 0.2 - 24s			
SZ-MT5		ON delay 0.5 - 60s				
Input terminal	SZ-MHT	Separate mounting thermal relay input terminal	TK-M0			
Base unit	SZ-MHB	DIN 35mm-wide rail mounted, screw mounted	TK-M0Q			
Auxiliary contact block	SZ-MA10	Contact arrangement : 1NC, A600, Q600				

● Contactors / SC-E Series


- AC operated / Non-reversing contactors


Series Standard	Type	Rated capacity [HP] (): Rated operational current						Continuous current [A]	UL File No.
		Single-phase motor		3-phase squirrel cage motor					
		110-120V	220-240V	200V	220-240V	440-480V	550-600V		
 SC-E Series	SC-E02	1/3 (7.2A)	1 (8A)	2 (7.8A)	2 (6.8A)	5 (7.6A)	5 (6.1A)	20	E42419
	SC-E03	1/2 (9.8A)	2 (12A)	3 (11A)	3 (9.6A)	7 1/2 (11A)	7 1/2 (9A)	20	
	SC-E04	1 (16A)	3 (17A)	5 (17.5A)	5 (15.2A)	10 (14A)	10 (11A)	25	
	SC-E05	2 (24A)	3 (17A)	5 (17.5A)	7 1/2 (22A)	15 (21A)	15 (17A)	32	
	SC-E1	2 (24A)	3 (17A)	7.5 (25.3A)	10 (28A)	25 (34A)	25 (27A)	50	
	SC-E2	3 (34A)	5 (28A)	10 (32.2A)	15 (42A)	30 (40A)	30 (32A)	60	
	SC-E2S	3 (34A)	10 (50A)	15 (48.3A)	20 (54A)	30 (40A)	30 (32A)	65	
	SC-E3	5 (56A)	15 (68A)	20 (62.1A)	25 (68A)	50 (65A)	50 (52A)	100	
	SC-E4	5 (56A)	15 (68A)	25 (78.2A)	30 (80A)	50 (65A)	50 (52A)	105	
	SC-E5	7.5 (80A)	15 (68A)	30 (92A)	30 (80A)	60 (77A)	75 (77A)	150	
	SC-E6	10 (100A)	20 (88A)	40 (119.6A)	40 (104A)	75 (96A)	100 (99A)	150	
SC-E7	15 (135A)	25 (110A)	50 (149.5A)	50 (130A)	100 (124A)	125 (125A)	200		

- DC operated / Non-reversing contactors


Series Standard	Type	Rated capacity [HP] (): Rated operational current						Continuous current [A]	UL File No.
		Single-phase motor		3-phase squirrel cage motor					
		110-120V	220-240V	200V	220-240V	440-480V	550-600V		
 SC-E Series	SC-E02/G	1/3 (7.2A)	1 (8A)	2 (7.8A)	2 (6.8A)	5 (7.6A)	5 (6.1A)	20	E42419
	SC-E03/G	1/2 (9.8A)	2 (12A)	3 (11A)	3 (9.6A)	7 1/2 (11A)	7 1/2 (9A)	20	
	SC-E04/G	1 (16A)	3 (17A)	5 (17.5A)	5 (15.2A)	10 (14A)	10 (11A)	25	
	SC-E05/G	2 (24A)	3 (17A)	5 (17.5A)	7 1/2 (22A)	15 (21A)	15 (17A)	32	
	SC-E1/G	2 (24A)	3 (17A)	7.5 (25.3A)	10 (28A)	25 (34A)	25 (27A)	50	
	SC-E2/G	3 (34A)	5 (28A)	10 (32.2A)	15 (42A)	30 (40A)	30 (32A)	60	
	SC-E2S/G	3 (34A)	10 (50A)	15 (48.3A)	20 (54A)	30 (40A)	30 (32A)	65	
	SC-E3/G	5 (56A)	15 (68A)	20 (62.1A)	25 (68A)	50 (65A)	50 (52A)	100	
	SC-E4/G	5 (56A)	15 (68A)	25 (78.2A)	30 (80A)	50 (65A)	50 (52A)	105	
	SC-E5	7.5 (80A)	15 (68A)	30 (92A)	30 (80A)	60 (77A)	75 (77A)	150	
	SC-E6	10 (100A)	20 (88A)	40 (119.6A)	40 (104A)	75 (96A)	100 (99A)	150	
SC-E7	15 (135A)	25 (110A)	50 (149.5A)	50 (130A)	100 (124A)	125 (125A)	200		


- 2E thermal overload relay

Series Standard	Type	No. of heat elements	Reset	Auxiliary contact arrangement	Heat element ratings [A]	Protection coordination		Applicable magnetic contactor types	UL File No.
						AC 600V Max. rated current of UL breaker [A]	AC 600V Max. rated current of UL fuse [A]		
SC-E Series 	TK-E02	3	Manual / Auto	1NO + 1NC	0.1-0.15 (0.1)	15	15	SC-E02, E02/G	E44592
					0.13-0.2 (0.13)	15	15		
					0.15-0.24 (0.15)	15	15		
					0.2-0.3 (0.2)	15	15		
					0.24-0.36 (0.24)	15	15		
					0.3-0.45 (0.3)	15	15		
					0.36-0.54 (0.36)	15	15		
					0.48-0.72 (0.48)	15	15		
					0.64-0.96 (0.64)	15	15		
					0.8-1.2 (0.8)	15	15		
					0.95-1.45 (0.95)	15	15		
					1.4-2.2 (1.4)	20	15		
					1.7-2.6 (1.7)	20	15		
					2.2-3.4 (2.2)	20	15		
					2.8-4.2 (2.8)	20	15		
					4-6 (4)	20	15		
					5-8 (5)	20	15		
					6-9 (6)	20	30		
					7-11 (7)	20	30		
					0.1-0.15 (0.1)	15	15		
					0.13-0.2 (0.13)	15	15		
					0.15-0.24 (0.15)	15	15		
					0.2-0.3 (0.2)	15	15		
					0.24-0.36 (0.24)	15	15		
					0.3-0.45 (0.3)	15	15		
					0.36-0.54 (0.36)	15	15		
					0.48-0.72 (0.48)	15	15		
					0.64-0.96 (0.64)	15	15		
					0.8-1.2 (0.8)	15	15		
					0.95-1.45 (0.95)	15	15		
					1.4-2.2 (1.4)	20	15		
					1.7-2.6 (1.7)	20	15		
					2.2-3.4 (2.2)	20	15		
					2.8-4.2 (2.8)	20	15		
					4-6 (4)	20	15		
					5-8 (5)	20	15		
					6-9 (6)	20	30		
					7-11 (7)	20	30		
					9-13 (9)	30	30		
					0.1-0.15 (0.1)	15	15	SC-E04, E04/G	
					0.13-0.2 (0.13)	15	15		
					0.15-0.24 (0.15)	15	15		
					0.2-0.3 (0.2)	15	15		
					0.24-0.36 (0.24)	15	15		
					0.3-0.45 (0.3)	15	15		
					0.36-0.54 (0.36)	15	15		
					0.48-0.72 (0.48)	15	15		
					0.64-0.96 (0.64)	15	15		
					0.8-1.2 (0.8)	15	15		
					0.95-1.45 (0.95)	15	15		
					1.4-2.2 (1.4)	20	15		
					1.7-2.6 (1.7)	20	15		
2.2-3.4 (2.2)	20	15							
2.8-4.2 (2.8)	20	15							
4-6 (4)	20	15							
5-8 (5)	20	15							
6-9 (6)	20	30							
7-11 (7)	20	30							
9-13 (9)	30	30							
12-18 (12)	30	50							
0.1-0.15 (0.1)	15	15	SC-E05, E05/G						
0.13-0.2 (0.13)	15	15							
0.15-0.24 (0.15)	15	15							
0.2-0.3 (0.2)	15	15							
0.24-0.36 (0.24)	15	15							
0.3-0.45 (0.3)	15	15							
0.36-0.54 (0.36)	15	15							
0.48-0.72 (0.48)	15	15							
0.64-0.96 (0.64)	15	15							
0.8-1.2 (0.8)	15	15							
0.95-1.45 (0.95)	15	15							
1.4-2.2 (1.4)	20	15							
1.7-2.6 (1.7)	20	15							
2.2-3.4 (2.2)	20	15							
2.8-4.2 (2.8)	20	15							
4-6 (4)	20	15							
5-8 (5)	20	15							
6-9 (6)	20	30							
7-11 (7)	20	30							

Series Standard	Type	No. of heat elements	Reset	Auxiliary contact arrangement	Heat element ratings [A]	Protection coordination		Applicable magnetic contactor types	UL File No.
						AC 600V Max. rated current of UL breaker [A]	AC 600V Max. rated current of UL fuse [A]		
SC-E Series 	TK-E02	3	Manual / Auto	1NO + 1NC	9-13 (9)	30	30	SC-E05, E05/G	E44592
					12-18 (12)	30	50		
					16-22 (16)	50	50		
					20-25 (20)	50	50		
	TK-E2	3	Manual / Auto	1NO + 1NC	4-6 (4)	60	20	SC-E1, E1/G	
					5-8 (5)	60	20		
					6-9 (6)	60	20		
					7-11 (7)	60	20		
					9-13 (9)	60	20		
					12-18 (12)	60	50		
					18-26 (18)	60	50		
					24-36 (24)	50	50		
					4-6 (4)	60	20	SC-E2, E2/G	
					5-8 (5)	60	20		
					6-9 (6)	60	20		
					7-11 (7)	60	20		
					9-13 (9)	60	20		
					12-18 (12)	60	50		
					18-26 (18)	60	50		
					24-36 (24)	50	50		
					32-42 (32)	70	70	SC-E2S, E2S/G	
					4-6 (4)	60	20		
					5-8 (5)	60	20		
					6-9 (6)	60	20		
					7-11 (7)	60	20		
					9-13 (9)	60	20		
					12-18 (12)	60	50		
					18-26 (18)	60	50		
	24-36 (24)	50	50						
	32-42 (32)	70	70						
	40-50 (40)	70	70						
	44-54 (44)	70	70						
	TK-E3	3	Manual / Auto	1NO + 1NC	7-11 (7)	60	20	SC-E3, E3/G	
					9-13 (9)	60	20		
					12-18 (12)	60	50		
					18-26 (18)	60	50		
					24-36 (24)	50	50		
					28-40 (28)	70	70		
					34-50 (34)	70	70		
					45-65 (45)	125	125		
					48-68 (48)	125	125	SC-E4, E4/G	
					7-11 (7)	60	20		
					9-13 (9)	60	20		
					12-18 (12)	60	50		
					18-26 (18)	60	50		
					24-36 (24)	50	50		
					28-40 (28)	70	70		
					34-50 (34)	70	70		
	45-65 (45)	125	125						
	48-68 (48)	125	125						
	64-80 (64)	125	125						
	TK-E5	3	Manual / Auto	1NO + 1NC	18-26 (18)	60	50	SC-E5	
					24-36 (24)	50	50		
					28-40 (28)	70	70		
					34-50 (34)	70	70		
					45-65 (45)	125	125		
					65-95 (65)	125	150		
	85-105 (85)	125	150						
	TK-E6	3	Manual / Auto	1NO + 1NC	45-65 (45)	175	150	SC-E6	
					53-80 (53)	175	150		
					65-95 (65)	175	150		
					85-125 (85)	175	150		
					45-65 (45)	175	150	SC-E7	
					53-80 (53)	175	150		
					65-95 (65)	175	150		
					85-125 (85)	175	150		
	110-160 (110)	225	200						

● SJ series high-sensitivity contactor (open type)


Standard	Non-reversible types		Max. motor capacity [HP]						Continuous current [A] ^{*1}	Auxiliary contact arrangement	Coil voltage code	UL File No.
	Magnetic contactor	Magnetic starters	Single-phase			3-phase						
	Type	Type	110-120V	220-240V	110-120V	220V	220-240V	440-480V				
SJ Series 	SJ-0G, 06G	SJ-0WG/N3H, 06WG/N3H SJ-0WG/2E, 06WG/2E	1/3	1	1	2	3	-	15	1NO, 1NC	12V DC 24V DC	E42419
	SJ-1SG	SJ-1SWG/3H SJ-1SWG/2E	1	2	2	5	5	7 1/2	25	2NO, 2NO+2NC		

Standard	Reversible types		Max. motor capacity [HP]						Continuous current [A] ^{*1}	Auxiliary contact arrangement	Coil voltage code	UL File No.
	Magnetic contactor	Magnetic starters	Single-phase			3-phase						
	Type	Type	110-120V	220-240V	110-120V	220V	220-240V	440-480V				
SJ Series 	SJ-0G, 06G	SJ-0WGRM/N3H, 06WGRM/N3H SJ-0WGRM/2E, 06WGRM/2E	1/3	1	1	2	3	-	15	1NO, 1NC	12V DC 24V DC	E42419
	SJ-1SG	SJ-1SWGRM/3H SJ-1SWGRM/2E	1	2	2	5	5	7 1/2	25	2NO, 1NO+1NC		


*1 Applicable when used as magnetic contactor

Notes 1: Allowable voltage variation is 85% to 110% of rated voltage.
2: Be careful of the polarity of operation coil terminals.


● FC Series AC operated magnetic contactors (open type)

Series Standard	Type	Max. motor capacity [HP]						Continuous current [A]	Auxiliary contact arrangement	UL File No.
		Single-phase			3-phase					
		110-120V	220-240V	200V	220-240V	440-480V	550-600V			
FC Series 	FC-0UL	1/2	1	1	1	-	-	15	1NO, 1NC	E42419
	FC-0TUL									
	FC-0SUL									
	FC-0STUL									
	FC-0/GUL									
	FC-0T/GUL									
	FC-1UL	1	2	5	5	7.5	7.5	20	1NO+1NC	
	FC-1SUL	2	3	5	7.5	10	7.5	26	1NO+1NC	
	FC-2SUL	3	5	10	10	15	10	35	1NO+1NC	
FC-3UL	3	7.5	10	15	25	15	45	1NO+1NC		
FC-4UL	5	10	15	20	30	25	65	1NO+1NC		

● FC Series DC operated magnetic contactors (open type)

Series Standard	Type	Max. motor capacity [HP]					Continuous current [A]	Auxiliary contact arrangement	UL File No.
		Single-phase		3-phase					
		110-120V	220-240V	200V	220-240V	380-440V			
FC Series 	FC-0/GUL	1/2	1	1	1	-	15	1NO, 1NC	E42419
	FC-0T/GUL								
	FC-0S/GUL								
	FC-0ST/GUL								

● SB series DC magnetic contactors

Series Standard	Type	Main contact arrangement	Operational current [A]												Continuous current [A]		UL File No.
			For variable-speed motor								DC motor (class DC2/DC4)				NO contact	NC contact	
			NO contact (2 serial poles)				Dynamic brake applied NC contact (activation time: 3 seconds)				NO contact (2 serial poles)						
			110V	240V	440V	550V	110V	240V	440V	550V	110V	240V	440V	550V			
SB Series 	SB-2N/UL	2NO	50	50	35	35	75	75	75	75	40	35	18	15	50	50	E42419
	SB-2NB/UL	2NO+1NC	50	50	35	35	75	75	75	75	40	35	18	15	50	50	
	SB-2N/SEUL	2NO	110	110	110	110	165	165	165	165	85	85	60	45	110	100	
	SB-2NB/SEUL	2NO+1NC	140	140	140	140	210	210	210	210	125	120	80	50	140	100	
	SB-5N/UL	2NO	240	240	240	240	360	360	360	360	240	200	120	100	240	160	
	SB-5NB/UL	2NO+1NC	320	320	320	320	480	480	480	480	320	290	200	150	320	200	
	SB-6N/UL	2NO															
	SB-6NB/UL	2NO+1NC															
	SB-10N/UL	2NO															
	SB-10NB/UL	2NO+1NC															
	SB-11N/UL	2NO															
SB-11NB/UL	2NO+1NC																

- Notes 1: The duty for variable-speed motor control (NO contact) and that for dynamic brake (NC contact) are applicable to the no-voltage circuit of twice the making capacity and to that of one time the making capacity, respectively.
- 2: The continuous current values for dynamic brake application are for the intermittent operation of 600 cycle/hour and 3-second activation time.
- 3: The values for DC motor application are applicable to the motor load of class DC2 (start/stop of shunt motors - time constant L/R: 2ms when closed and 7.5ms when open) or DC4 (start/stop of series motors - time constant L/R: 7.5ms when closed and 10ms when open) under JEM1038.

● Standard application of built-in thermal overload relays


Type	No. of heat elements	Reset	Auxiliary contact arrangement	Heat element ratings [A]	Protection coordination		Applicable magnetic starter types
					Max. rated current of current limiting fuse [A] ^{*1}	Max. rated current of molded case circuit breaker [A]	
TR-0/UL	3	Manual	1(NO+NC)	0.48 - 0.72 (0.48)	15	15	SJ-0WG/UL
				0.64 - 0.96 (0.64)	15	15	
				0.8 - 1.2 (0.8)	15	15	
				0.95 - 1.45 (0.95)	15	15	
				1.4 - 2.2 (1.4)	15	15	
				1.7 - 2.6 (1.7)	15	15	
				2.2 - 3.4 (2.2)	15	15	
				2.8 - 4.2 (2.8)	15	15	
				4 - 6 (4)	15	15	
				5 - 8 (5)	20	15	
				6 - 9 (6)	30	15	
7 - 9.6 (7)	30	15					
TR-0N/3Z716 TK-0NZ716	3	Manual/Auto	1NO+1NC	0.1 - 0.15 (0.1)	1 (15)	-	SJ-0WG/NUL SJ-0WG/2EUL
				0.15 - 0.24 (0.15)	1 (15)		
				0.24 - 0.36 (0.24)	2 (15)		
				0.36 - 0.54 (0.36)	3 (15)		
				0.54 - 0.72 (0.48)	3 (15)		
				0.64 - 0.96 (0.64)	3 (15)		
				0.8 - 1.2 (0.8)	5 (15)		
				0.95 - 1.45 (0.95)	5 (15)		
				1.4 - 2.2 (1.4)	10 (15)		
				1.7 - 2.6 (1.7)	10 (15)		
				2.2 - 3.4 (2.2)	15		
				2.8 - 4.2 (2.8)	15		
				4 - 6 (4)	15		
				5 - 8 (5)	20		
6 - 9 (6)	30						
7 - 11 (7)	30						
TR-5-1N/3 TK-5-1N	3	Manual/Auto	1NO+1NC	0.1 - 0.15 (0.1)	1 (15)	-	SJ-1SWG/UL SJ-1SWG/2EUL
				0.15 - 0.24 (0.15)	1 (15)		
				0.24 - 0.36 (0.24)	2 (15)		
				0.36 - 0.54 (0.36)	3 (15)		
				0.48 - 0.72 (0.48)	3 (15)		
				0.64 - 0.96 (0.64)	3 (15)		
				0.8 - 1.2 (0.8)	5 (15)		
				0.95 - 1.45 (0.95)	5 (15)		
				1.4 - 2.2 (1.4)	10 (15)		
				1.7 - 2.6 (1.7)	10 (15)		
				2.2 - 3.4 (2.2)	15		
				2.8 - 4.2 (2.8)	15		
				4 - 6 (4)	15		
				5 - 8 (5)	20		
6 - 9 (6)	30						
7 - 11 (7)	30						
9 - 13 (9)	30						
12 - 18 (12)	30						

*1 Parenthesized values in the fuse rating column are for CSA approved products.

Note 1: Parenthesized figures in the "Heat element rating" column are the nominal rating to be specified at order placement.

■ Solid-state Contactors


● 3-pole Solid-state contactors

Series Standard	Rated main-circuit voltage	Type		Number of main circuit elements	Continuous current [A]	Max. motor capacity [HP] (at 60 Hz)				UL File No.
		Main body	Cooling fin			Single-phase		3-phase		
						110-120V	220-240V	220-240V	440-480V	
SS Series 	100-240V AC	SS032	-	2	3	-	1/10	1/2	-	E132864
		SS033	-	3	3	-	1/10	1/2	-	
		SS082	Fins integrated into main body	2	8	1/10	1/4	3/4	-	
		SS083		3	8	1/10	1/4	3/4	-	
		SS202	SX1-D10	2	20	1/6	1/2	1 1/2	-	
		SS203	SX1-D10	3	20	1/6	1/2	1 1/2	-	
		SS302	SX1-D10	2	30	1/3	1	2	-	
		SS303	SX1-E12	3	30	1/3	1	2	-	
		SS402	SX1-D14	2	40	1/2	1 1/2	3	-	
		SS403	SX1-E12	3	40	1/2	1 1/2	3	-	
		SS502	SX1-E12	2	50	1	3	5	-	
		SS503	SX1-E17	3	50	1	3	5	-	
		SS802	SX1-C12	2	80	3	5	10	-	
		SS803	SX1-C12	3	80	3	5	10	-	
	SS1202	SX1-C12	2	120	3	5	10	-		
	SS1203	SX1-C12	3	120	3	5	10	-		
	200-480V AC	SS302H	SX1-E12	2	30	-	1	5	-	
		SS303H	SX1-E12	3	30	-	1	5	-	
		SS502H	SX1-E12	2	50	-	3	5	10	
		SS503H	SX1-E17	3	50	-	3	5	10	
SS802H		SX1-C12	2	80	-	5	10	20		
SS803H		SX1-C12	3	80	-	5	10	20		
SS1202H	SX1-C12	2	120	-	5	10	20			
SS1203H	SX1-C12	3	120	-	5	10	20			


Notes 1: Figures in "Continuous current" and "Max. motor capacity" columns are those when operated at 40 °C in ambient temperature with cooling fins mounted.

2: Motor running conditions: make-break frequency = 1200 times per hour; duty cycle = 25%; motor starting current = 6 times the total load current; motor starting time = 0.7 second or less.

● Single-pole Solid-state contactors


Series Standard	Rated main-circuit voltage	Type	Number of main circuit elements	Continuous current [A]	Max. motor capacity [HP] (at 60 Hz)				UL File No.
					Single-phase		3-phase		
					120V	240V	240V	480V	
SS Series 	100-240V AC	SS101	1	10	-	-	-	-	E132864
		SS201	1	20	-	-	-	-	
		SS301	1	30	-	-	-	-	
		SS401	1	40	-	-	-	-	
		SS501	1	50	-	-	-	-	
		SS701	1	70	2	5	3	10	
		SS1001	1	100	3	7 1/2	5	15	
		SS1501	1	150	5	10	10	20	
		SS2001	1	200	7 1/2	15	10	30	
		200-480V AC	SS701H	1	70	5	10	10	
	SS1001H		1	100	7 1/2	15	15	30	
	SS1501H		1	150	10	25	20	40	
	SS2001H		1	200	20	40	30	60	

● Solid-state contactor for DC load or exclusively for heater load


Series Standard	Rated main-circuit voltage	Type	Number of main circuit elements	Continuous current [A]	UL File No.
For DC load	24 -240V DC	SS031D	1	3	E142975
Exclusively for heater load 	100-240V AC	SS101C	1	10	
		SS201C		20	
		SS301C		30	

■ Molded Case Circuit Breakers/Earth Leakage Circuit Breakers

● EA-UL Series

Series	Type	Current [A]	Poles	Voltage [V] AC	Interrupting capacity [kA]		UL File No.
					UL240V	IEC230V	
SA-UL Series 	EA100CUL	60, 70, 75, 80, 90, 100	2	240	14	25	E90584 (UL489)
			3	240	14	25	

● SA-UL Series

Series	Type	Current [A]	Poles	Voltage [V] AC	Interrupting capacity [kA]		UL File No.
					UL240V	IEC230V	
SA-UL Series 	SA50RCUL	3, 5, 10, 15, 20, 30, 40, 50	2	240	14	25	E90584 (UL489)
			3	240	14	25	
	SA100CUL	15, 20, 30, 40, 50, 60, 70, 75, 80, 90, 100	2	240	35	50	
			3	240	35	50	
	SA100CUL	15, 20, 30, 40, 50, 60, 70, 75, 80, 90, 100	2	480	85	100	
			3	480	85	100	
	SA225CUL	125, 150, 175, 200, 225	2	240	35	50	
			3	240	35	50	
	SA225RCUL	125, 150, 175, 200, 225	2	480	85	100	
			3	480	85	100	
	SA400CUL	250, 300, 350, 400	2	240	42	50	
			3	240	42	50	
	SA400RCUL	250, 300, 350, 400	2	480	85	85	
			3	480	85	85	
SA600RCUL	500, 600	3	480	85	85		
SA800RCUL	700, 800	3	480	85	85		

Note 1: Product conforming to UL508: indication in applicable load output [HP].

● External operating handles

Series	Type	Applicable model				UL File No.
		MCCBs		ELCBs		
		E series	S series	E series	S series	
V-type handle	BZ6V10C	EA32AC, 33AC EA52AC, 53AC EA52C, 53C EA62C, 63C EA103AC, 102C, 103C EA102CUL, 103CUL	SA32C, 33C SA52C, 53C SA52RC, 53RC SA62C, 63C SA62RC, 63RC SA52RCUL, 53RCUL	EG32AC, 33AC, 33C EG52AC, 53AC, 53C EG63C EG103AC, 102C, 103C EG102CUL, 103CUL	SG33C SG53C SG53RC SG63C SG63RC SG53RCUL	E93289 (UL489)
	BZ6V30C	-	SA102C, 103C SA102CUL, 103CUL SA102RC, 103RC SA102RCUL, 103RCUL	-	SG103C SG103CUL SG103RC	
	BZ6V40C	EA202C, 203C	SA202C, 203C SA202CUL, 203CUL SA202RC, 203RC SA202RCUL, 203RCUL	EG203C	SG203C SG203CUL SG203RC	
	BZ6V60C	EA402C, 403C	SA402C, 403C SA402CUL, 403CUL SA402RC, 403RC SA402RCUL, 403RCUL	EG403C	SG403C SG403CUL SG403RC	
	BZ6V70C	EA603C, 803C	SA603RC, 803RC SA603RCUL, 803RCUL	EG603C EG803C	SG603RC SG803RC	
N-type handle	BZ6N10C	EA32AC, 33AC EA52AC, 53AC EA52C, 53C EA62C, 63C EA103AC, 102C, 103C	SA32C, 33C SA52C, 53C SA52RC, 53RC SA62C, 63C SA62RC, 63RC	EG32AC, 33AC, 33C EG52AC, 53AC, 53C EG63C EG103AC, 102C, 103C	SG33C SG53C SG53RC SG63C SG63RC	E216772 (UL508)
	BZ6N10CP	EA102CUL, 103CUL	SA52RCUL, 53RCUL	EG102CUL, 103CUL	SG53RCUL	
	BZ6N30CP	-	SA102CUL, 103CUL SA102RCUL, 103RCUL	-	SG103CUL	
	BZ6N40CP	-	SA202CUL, 203CUL SA202RCUL, 203RCUL	-	SG203CUL	
	BZ6N60CP	-	SA402CUL, 403CUL SA402RCUL, 403RCUL	-	SG403CUL	
	BZ6N70CP	-	SA603RCUL, 803RCUL	-	-	
Flange-type handle	BZ6UF30D	-	SA100CUL SA100RCUL	-	SG103CUL	E93289 (UL489)
	BZ6UF40D	-	SA225CUL SA225RCUL	-	SG203CUL	
	BZ6UF60D	-	SA400CUL SA400RCUL	-	SG403CUL	

● α-TWIN Series (UL 508 listed)


Frame [A]	30					50					60					100																
Type	EA32AC		EA33AC			EA52AC		EA53AC			EA52C		EA53C			EA62C		EA63C			EA103AC		EA102C			EA103C						
Pole	2					3					2					3					2					3						
Rated operating voltage [V]	AC		240					240					550					550					240					600				
Rated current [A]	3	5	10	15	20	30	5	10	15	20	30	40	50	5	10	15	20	30	40	50	60	75	100	150	200	250	60	75	100	150	200	250
UL508	3-phase	Applicable load output [Hp], for 3 poles	AC550V (550-600V)	-	-	-	-	-	-	-	-	-	-	-	-	1	3	5	7.5	10	15	20	25	-	-	-	25	30	40			
			AC440-480V	-	-	-	-	-	-	-	-	-	-	-	-	1	2	3	5	10	10	15	20	20	-	-	-	20	25	30		
			AC220-240V	-	0.5	1	2	2	3	0.5	1	2	2	3	5	7.5	0.5	1	2	2	3	5	7.5	10	10	10	15	10	10	15		
			AC110-120V	-	-	0.5	3/4	1	2	-	0.5	3/4	1	2	2	3	-	-	-	-	-	-	-	-	-	3	5	7.5	-	-	-	
	Single-phase	Applicable load output [Hp]	AC550V (550-600V)	-	-	-	-	-	-	-	-	-	-	-	-	0.5	1.5	3	5	7.5	10	15	-	-	-	15	20	25				
			AC440-480V	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	3	5	5	7.5	10	-	-	-	10	15	20			
			AC220-240V	0.1	1/6	1/3	3/4	1	2	1/6	1/3	3/4	1	2	3	3	1/6	1/3	3/4	1	2	3	3	5	5	5	7.5	5	5	7.5		
			AC110-120V	-	-	1/6	1/4	1/3	3/4	-	1/6	1/4	1/3	3/4	1	1.5	-	1/6	1/4	1/3	3/4	1	1.5	-	2	3	3	-	-	-		
	UL File No.			E216772																												

Frame [A]	30					50					60																					
Type	SA32C		SA33C			SA52C		SA53C			SA52RC		SA53RC			SA62C		SA63C			SA62RC		SA63RC									
Pole	2					3					2					3					2					3						
Rated operating voltage [V]	AC		550					600					600					600					600									
Rated current [A]	3	5	10	15	20	30	5	10	15	20	30	40	50	5	10	15	20	30	40	50	60	75	100	150	200	250	60	75	100	150	200	250
UL508	3-phase	Applicable load output [Hp], for 3 poles	AC550V (550-600V)	3/4	1	3	5	7.5	10	1	3	5	7.5	10	15	20	3	5	7.5	10	15	20	25	-	-	-	25	-	-	-		
			AC440-480V	0.5	1	2	3	5	10	1	2	3	5	10	10	15	2	2	3	5	10	10	15	20	20	-	-	-	-	-	-	
			AC220-240V	-	0.5	1	2	2	3	0.5	1	2	2	3	5	7.5	1	2	2	3	5	7.5	10	10	10	15	10	10	15	20		
			AC110-120V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Single-phase	Applicable load output [Hp]	AC550V (550-600V)	-	0.5	1.5	3	3	5	0.5	1.5	3	3	5	7.5	10	1.5	3	3	5	7.5	10	15	-	-	-	15	-	-	-		
			AC440-480V	-	-	1	2	3	5	-	1	2	3	5	5	7.5	1	2	3	5	5	7.5	10	10	-	-	-	-	-	-		
			AC220-240V	-	1/6	1/3	3/4	1	2	1/6	1/3	3/4	1	2	3	3	1/3	3/4	1	2	3	3	5	5	5	7.5	5	5	7.5	10		
			AC110-120V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	UL File No.			E216772																												

● EG-UL Series

Series	Type	Rated current	Poles	Rated operating voltage [V]	Interrupting capacity [kA]		UL File No.
					UL240V	IEC230V	
SG-UL, EG-UL Series	EG100CUL	60, 75, 100	2	240	14	10	E90584 (UL489)
			3	240	14	10	

● SG-UL Series

Series	Type	Current [A]	Poles	Voltage [V]	Interrupting capacity [kA]		UL File No.
					UL240V	IEC230V	
SA-UL Series 	SG50RCUL	3, 5, 10, 15, 20, 30, 40, 50	3	240	14	25	E90584 (UL489)
	SG100CUL	32, 40, 50, 60, 75, 100	3	240	35	50	
	SG225CUL	125, 150, 175, 200, 225	3	240	35	50	
	SG400CUL	250, 300, 350, 400	3	480	42	50	


Note 1: Product conforming to UL508: indication in applicable load output [HP].

● α -TWIN Series (UL 508 listed)



Frame [A]				30						50						60			100						
Type				EG32AC		EG33AC		EG33C		EG52AC		EG53AC		EG53C		EG63C			EG103AC			EG102C		EG103C	
Pole				2		3		3		2		3		3		3			2			3		3	
Rated operating voltage [V]				AC						240						240			240			240			
Rated current [A]				5	10	15	20	30	5	10	15	20	30	40	50	60	60	75	100	60	75	100	60	75	100
UL508	3-phase	Applicable load output [Hp], for 3 poles	AC220-240V	0.5	1	2	2	3	0.5	1	2	2	3	5	7.5	10	10	15	15	10	10	15	10	10	15
	Single-phase	Applicable load output [Hp]	AC220-240V	1/6	1/3	3/4	1	2	1/6	1/3	3/4	1	2	3	3	5	5	7.5	7.5	5	5	7.5	5	5	7.5
High-speed type	Rated operating AC voltage [V] [UL508 (cUL)]			240						240						240			240						
	Rated sensitive current $I_{\Delta n}$ [mA] [UL508 (cUL)]			15, 30, 100						15, 30, 100/200						30, 100/200			100/200			100/200/500			
	Pick-up current [UL1053]			0.7 × rated sensitive current																					
Tripping time (S) [UL1053]				0.1 or less																					
UL File No.				E216772																					

Frame [A]				30						50						60										
Type				SG33C						SG53C						SG63C			SG63RC							
Pole				3						3						3			3							
Rated operating voltage [V]				AC						240						240			240							
Rated current [A]				3	5	10	15	20	30	3	5	10	15	20	30	40	50	60	60	75	60	75	100	60	75	100
UL508	3-phase	Applicable load output [Hp], for 3 poles	AC220-240V	-	0.5	1	2	2	3	0.5	1	2	2	3	5	7.5	10	10	15	10	10	15	10	10	15	
	Single-phase	Applicable load output [Hp]	AC220-240V	-	1/6	1/3	3/4	1	2	1/6	1/3	3/4	1	2	3	3	5	5	7.5	5	5	7.5	5	5	7.5	
High-speed type	Rated operating AC voltage [V] [UL508 (cUL)]			240						240						240			240							
	Rated sensitive current $I_{\Delta n}$ [mA] [UL508 (cUL)]			30, 100/200/500						30, 100/200/500						30, 100/200/500			30, 100/200/500							
	Pick-up current [UL1053]			0.7 × rated sensitive current																						
Tripping time (S) [UL1053]				0.1 or less																						
UL File No.				E216772																						


● BU □ A series

Series UL approved	Type	Current [A]	Poles	Voltage [V]		Interrupting capacity [kA]				UL File No.
				AC	DC	AC [V]		DC [V]		
						240	480	250	125/250	
	BU-ECA	5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 100	2 3	240V	-	10	-	-	-	E90584
	BU-GCA	125, 150, 175, 200, 225	2 3	240V	-	10	-	-	-	
	BU-GDA	125, 150, 175, 200, 225	2 3	240V	-	22	-	-	-	
	BU-KDA	250, 300, 350, 400	2 3	240V	250	22	-	10	10	


● BU □ B series

Series UL approved	Type	Current [A]	Poles	Voltage [V]		Interrupting capacity [kA]					UL File No.
				AC	DC	AC [V]			DC [V]		
						600	480	240	250	125/250	
	BU-JSB	125, 150, 175, 200, 225, 250	2 3	600	250	22	30	50	10	10	E90584
	BU-KSB	250, 300, 350, 400	2 3	600	250	22	30	50	10	10	
	BU-LSB	500, 600	2 3	600	250	22	30	50	10	10	
	BU-MSB	700, 800	2 3	600	-	22	30	50	-	-	
	BU-NSB	1000, 1200	2 3	600	-	22	30	50	-	-	
BU high-performance 	BU-JHB	125, 150, 175, 200, 225, 250	2 3	600	250	25	35	65	10	10	E90584
	BU-KHB	250, 300, 350, 400	2 3	600	250	25	35	65	10	10	
	BU-LHB	500, 600	2 3	600	250	25	35	65	10	10	
	BU-MHB	700, 800	2 3	600	-	25	42	65	-	-	
	BU-NHB	1000, 1200	2 3	600	-	25	42	65	-	-	

● BU □ C series






Series UL approved	Type	Current [A]	Poles	Voltage [V]		Interrupting capacity [kA]			UL File No.
				AC	DC	AC [V]		AC [V]	
						240	480	250	
BU-UL/CE certificate Series 	BU2EHC	15,20,25,30,35,40,45,	2	480	250	18	14	10	E90584
	BU3EHC	50,60,70,80,90,100	3	600		18	14	10	
	BU2FHC	15,20,25,30,35,40,50,	2	480		65	25	20	
	BU3FHC	60,70,80,90,100 125,150	3	600		65	25	20	

■ Manual Motor Starters


Series Standard	Type	Thermal current setting range Operational current I _e [A]	Max. motor capacity and full-load current 3-phase [HP]				Group Installation				UL File No.
			AC200-208V	AC220-240V	AC440-480V	AC550-600V	Rated breaking capacity [kA]			Max. fuse /MCCB	
							AC240V	AC480V	AC600V	Rated current [A]	
BM3 Series 	BM3RSB	0.1-0.16	-	-	-	-	100	50	10	500	E163944 (UL508)
		0.16-0.25	-	-	-	-	100	50	10	500	
		0.25-0.4	-	-	-	-	100	50	10	500	
		0.4-0.63	-	-	-	-	100	50	10	500	
		0.63-1	-	-	1/2	1/2	100	50	10	500	
		1-1.6	1/4	1/3	3/4	3/4	100	50	10	500	
		1.6-2.5	1/2	1/2	1	1 1/2	100	50	10	500	
		2.5-4	3/4	3/4	2	3	100	50	10	500	
		4-6.3	1	1 1/2	3	5	100	50	10	500	
		6.3-10	2	3	5	7 1/2	100	22	10	500	
		9-13	3	3	7 1/2	10	100	22	10	500	
		11-16	3	5	10	10	100	22	10	500	
	14-20	5	5	10	15	50	22	10	500		
	19-25	7 1/2	7 1/2	15	20	50	22	10	500		
	24-32	10	10	20	30	50	22	10	500		
	BM3RHB	0.1-0.16	-	-	-	-	100	50	10	500	
		0.16-0.25	-	-	-	-	100	50	10	500	
		0.25-0.4	-	-	-	-	100	50	10	500	
		0.4-0.63	-	-	-	-	100	50	10	500	
		0.63-1	-	-	1/2	1/2	100	50	10	500	
		1-1.6	1/4	1/3	3/4	3/4	100	50	10	500	
		1.6-2.5	1/2	1/2	1	1 1/2	100	50	10	500	
		2.5-4	3/4	3/4	2	3	100	50	10	500	
		4-6.3	1	1 1/2	3	5	100	50	10	500	
		6.3-10	2	3	5	7 1/2	100	50	10	500	
		9-13	3	3	7 1/2	10	100	50	10	500	
		11-16	3	5	10	10	100	50	10	500	
	14-20	5	5	10	15	100	50	10	500		
	19-25	7 1/2	7 1/2	15	20	100	50	10	500		
	24-32	10	10	20	30	100	50	10	500		
	BM3VSB	6.3-10	2	3	5	7 1/2	100	50 (22)	10	600	
		9-13	3	3	7 1/2	10	100	50 (22)	10	600	
	BM3VHB	11-16	3	5	10	10	100	50 (22)	10	600	
14-20		5	5	10	15	100	50 (22)	10	600		
19-25		7 1/2	7 1/2	15	20	100	50 (22)	10	600		
24-32		10	10	20	30	100	50 (22)	10	600		
28-40		10	10	30	30	100	50 (22)	10	600		
35-50		15	15	30	40	100	50 (22)	10	600		
45-63		20	20	40	60	100	50 (22)	10	600		

Note 1: The figures in parentheses () are for BM3VSB.

■ Circuit Protector

Series Standard	Type	Voltage [V]	Current [A]	Interrupting capacity (250V AC)	Internal circuit	UL File No.
E 	CP3□E	250V AC 60V DC	0.05-30A	1,000A	Series type Shunt type Relay type (current tripping) Switch type	E96846 E83461 (Switch type)
	V 	CP3□V				
T	CP3□T	240V AC 60V DC	0.1-30A	1,000A	Series type	E96846
F 	CP3□F	240V AC 60V DC	0.1-30A	2,500A	Series type	
P 	CP3□P	240V AC 60V DC	0.3-25A	1,000A	Series type	
B 	CP5□B	240V AC 60V DC	0.3-50A	1,500A	Series type	

■ Super-rapid Fuses

Type Standard	Rating			UL File No.
	Voltage [V]	Current [A]	Interrupting capacity	
CR2LS-10/UL 	250V AC, 400V DC	10	10kA (pf0.8) at 250V AC 10kA (time constant: 2.0ms) at 400V DC	E92312
CR2LS-20/UL		20		
CR2LS-30/UL		30		
CR2LS-50/UL		50		
CR2LS-75/UL		75		
CR2LS-100/UL		100		
CR2L-150/UL		150		
CR2L-200/UL		200		
CR2L-260/UL		260		
CR2L-350/UL		350		
CR2L-400/UL	400			
CR6L-20/UL	600V AC, 600V DC	20	50kA (pf0.8) at 600V AC 10kA (time constant: 1.0ms) at 600V DC	E92312
CR6L-30/UL		30		
CR6L-50/UL		50		
CR6L-75/UL	600V AC	75	10kA (time constant: 3.0ms) at 600V DC	
CR6L-100/UL	600V AC, 600V DC	100	50kA (pf0.8) at 600V AC 10kA (time constant: 1.0ms) at 600V DC	
CR6L-150/UL		150		
CR6L-200/UL		200		
CR6L-300/UL		300		

■ Pushbuttons, Selector Switches, Pilot Lights, Buzzers

● Command switches <AR22/DR22/AR30/DR30/AM22/DM22 series>


a. Illuminated pushbutton switches

Bezel	Operator	Type						UL File No.
		AR22		AR30		AM22		
		Momentary	Alternate	Momentary	Alternate	Momentary	Alternate	
Round bezel	Flush round head	AR22F0L	AR22F5L	-	-	AM22F0L	AM22F5L	E44592
	Extended round head	AR22E0L	AR22E5L	AR30E0L	AR30E5L	AM22E0L	AM22E5L	
	Mushroom head (40mm dia.)	AR22M0L	AR22M5L	-	-	AM22M0L	AM22M5L	
	Mushroom head (29mm dia.)	AR22M4L	AR22M9L	-	-	AM22M4L	AM22M9L	
	Extended with transparent full guard (24mm dia.)	AR22G4L	AR22G9L	AR30G4L	AR30G9L	AM22G4L	AM22G9L	
	Extended with full guard (24mm dia.)	AR22G1L	AR22G6L	AR30G3L	AR30G8L	-	-	
	Extended with full guard (24mm dia. with openings)	AR22G2L	AR22G7L	AR30G2L	AR30G7L	AM22G2L	AM22G7L	
	Push-lock, turn-reset (40mm dia. with white arrow)	AR22V5L (Returning method : turn-reset)		AR30V5L (Returning method : turn-reset)		-	-	
Push-pull	-	-	AR30Q7L (Returning method : automatic return)		-	-		
Square bezel	Flush square head	AR22F0M	AR22F5M	-	-	-	-	
	Extended square head	AR22E0M	AR22E5M	-	-	-	-	
	Flush round head	AR22F0P	AR22F5P	-	-	-	-	
	Extended round head	AR22E0P	AR22E5P	-	-	-	-	
	Mushroom head (29mm dia.)	AR22M4P	-	-	-	-	-	


b. Pushbutton switches

Bezel	Operator	Type						UL File No.
		AR22		AR30		AM22		
		Momentary	Alternate	Momentary	Alternate	Momentary	Alternate	
Round bezel	Flush round head	AR22F0R	AR22F5R	AR30F0R	AR30F5R	AM22F0R	AM22F5R	E44592
	Extended round head	AR22E0R	AR22E5R	AR30E0R	AR30E5R	AM22E0R	AM22E5R	
	Mushroom head (40mm dia.)	AR22M0R	AR22M5R	AR30M0R	AR30M5R	AM22M0R	AM22M5R	
	Mushroom head (29mm dia.)	AR22M4R	AR22M9R	AR30M4R	-	AM22M4R	-	
	Flush with full guard (24mm dia.)	AR22G2R	-	-	-	-	-	
	Extended with full guard (24mm dia.)	AR22G3R	AR22G8R	AR30G1R	AR30G6R	AM22G3R	AM22G8R	
	Extended with half guard	AR22G0R	AR22G5R	AR30G0R	AR30G5R	-	-	
	Pin lock	-	-	AR30GPR	-	-	-	
	Mushroom head with full guard (40mm dia.)	AR22M3R	-	AR30M3R	-	AM22M3R	AM22M8R	
	Mushroom head with full guard (35mm dia. metal nut)	-	-	AR30GSR	-	-	-	
	Pushbutton with selector ring(2-position)	AR22S1R	-	AR30S1R	-	-	-	
	Pushbutton with selector ring(2-position)	AR22S2R	-	AR30S2R	-	-	-	
	Pushbutton with selector ring(2-position)	AR22S3R	-	AR30S3R	-	-	-	
	Pushbutton with selector ring(2-position)	AR22S6R	-	AR30S6R	-	-	-	
	Giant head	-	-	AR30B0R	-	-	-	
	Giant head with guard	-	-	AR30B1R	-	-	-	
	Giant head with full guard	-	-	AR30B2R	-	-	-	
	Giant head with full guard	-	-	AR30B3R	-	-	-	
	Push, turn-lock	-	-	AR30N0R	-	-	-	
	Push-lock, turn-reset (40mm dia. with white arrow)	AR22V5R (Returning method : turn-reset)		AR30V5R (Returning method : turn-reset)		-	-	
Pushbutton with emergency operating cap	-	-	AR30FVR	-	-	-		
Square bezel	Flush square head	AR22F0S	AR22F5S	-	-	-	-	
	Extended square head	AR22E0S	AR22E5S	-	-	-	-	
	Flush round head	AR22F0Y	AR22F5Y	-	-	-	-	
	Extended round head	AR22E0Y	AR22E5Y	-	-	-	-	
	Mushroom head (29mm dia.)	AR22M4Y	-	-	-	-	-	

c. Emergency stop pushbutton switches

Bezel	Operator	Type						UL File No.
		AR22		AR30		AM22		
		With white arrow	No white arrow	With white arrow	No white arrow	With white arrow	No white arrow	
Round bezel	Push-lock, turn-reset (29mm dia.)	AR22VSR	AR22V4R	-	-	AM22VSE	-	E44592
	Push-lock, turn-reset (40mm dia.)	AR22V0R	AR22V2R	AR30V0R	AR30V2R	AM22V0E	-	
	Push-lock, turn-reset (65mm dia.)	-	-	AR30V1R	-	-	-	
	Key-release push-lock, turn-reset (40mm dia.)	-	AR22V7R	-	-	-	-	
	Push-lock, pull-reset (35mm dia.)	-	AR22Q2R	-	AR30Q2R	-	-	
	Unibody push-lock, turn-reset (40mm dia.)	AR22VGE	-	-	-	-	-	E44592 

d. Emergency stop illuminated pushbutton switches

Bezel	Operator	Type						UL File No.
		AR22		AR30		AM22		
		With white arrow	No white arrow	With white arrow	No white arrow	With white arrow	No white arrow	
Round bezel	Push-lock, turn-reset (29mm dia.)	AR22VSL	-	-	-	AM22VSF	-	E44592
	Push-lock, turn-reset (40mm dia.)	AR22V0L	AR22V2L	AR30V0L	AR30V2L	AM22V0F	-	
	Push-lock, turn-reset (40mm dia. Transparent in all colors)	AR22VDL	AR22VAL	-	-	AM22VDF	-	
	Unibody push-lock, turn-reset (40mm dia.)	AR22VGF	-	-	-	-	-	E44592 

e. Pilot lights

Bezel	Lens	Type			UL File No.
		DR22	DR30	DM22	
Round bezel	Dome	DR22D0L	DR30D0L	DM22D0L	E44592
	Extended round	DR22E3L	DR30E3L	DM22E3L	
	Faceted	DR22K0L	DR30K0L	DM22K0L	
Square bezel	Flush square	DR22F3M	-	-	
	Flush square (Transparent lens)	DR22F4M	DR30F4M*	-	
	Flush square (12mm high frame)	DR22F5M	-	-	
	Extended square	DR22E3M	-	-	
	Flush rectangular	DR22E3N	-	-	
	Flush rectangular (Transparent lens)	-	DR30F4N*	-	
	Flush square large type (Transparent lens)	-	DR30M4M*	-	
Extended round	DR22E3P	-	-		

Note 1. With resistor unit and resistor types : Not approved

Note 2. * LED 12V AC type : Not approved


f. Selector switches

Bezel	Operator	Type						UL File No.
		AR22		AR30		AM22		
		Standard type	Control type	Standard type	Control type	Standard type	Control type	
Round bezel	Knob	AR22PR	AR22PCR	AR30PR	AR30PCR	AM22PR	AM22PCR	E44592
	Lever	AR22WR	AR22WCR	AR30WR	AR30WCR	AM22WR	AM22WCR	
	Cylindrical knob	AR22RR	AR22RCR	-	-	-	-	
	Key	AR22JR	AR22JCR	AR30JR	AR30JCR	AM22JR	AM22JCR	
	Key (long durability)	AR22JAR	-	AR30JAR	-	-	-	
Square bezel	Knob	AR22PY	AR22PCY	-	-	-	-	
	Lever	AR22WY	AR22WCY	-	-	-	-	
	Cylindrical knob	AR22RY	AR22RCY	-	-	-	-	
	Key	AR22JY	AR22JCY	-	-	-	-	

g. Illuminated selector switches

Bezel	Operator	Type			UL File No.
		AR22	AR30	AM22	
		Standard type	Standard type	Standard type	
Round bezel	Knob	AR22PL	AR30PL	AM22PL	E44592
Square bezel	Knob	AR22PP	-	-	

h. Joy stick selector switches (Lever switches)

Bezel	Handle	Type						UL File No.
		AR22		AR30		AM22		
		Manual return	Spring return	Manual return	Spring return	Manual return	Spring return	
Round bezel	Ball type (without lock)	AR22A0□	AR22A5□	AR30A0□	AR30A5□	-	-	E44592 
	Ball type (with lock)	AR22A1□	AR22A6□	AR30A1□	AR30A6□	-	-	
	Rubber cap type (without lock)	AR22A2□	AR22A7□	AR30A2□	AR30A7□	-	-	

i. Buzzers

Bezel	Sound	Type			UL File No.
		DR22	DR30	DM22	
		Standard type	Standard type	Standard type	
Round bezel	Electronic sound	DR22B5	DR30B5	-	E44592
	Electronic sound (economy)	-	DR30B6	-	
	Electronic sound (IP54)	DR22B8	DR30B8	-	

Note: 6V AC, 110V DC types : Not approved

j. Contact ratings

AC (COS $\phi=0.35$)

Contact rated code	120V		240V		480V		600V	
	Making current	Breaking current	Making current	Breaking current	Making current	Breaking current	Making current	Breaking current
A600	60A	6.0A	30A	3.0A	15A	1.5A	12A	1.2A
B300 (AR22VG)	30A	3.0A	15A	1.5A	-	-	-	-

DC $T_{0.95} = 6P$ (Max. 300ms)

Description	Contact rated code	Making current · Breaking current		
		125V	250V	301V – 600V
Illuminated pushbutton switch Pushbutton (With selector ring type: AR22S2R, AR30S2R only) Emergency stop pushbutton switch	P600	1.1A	0.55A	0.2A
Emergency stop illuminated pushbutton switch (Except the overlap contact types)	Q300 (AR22VG)	0.55A	0.27A	-
Overlap contact types of products shown above Pushbutton (With selector ring type: AR22S1R, AR22S6R, AR30S1R and AR30S6R only) Selector switch (2-position only, except the overlap contact types) Illuminated selector switch (2-position only, except the overlap contact types)	Q600	0.55A	0.27A	0.1A
Pushbutton (With selector ring type: AR22S3R, AR30S3R only) Selector switch (2-pos./overlap contact type, 3-, 4-, 5-pos. Type) Illuminated selector switch (2-pos./overlap contact type, 3-pos. Type)	R300	0.22A	0.11A	-

Note : Joy stick selector switches (Lever switches): 250V AC, 5A (Res. load) 125V DC, 0.2A 24V DC, 1A (Res. load)

k. Lamp ratings

	LED lamp	Incandescent lamp	Neon lamp (AR22VGF type)
Full-voltage (without transformer)	Max. 24V AC/DC	Max. 30V AC/DC	Max. 240V AC
With transformer	Max. 550V AC (Short-body type: Max. 220V AC)		-

● Command switches <AH25 series>

a. Pushbutton switches

Name	Type	Specification		UL File No.
	AH25	Contact arrangement	Color	
Pushbutton switches	E	1NO	Green	E44592
	E5	1NC	Red	
	F	1NO+1NC	Black	
	F5	2NO	Dark green	
	G	2NC	Yellow	
	G1	2NO+2NC	White	
	G5	3NO, 3NC	Orange	
	G6	3NO+3NC	Blue	
	M	4NO, 4NC		
	M5	4NO+4NC		
	SE	(1NO+1NC or 2NO+2NC for E5,		
	SE5	F5, G5, G6, M5,		
	SF	SF5 and SE5 types)		
	SF5			
Wobble stick switch	U			
Pushbutton with selector ring (2-position)	S1	2NO+2NC		
	S2			
	S3			
	S4			
	S5			
	S6			
Mechanically interlocked pushbutton switches	F5/F□	1NO+1NC + 1NO+1NC		
	F5/E□			
	F5/M□			
	E5/E□			
	E5/M□			
M5/M□				

b. Selector switches

Name	Type	Specification		UL File No.
	AH25	Contact arrangement	Color	
Selector switches (2-position)	J0	1NO, 1NC	(For P type)	E44592
	J2	1NO+1NC	Black	
	P0	2NO, 2NC	Green	
	P2	2NO+2NC	Red	
	SJ2	3NO, 3NC		
	SP2	3NO+3NC		
Selector switches (3-position)	J3	4NO, 4NC		
	J5	4NO+4NC		
	P1	(2NO+2NC for P1 and PC types)		
	P3			
	P5			
	P6			
	J6			
	PC			
	SJ3			
	SP3			

c. Illuminated pushbutton switches

Name	Type	Specification		UL File No.
	AH25	Contact arrangement	Color	
Illuminated pushbutton switches	L	·Without transformer	Green	E44592
	L1	1NO, 1NC, 1NO+1NC	Red	
	L2	2NO, 2NC, 2NO+2NC	White	
	L3	3NO, 3NC, 3NO+3NC	Blue (except LED)	
	L4	4NO, 4NC, 4NO+4NC	Yellow	
	L5	·With transformer	Orange	
	L6	1NO, 1NC, 1NO+1NC		
	L7	2NO, 2NC, 2NO+2NC		
	L8	(1NO+1NC or 2NO+2NC for L5, L6,		
	SL	L7, L8, SL5 and SL6 types)		
	SL1			
	SL5			
	SL6			

d. Pilot lights

Name	Type	Specification		UL File No.
	AH25	Lamp voltage	Color	
Pilot lights	ZK	·Without transformer Incandescent	Green	E44592
	ZM		Red	
	ZN	Max. 30V AC/DC	White	
	ZS	LED Max. 24V AC/DC ·With transformer Max. 600V AC	Blue (except LED) Yellow Orange	

e. Contact ratings

Voltage [V]	Application		Continuous current [A]	AC		
	UL	CSA		Make [A]	Break [A]	
110-120	●		10	60	6.0	
120		●				
220-240	●				30	3.0
240		●				
440-480	●				15	1.5
480		●				
550-600	●				12	1.2
600		●				

Voltage [V]	Application		DC
	UL	CSA	Make and break currents [A]
115-125	●		1.1
115		●	
125			
230-250	●		0.55

Note: AH25-J3, -J5, -P3 and -P1 types cannot be used in DC circuit.

● Command switches <AH164/AH165/AH165-2/AH225/AG225/AH16P/AH22P/AH16P-2/AG22 and AG23 series>

a. AH164/AH165 series

Name	Type		Specification		Contact	Indicator	UL File No.
	AH164	AH165	Contact arrangement	Color			
Pushbutton switches	E SF TF TGF M SM TM	E SF TF TGF M SM TM ¹ V ¹ V1 ¹	1NO+1NC 2NO+2NC 3NO+3NC	Green Red Black Yellow White Orange Blue	250V AC5A max, 24V DC1A 125V DC0.2A, Resistive load (Cannot be used when potential differs in the same contact or unit)		E44592
	E5 SF5 TF5 TGF5 M5 SM5 TM5	E5 SF5 TF5 TGF5 M5 SM5 TM5					
Illuminated pushbutton switches	L SL TL TGL	L SL TL TGL	1NO+1NC 2NO+2NC 3NO+3NC	Green Red White Yellow Orange Blue		- Without transformer For incandescent lamps (120V AC/DC max 1.2W) 6V, 14V, 28V, 48V, AC/DC For LED lamps ³ 5V, 6V, 12V, 24V DC For neon lamps 110V, 120V, 220V AC - With transformer For incandescent/LED lamps: 110V, 220V AC	
	L5 SL5 TL5 TGL5	L5 SL5 TL5 TGL5					
Emergency stop pushbutton switches	-	V5 V6	NC NC	Red			
Selector switches	P0 P1 P2 P3 P6 P7 SP0 SP1 SP2 SP3 SP6 SP7 J0 J1 J2 J3 J6 J7 SJ0 SJ1 SJ2 SJ3 SJ6 SJ7	P0 P1 P2 P3 P6 P7 SP0 SP1 SP2 SP3 SP6 SP7 J0 J1 J2 J3 J6 J7 SJ0 SJ1 SJ2 SJ3 SJ6 SJ7 RJM2 ² JM2 ²	1NO+1NC 2NO+2NC 3NO+3NC	Knob color: black; key type: A, B, C, D, E and F			
Pilot lights	Z ZS ZT	Z ZS ZT ZM ZT1	-	Green Red White Yellow Orange Blue	-	- Without transformer For incandescent lamps (except ZM types) (120V AC-DC max 1.2W) 6V, 14V, 28V, 48V, AC/DC 6.3V, 18V, 24V, 30V AC/DC (ZT1 types) For LED lamps ³ 5V, 6V, 12V 24V DC 6V DC, 12V, 15V, 24V AC/DC (ZT1 types) 12V, 24V DC (ZM types) For neon lamps 110V, 120V, 220V AC - With transformer For incandescent/LED lamps: 110V, 220V AC	
Buzzers	TX2	X	-	Black	-	6V, 12 - 24V, 35 - 48V AC/DC	
Numerical indicators	TC4	TC4	-	-	-	24V DC	

¹ Contact arrangement is 1NC or 2NC; button color is red.

² Contact arrangement is 1NO+1NC or 2NO+2NC.

³ The spot LED type and 2-color LED type have not been approved.

b. AH165-2/AH225/AG225/AH16P/AH22P/AH16P-2 series

Name	Type						Specification		Contact	Indicator	UL File No.
	AH165-2	AH225	AG225	AH16P	AH16P-2	AH22P	Contact arrangement	Color			
Pushbutton switches	F, E, SF, SE, SCE, M, YM, S2, YS2, V, YV, SG ^{*1}	F, E, M, S2, V	F, E, CE, M, S2, V	TF, SF, E, TGF, M, SM, TM	F, E, SF, SE, SCE, M, YM, S2, YS2, V, YV	F, E, M, S2, V	1NO+1NC 2NO+2NC 3NO+3NC (Items for P board: 3NO + 3NC not included)	Green Red Black Yellow White Orange Blue	250V AC5A max 24V DC1A 125V DC0.2A Resistive load (Cannot be used when potential differs within the same contact or unit)	-	E44592
	F5, E5, SF5, SE5, SCE5, SG5 ^{*1}	F5, E5	F5, E5, CE5	TF5, SF5, E5, TGF5, M5, SM5, TM5	F5, E5, SF5, SE5, SCE5	F5, E5					
Illuminated pushbutton switches	FL, EL, SFL, SEL, SCL, ML, YML, VL, YVL, SGL ^{*1}	FL, EL, ML, VL	FL, EL, CL, ML, VL	TL, SL, L, TGL	FL, EL, SFL, SEL, SCL, ML, YML, VL, YVL	FL, EL, ML, VL	1NO+1NC 2NO+2NC 3NO+3NC (Items for P board: 3NO + 3NC not included)	Green Red White Yellow Orange Blue (LED lamps are for AH165-2, AH16P and AH16P-2 types only.)	-	For incandescent lamps 120V AC/DC max 1.2W 6V, 14V, 28V, 48V AC/DC For LED lamps 5V, 6V, 12V, 24V DC For neon lamps (Except for items for P board) 110V, 120V, 220V AC	
	FL5, EL5, SFL5, SEL5, SCL5, SGL5 ^{*1}	FL5, EL5	FL5, EL5, CL5	TL5, SL5, L5, TGL5	FL5, EL5, SFL5, SEL5, SCL5	FL5, EL5					
Selector switches	P, YP, H, SH, J, YJ, SP ^{*1} , SJ ^{*1}	P, H, J	P, H, J	P, SP, H, SH, J, SJ	P, YP, H, SH, J, YJ	P, H, J	1NO+1NC 2NO+2NC 3NO+3NC (Items for P board: 3NO + 3NC not included)	Knob color: black; key type: A, B, C, D, E and F			
Illuminated selector switches	PL	PL	PL	-	-	-	1NO+1NC 2NO+2NC	Green Red White Yellow Orange Blue (LED lamps are for AH-165-2 type only.)		For incandescent lamps 120V AC/DC max 1.2W 6V, 14V, 28V, 48V AC/DC For LED lamps 5V, 6V, 12V, 24V DC	
Pilot lights	Z, ZE, SZ, SZE	-	-	ZT, ZS, Z	Z, ZE, SZ, SZE	-	-	Green Red White Yellow Orange Blue		For incandescent lamps 120V AC/DC max 1.2W 6V, 14V, 28V, 48V AC/DC For LED lamps 5V, 6V, 12V, 24V DC For neon lamps (Except for items for P board) 110V, 120V, 220V AC	

*1 Certified contact configuration: 1NO + 1NC only

c. AG22/AG23 series

Name	Type		Specification		Contact	Indicator	UL File No.
	AG22	AG23	Contact arrangement	Color			
Illuminated pushbutton switches	Incandescent	LA, LB, L5A, L5B	LA, LB, LC, LD, LE, LF, L5A, L5B, L5C, L5D, L5E, L5F	AG22; 1NO+1NC 2NO+2NC	Green Red White Yellow Orange Blue (except LED)	250V AC5A max 24V DC 1A 125V DC 0.2A Resistive load (Cannot be used when potential differs within the same contact or unit)	E44592
		Contact portion L1, L2, L51, L52	Contact portion L1, L2, L3, L4, L51, L52, L53, L54	AG23; 1NO+1NC 2NO+2NC 3NO+3NC 4NO+4NC			
	LED	Illuminating portion LA□3, LB□3	Illuminating portion LA□3, LB□3, LC□3, LD□3, LE□3, LF□3				
Pilot lights	Incandescent	ZA, ZB	ZA, ZB, ZC, ZD, ZE, ZF	-			
		LED	Case Z6	Case Z6			
	LED	Illuminating portion ZA□3, ZB□3	Illuminating portion ZA□3, ZB□3, ZC□3, ZD□3, ZE□3, ZF□3				

● Command switches <AG28/DG28 series>

a. Illuminated pushbutton switch, Pushbutton switch

Bezel	Operator	Type				UL File No.
		Illuminated pushbutton switch		Pushbutton switch		
		Momentary	Alternate	Momentary	Alternate	
Square bezel	Flush square head	AG28F0M	AG28F5M	AG28F0S	AG28F5S	E44592
	Flush with full guard	AG28G2M	AG28G7M	AG29G2S	AG28G7S	
	Pushbutton with selector ring (2-position, 24mm dia.)	-	-	AG28S2Y	-	

b. Selector switch, Illuminated pushbutton switch, Pilot light

Bezel	Operator	Type			UL File No.
		Selector switch		Pilot light	
		Non-illuminated type	Illuminated type		
Square bezel	Knob	AG28PY	AG28PP	-	E44592
	Flush square head	-	-	DG28F3M	

c. Ratings

Please refer to “j. Contact ratings” and “k. Lamp ratings” for command switches (AR22, DR22, AR30, and DR30 series) in the table above.


■ Control Relays

● Control relays

Standard	Type	Contact arrangement	Voltage	Resistive load	Inductive load	Continuous current	UL File No.
	HH52□ HH52□W	2(NO+NC) single contact, bifurcated contact	120V AC	5A	1.5A	5A	E42419
			240V AC	5A			
			30V DC	5A	2A (15ms)		
			120V DC	0.3A	0.2A (15ms)		
	HH52□U	2(NO+NC) high capacity single contact	120V AC	7A	1.5A	7A	E42419
			240V AC	7A			
			30V DC	7A	2A (15ms)		
			120V DC	0.3A	0.2A (15ms)		
	HH53□	3(NO+NC) single contact	120V AC	5A	1.5A	5A	E42419
			240V AC	5A			
			30V DC	5A	2A (15ms)		
			120V DC	0.3A	0.2A (15ms)		
	HH54□	4(NO+NC) single contact	120V AC	3A	1A	3A	E42419
			240V AC	3A			
			30V DC	3A	2A (15ms)		
			120V DC	0.3A	0.2A (15ms)		
	HH54□U	4(NO+NC) high capacity single contact	120V AC	5A	1A	5A	E42419
			240V AC	5A			
			30V DC	5A	2A (15ms)		
			120V DC	0.3A	0.2A (15ms)		
HH54□W	4(NO+NC) bifurcated contact	120V AC	3A	1A	3A	E42419	
		240V AC	3A				
		30V DC	3A	2A (15ms)			
		120V DC	0.2A	0.2A (15ms)			
HH62□	2(NO+NC) single contact	120V AC	10A	1.5A	10A	E42419	
		240V AC	10A				
		30V DC	8A	2A (15ms)			
		120V DC	0.3A	0.2A (15ms)			
HH62□W	2(NO+NC) bifurcated contact	120V AC	5A	1.5A	7A	E42419	
		240V AC	5A				
		30V DC	5A	2A (15ms)			
		120V DC	0.3A	0.2A (15ms)			
HH63□ HH64□	3(NO+NC) single contact	120V AC	10A	1.5A	10A	E142976 (HH63□) E142975 (HH64□)	
		240V AC	10A				
	4(NO+NC) single contact	30V DC	8A	2A (15ms)			
		120V DC	0.3A	0.2A (15ms)			
HH22P□-UL	2(NO+NC) single contact, bifurcated contact	120V AC	6A	2A	6A	E42419	
		240V AC	6A				
		30V DC	6A	3A (15ms)			
		120V DC	0.5A	0.3A (15ms)			
HH23P□-UL	3(NO+NC) single contact, bifurcated contact	120V AC	6A	2A	6A	E42419	
		240V AC	6A				
		30V DC	6A	3A (15ms)			
		120V DC	0.5A	0.3A (15ms)			

□: P, B or S (mounting method)

● Card relays, terminal relays

Standard	Type	Contact arrangement	Voltage	Resistive load	Inductive load	Continuous current	UL File No.	
	RT11-UL, 17-UL	1(NO+NC)	120V AC	3A	1A	3A	E83461	
			240V AC	3A	-			
			30V DC	3A	2A (7ms)			
			120V DC	0.3A	0.2A (7ms)			
	RB104, 105	1NO	120V AC	-	1A	5A	E44592	
			240V AC	5A	-			
			30V DC	5A	2A (15ms)			
			120V DC	0.5A	0.2A (15ms)			
	RS4□ RS6N (-P) RS16 (-P)	4-pole	6-pole 16-pole	120V AC	-	1A	5A (2A for RS6N and RS16)	E44592
				240V AC	5A (2A for RS6N and RS16)	-		
		30V DC		5A (2A for RS6N and RS16)	2A (15ms)			
		120V DC		0.5A	0.2A (15ms)			

● Sockets

Standard	Type	Specification	Used with	UL File No.
UL	TP58	Soldering	HH52	E90265
	TP58B	PC board		
	TP58R2	Wire wrap		
	TP58X2	Rail mounting (M3.5)		
	TP58X1	Rail mounting (M3)	HH53	E90265
	TP511	Soldering		
	TP511B	PC board		
	TP511R2	Wire wrap		
	TP511X2	Rail mounting (M3.5)	HH54	E90265
	TP514	Soldering		
	TP514B	PC board		
	TP514R2	Wire wrap		
	TP514X2	Rail mounting (M3.5)	HH62	E42419
	TP514X1	Rail mounting (M3)		
	TP68	Soldering		
	TP68B	PC board		
	TP68R	Wire wrap	HH63	E142976
	TP68X2	Rail mounting (M3.5)		
	TP611X2	Rail mounting (M3.5)		
	TP614X2	Rail mounting (M3.5)		
8GB-UL	Soldering	HH22	E42419	
11GB-UL	Soldering	HH23		


■ Timers

Type and rating

Standard	Type	Operation	Mounting	Indication	Contact arrangement	Control output	Input voltage	Power consumption	Timing range					
UL	MS4SM	On-delay Flicker One-shot momentary action Signal off-delay	Surface/ flush	Power-on Time up	Time-limit 2(NO+NC)	See the UL approved type list shown at page 45	100 to 240V AC 50/60Hz 24V AC/DC 48 to 127V DC	Approx. 10VA for AC type. Approx. 1W for DC type.	From 0.6 seconds to 60 hours, 16 changeable ranges					
	MS4SA	On-delay		Power-on Time up	Time-limit 2(NO+NC)									
	MS4SC	On-delay		Power-on Time up	Time-limit 1(NO+NC) + instantaneous 1(NO+NC)									
	MS4SR	Repeat		Power-on ON	Time-limit 2(NO+NC)									
	MS4SF	Off-delay		Power-on	Time-limit 2(NO+NC)									
	MS4SF-R	Off-delay		Power-on	Time-limit 1(NO+NC) + instantaneous reset									
	MS4SY	人 - Δ		人 contact input Δ contact output	Time-limit 1NO (人) 1NO (Δ) instantaneous 1NO									
	MS4SE	Electrically reset On-delay		Power-on	Time-limit 1(NO+NC)									
	ST7P-2	On-delay		Surface	Power-on Time up					Time-limit 2(NO+NC)	240V AC 3A	100V AC 200V AC 24V DC	100V AC approx. 1.2VA 200V AV approx. 1.5VA 24V DC approx. 1.1W	0.06 to 0.5s 0.25 to 3min 0.1 to 1s 1 to 10min 0.3 to 3s 2 to 30min 0.4 to 5s 4 to 60min 1 to 10s 0.2 to 2h 2 to 30s 0.5 to 6h 4 to 60s 1 to 12h
	ST7P-4	On-delay		Surface	Power-on Time up					Time-limit 4(NO+NC)	(Resistive load)			
MD4E	8 operation modes	Surface/ flush	-	Time-limit 1(NO+NC)	250V AC 5A (Resistive load)	100 to 240V AC 50/60Hz 24V AC/DC 50/60Hz	100V AC approx. 1.1VA 200V AV approx. 1.5VA 24V DC approx. 0.8W 24V AC approx. 1.1VA	0.001s to 9999h { 9.999s 99min 59s 99.99s 99h 59min 999.9s 9999h 9999s }						
MS7S1	On-delay	Surface	Time up	Time-limit 1(NO+NC)	220V AC 1A (Resistive load)	100/200V AC 110/220V AC 50/60Hz Terminal switchover 24V AC, 24V DC	Approx. 2VA for AC type. Approx. 1W for DC type.	0.2 to 1.2s 0.5 to 3s 1 to 6s 2 to 12s 5 to 30s 10 to 60s 0.5 to 3min 1 to 6min 2 to 12min 5 to 30min 10 to 60min						

Note: For connection, use a socket applicable to the object type.


● Supertimer

Standard	Type	Operation	Control output	UL File No.
c  US	MS4SM	On-delay Flicker One-shot momentary action Signal off-delay	Contact rating: 5A, 250V AC (resistive load)	E44592
	MS4SA	On-delay		
	MS4SC	On-delay	Contact rating: 5A, 240V AC (resistive load)	
	MS4SR	Repeat	Contact rating: 5A, 250V AC (resistive load)	
	MS4SF	Off-delay	Contact rating: 3A, 250V AC (resistive load)	
	MS4SF-R	Off-delay	Contact rating: 5A, 250V AC (resistive load)	
	MS4SY	Star-delta	Contact rating: 5A, 240V AC (resistive load)	
	MS4SE	Electrically reset off-delay	Contact rating: 5A, 250V AC (resistive load)	
	MS7S1	On-delay	Contact rating: 1A, 220V AC (resistive load)	
	ST7P-2	On-delay	Contact rating: 3A, 240V AC (resistive load)	
	ST7P-4	On-delay		

● Digital timer

Standard	Type	Operation	Control output	UL File No.
c  US	MD4E	8 modes	Contact rating: 5A, 250V AC (resistive load)	E42419

● Sockets

Standard	Type Standard	Specification	Used with	UL File No.
c  UL	TP411X	Rail mounting, screw terminal (11-pin)	MS4SM	E195744
	TP411SBA	Flush mounting, screw terminal (11-pin)		
	ATX2NS	Flush mounting, solder terminal (11-pin)		
	TP48X	Rail mounting, screw terminal (8-pin)	MS4SA MS4SC MS4SF MS4SY MS4SE MS4SR MD4E	E90265
	TP48SB	Flush mounting, screw terminal (8-pin)		
	ATX1NS	Flush mounting, solder terminal (8-pin)		
	TP88X1	Rail mounting, screw terminal (8-pin)		
	TP88X2		ST7P-2	E90265
	TP88	Surface mounting, solder terminal (8-pin)		
	TP88R2	Surface mounting, wire wrap (8-pin)		
	TP88B	Surface mounting, PC board (8-pin)		
	TP814X1	Rail mounting, screw terminal (11-pin)	ST7P-4	E90265
	TP814X2			
	TP814	Surface mounting, solder terminal (11-pin)		
	TP814R2	Surface mounting, wire wrap (11-pin)		
	TP814B	Surface mounting, PC board (11-pin)		

■ Terminal Blocks

● High-strength terminal blocks

Standard	No. of poles	Type	Connecting wire size	Rated current [A]	UL File No.
UL	3	SKT14A-3C	14-8AWG-Cu	50	E45457
		SKT38A-3C	14-6AWG-Cu	65	
		SKT60A-3C	12-4AWG-Cu	85	
		SKT100A-3C	12-2AWG-Cu	115	

● Combination terminal blocks

Standard	Type	Withstand voltage [V]	Rated current [A]	Connecting wire size	UL File No.
UL	LT2F-010	600	15	20-16AWG-Cu	E45457
	LT2F-020		19	16-14AWG-Cu	
			22		
	LT2F-030		27	14-10AWG-Cu	
	LT2F-040		35	12-10AWG-Cu	
			40		
	LT2F-080		68	8-6AWG-Cu	
	LT2F-020W		19	18-14AWG-Cu	
	LT2E-020		20	20-14AWG-Cu	
	LT2E-030		30	18-12AWG-Cu	
	LT2E-040		40	18-10AWG-Cu	
	LT2E-080		75	10-6AWG-Cu	
	LT2E-090		95	8-4AWG-Cu	
	LT2E-150		150	4-2/0AWG-Cu	
	LT2E-200		200	2-4/0AWG-Cu	
	LT2E-300		300	2/0-300AWG-Cu	
LT2E-400	400	4/0-350AWG-Cu			
LT2E-600	550	300-600AWG-Cu			

● Relaying connector terminal block

Standard	Type	Withstand voltage [V]	Rated current [A]	Connecting wire size	UL File No.
UL	LP5W-20H5	125	1	22-16AWG-Cu	E45457
	LP5W-24H1				
	LP5W-26H5				
	LP5W-34H5				
	LP5W-40H1				
	LP5W-40H5				
	LP5W-50H5				

■ Limit Switches

● AL type

a. Type

Standard	Series	Type	Name of actuator	Ratings	UL File No.																																		
UL	General-purpose	AL-N11□□UL	Roller lever type	<table border="1"> <tr> <td rowspan="3">DC</td> <td colspan="4">Make and break currents [A]</td> </tr> <tr> <td>Voltage</td> <td>30V</td> <td>125V</td> <td>250V</td> </tr> <tr> <td colspan="2">Load type</td> <td colspan="2">Resistive load</td> </tr> <tr> <td rowspan="2">Continuous current</td> <td>5A</td> <td>5</td> <td>0.4</td> <td>0.2</td> </tr> <tr> <td colspan="4"></td> </tr> <tr> <td rowspan="3">AC</td> <td>Contact current code</td> <td>Voltage</td> <td>Make</td> <td>Break</td> </tr> <tr> <td rowspan="2">B300</td> <td>120V</td> <td>30A</td> <td>3A</td> </tr> <tr> <td>240V</td> <td>15A</td> <td>1.5A</td> </tr> </table>	DC	Make and break currents [A]				Voltage	30V	125V	250V	Load type		Resistive load		Continuous current	5A	5	0.4	0.2					AC	Contact current code	Voltage	Make	Break	B300	120V	30A	3A	240V	15A	1.5A	E44592
		DC	Make and break currents [A]																																				
			Voltage			30V	125V	250V																															
			Load type		Resistive load																																		
		Continuous current	5A		5	0.4	0.2																																
		AC	Contact current code		Voltage	Make	Break																																
			B300		120V	30A	3A																																
					240V	15A	1.5A																																
		AL-N21□□UL	Adjustable roller lever type																																				
		AL-N31□□UL	Rod lever type																																				
		AL-P11□□UL	Push plunger type																																				
		AL-P21□□UL	Roller plunger type																																				
		AL-P31□□UL	Ball plunger type																																				
	AL-F11□□UL	Fork roller lever type																																					
	AL-S11□□UL	Coil spring type																																					
	AL-S21□□UL	Spring rod type																																					
	AL-W11□□UL	Wire spring type																																					
	AL-Y11□□UL	Side push plunger type																																					
	AL-Y21□□UL	Side roller plunger type																																					
	AL-Y31□□UL	Side ball plunger type																																					
	Small	AL-SN11□□UL	Roller lever type																																				
		AL-SN21□□UL	Adjustable roller lever type																																				
		AL-SN31□□UL	Rod lever type																																				
		AL-SP11□□UL	Push plunger type																																				
		AL-SP21□□UL	Roller plunger type																																				
		AL-SK11□□UL	Roller arm type																																				
AL-SK21□□UL		Reverse roller arm type																																					
AL-SS11□□UL		Spring rod type																																					

Note: Symbols for lamp voltage and type are filled in □□.

□□

Lamp type

Symbol	Type
1	Neon lamp
2	LED

Lamp voltage

Symbol	Voltage	Manufacture	
		Neon lamp	LED
A	5 to 8V	-	○
B	10 to 15V	-	○
E	18 to 24V	-	○
H	110 to 220V	○	-

b. Performance

Item	General-purpose (AL)	Small (AL-S)
Insulation resistance	Min. 100M (by 500V DC megger) between non-continuous terminals or between each terminal and uncharged metal part.	
Withstand voltage	1500V between each terminal and uncharged metal part	
Vibration resistance ^{*1}	Double amplitude 1.5mm, 10 to 55 Hz	
Impact resistance ^{*1}	300 m/s ²	
Permissible operation cycle	120 cycle/min.	
Temperature rise	50°C or less	
Life	Mechanical 30 million cycles (N1 type) 10 million cycles (other types)	10 million cycles
Ambient temperature	-10°C to +80°C	
Ambient humidity	95% RH or less	

^{*1} Except coil spring, spring rod and wire spring types

Contact reliability:

It was confirmed that these switches work without problem under the circuit conditions of 5V AC/DC and 2mA. However, operation ranges may change depending on environmental conditions and load types. For details, contact Fuji Electric.

c. Operational characteristics

- General-purpose (AL)

Item \ Type	AL-N11UL	AL-N21UL ^{*1}	AL-N31UL ^{*2}	AL-P11UL	AL-P21UL	AL-P31UL	AL-F11UL
Required operating force: OF max.	900g	900g	290g	1500g	1500g	1500g	950g
Return force: RF min.	50g	50g	15g	820g	820g	820g	-
Movement before operation: PT min.	12deg.	12deg.	12deg.	2mm	2mm	2mm	55deg.
Movement after operation: OT min.	65deg.	65deg.	65deg.	5mm	5mm	5mm	35deg.
Differential movement: MD max.	7deg.	7deg.	7deg.	1mm	1mm	1mm	-
Overall movement: TT min.	75deg.	75deg.	75deg.	-	-	-	90±10deg.

^{*1} When lever length is 38 mm

^{*2} When rod lever length is 135 mm

Item \ Type	AL-Y11UL	AL-Y21UL	AL-Y31UL	AL-S11UL	AL-S21UL	AL-W11UL
Required operating force: OF max.	4082g	4082g	4082g	150g	150g	150g
Return force: RF min.	907g	907g	907g	-	-	-
Movement before operation: PT min.	2.8mm	2.8mm	2.8mm	30mm	30mm	40mm
Movement after operation: OT min.	4mm	4mm	4mm	-	-	-
Differential movement: MD max.	1mm	1mm	1mm	-	-	-

- Small (AL-S)

Item \ Type	AL-SP11UL	AL-SP21UL	AL-SK11UL	AL-SK21UL	AL-SN11UL	AL-SN21UL ^{*1}	AL-SN31UL ^{*1}	AL-SS11UL
Required operating force: OF max.	450g	850g	400g	400g	700g	700g	700g	150g
Return force: RF min.	200g	450g	180g	180g	50g	50g	50g	-
Movement before operation: PT min.	2mm	2mm	2.5mm	2.5mm	30deg.	30deg.	30deg.	30mm
Movement after operation: OT min.	4mm	3mm	5mm	5mm	40deg.	40deg.	40deg.	-
Differential movement: MD max.	1mm	1mm	1.3mm	1.3mm	8deg.	8deg.	8deg.	-

^{*1} When lever/rod length is 25 mm