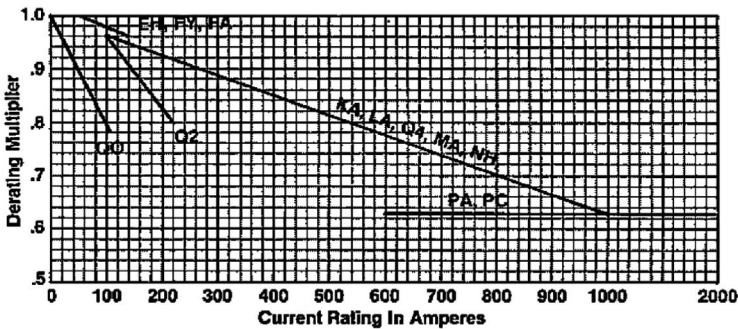


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(Unless the circuit breaker is rated for operation at 100% of its rating). Therefore, the current carrying capacity of a 200 A kA circuit breaker operating under continuous load at 400 Hz would be $200 \times 0.92 \times 0.80 = 147 \text{ A}$.

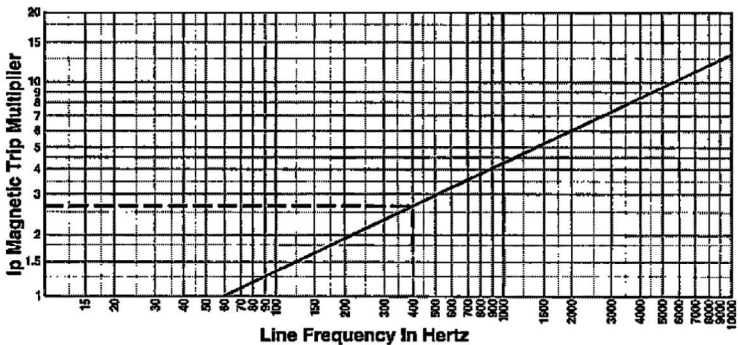
Figure 9: 400 Hz Thermal Rerating Multiplier



At frequencies above 60 Hz, the interrupting capacity of thermal-magnetic circuit breakers is less than the 60 Hz interrupting capacity. Unless specifically marked on 400 Hz systems, the interrupting capacity of Schneider Electric circuit breakers is reduced to 1/10th of the 60 Hz interrupting capacity.

- Magnetic Tripping Performance

Figure 10: 60 Hz Current Multipliers



At frequencies above 60 Hz, more current is necessary to magnetically trip a circuit breaker than at 60 Hz. The figure below shows the multipliers of 60 Hz current that it takes to magnetically trip a circuit breaker when applied at various frequencies. For example, at 60 Hz it takes 1000 A to magnetically trip a 200 A KA circuit breaker at its low setting. At 400 Hz it takes 2600 A (2.6 multiplier) to magnetically trip the same circuit breaker.

- Rerating for Direct Current

Trip curves provide complete time-current characteristics of circuit breakers when applied on ac systems only. Thermal-magnetic circuit breakers (1000 A frame or less) on dc systems retain their thermal tripping characteristics, but a multiplier must be applied to the ac magnetic trip level to determine an equivalent dc trip level.

Below is a list of multipliers for the dc magnetic trip level of each type of thermal-magnetic circuit breaker:

Table 6: Rerating Multipliers for Direct Current

Circuit Breaker	Magnetic Trip Level Multiplier
FA/FH/FC	1.15
KA/KH/KC	Hi Setting 1.15
	Lo Setting 1.3
LA/LH	Hi Setting 1.2
	Lo Setting 1.3
MA/MH	Hi Setting 1.1
	Lo Setting 1.2

For example, the equivalent dc magnetic trip levels for a 200 A kA circuit breaker would be:

1. ac Hi Setting = 2000 A + 20%.
2. dc Hi Setting = 2000 A x 1.15 = 2300 A + 20%.
3. ac Lo Setting = 1000 A + 25%.
4. dc Lo Setting = 1000 A x 1.3 = 1300 A + 25%.

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Accessories

This section describes the UL listed accessories available for Schneider Electric thermal-magnetic molded case circuit breakers, Mag-Gard magnetic only instantaneous trip circuit breakers and molded case switches. These accessories increase application versatility and meet the demands of modern electrical distribution systems.

The following table lists the accessories available for Schneider Electric thermal-magnetic circuit breakers, magnetic only circuit breakers and molded case switches.

Table 35: Accessories Available

Accessory	Circuit Breaker Frame																					
	FA	FH	FC	FI	FY	QB ¹ QD ¹ QG ¹ QJ ¹	KA	KH	KC	KI	Q4	LA	LI	LC	LH	MA	MH	NA	NC	PAF	PHF	PCF
Shunt Trip	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ground Fault Shunt Trip	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X	X	X
Undervoltage Trip	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Auxiliary Switch	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Alarm Switch	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cylinder Lock ²	X	X	X	X			X	X			X	X			X	X	X					
Ground Fault Module	X	X	X	X			X	X	X	X												
Handle Padlock Attachment	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Walking Beam	X						X					X			X	X	X					
Front Mount Mechanical Interlock						X																
Combination Handle Tie and Lock Off	X	X	X	X	X			X														
Handle Extension	X	X	X	X			X				X	X	X	X	X	X	X	X	X	X		
Electrical Operator	X	X	X	X			X				X	X			X	X	X			X	X	X

¹ For PowerPacT Q-frame information see Class 734.

² Cylinder locks not available on FA/FH Mag-Gard circuit breakers.

Factory and Field Installation Types

Note: See Catalog Numbers for an explanation of the catalog numbering system.

Some electrical accessories are factory installed while others are field installable.

• Factory Installed Accessories

Factory installed accessories are internally mounted and provided with minimum 18-inch lead wires. Factory installed devices cannot be removed or repaired in the field.

Factory installed accessories are ordered by adding the correct suffix number to the standard circuit breaker catalog number (i.e., a three-pole, 600 Vac, 100 A molded case circuit breaker with a 120/240 Vac shunt trip would be FAL361001021). Suffix numbers for some combinations of factory installed electrical accessories are listed in this section. If the combination is not listed in one of the tables, order the combination by description.

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The table below shows suffix numbers for the following combinations of factory installed accessories for the FA, FH, FC, FI, KA, KH, KC, and KI thermal-magnetic circuit breakers, magnetic only circuit breakers and molded case switches. Additional combinations are available; please contact the Schneider Electric Customer Care Center at: 1-888-778-2733.

Table 36: Suffixes for Factory Installed Accessories¹

Device Suffix	Shunt Trip		Shunt Trip			Undervoltage Trip		Undervoltage Trip		Auxiliary Switches			Not Compatible With:
	24 Vdc	48 Vdc	24 Vac	120/240 Vac	277/480 Vac	24 Vdc	48 Vdc	120 Vac	240 Vac	1A-1B	2A-2B	3A-3B	
1027	X												
1386	X									X			FA 2P
1426	X										X		FA 2P
1472	X											X	FA 2P, FA 3P, FI, KC, KI
1028		X											
1390		X								X			FA 2P
1433		X									X		FA 2P
1477		X										X	FA 2P, FA 3P, FI, KC, KI
1042			X										
1441			X							X			FA 2P
1442			X								X		FA 2P
1021				X									
1380				X						X			FA 2P
1422				X							X		FA 2P
1466				X								X	FA 2P, FA 3P, FI, KC, KI
1037					X								
1388					X					X			FA 2P
1427					X						X		FA 2P
1127						X							
1616						X				X			FA 2P
1625						X					X		FA 2P
1128							X						FI, KC, KI
1627							X				X		FA, 2P, FI, KC, KI
1670							X					X	FA 2P, FA 3P, FI, KC, KI
1121								X					
1590								X		X			FA 2P
1595								X			X		FA 2P
1631								X				X	FA 2P, FA 3P, FI, KC, KI
1124									X				
1581									X	X			FA 2P
1619									X		X		FA 2P
1611									X			X	FA 2P, FA 3P, FI, KC, KI
1212										X			FA 2P use 1202 suffix

—Continued on next page

Legacy Thermal-Magnetic / Magnetic Only Molded Case Circuit Breakers

Table 36: Suffixes for Factory Installed Accessories¹ (continued)

Device Suffix	Shunt Trip		Shunt Trip			Undervoltage Trip		Undervoltage Trip		Auxiliary Switches			Not Compatible With:
	24 Vdc	48 Vdc	24 Vac	120/240 Vac	277/480 Vac	24 Vdc	48 Vdc	120 Vac	240 Vac	1A-1B	2A-2B	3A-3B	
1352											X		
1354											X ²		FA 2P
1364												X ³	FA 2P
1218												X ⁴	FA 2P, FA 3P, FI, KC, KI

¹ The FA one-pole Circuit Breaker is not included in this table.

² Circuit breaker has 2 sets of 2A2B auxiliary contacts.

³ The FA three-pole, FI, KC, and KI circuit breakers will include 1A1B in the left pole and 2A2B in the right pole to achieve 3A3B.

⁴ Circuit breaker has 2 sets of 3A3B contacts.

- Factory Installed Combinations of Electrical Accessories

Table 37: Available Factory Installed Accessory Combinations^{1 2}

FA, FH, FC and FI Thermal-Magnetic Circuit Breakers				KA and KH Circuit Breakers		KC and KI Circuit Breakers	
Accessory	One-Pole	Two-Pole	Three-Pole	Accessory	Two-or Three-Pole	Accessory	Two-or Three-Pole
A/S (1A1B or 2A2B)		X	X	A/S (1A1B or 2A2B or 3A3B)	X	A/S (1A1B or 2A2B)	X
A/S (3A3B or 4A4B)			X	A/S (4A4B or 5A5B or 6A6B)	X	A/S (3A3B or 4A4B)	X
A/S (1A1B or 2A2B), B/A		X	X	A/S (1A1B or 2A2B or 3A3B), B/A	X	A/S (1A1B or 2A2B), B/A	X
A/S (3A3B or 4A4B), B/A			X	A/S (4A4B or 5A5B or 6A6B), B/A	X	A/S (3A3B or 4A4B), B/A	X
A/S (1A1B or 2A2B), B/A, S/T			X	A/S (1A1B or 2A2B or 3A3B), B/A, S/T	X	A/S (1A1B or 2A2B), B/A, S/T	X
A/S (1A1B or 2A2B), S/T			X	A/S (1A1B or 2A2B or 3A3B), S/T	X	A/S (1A1B or 2A2B), S/T	X
A/S (1A1B or 2A2B), B/A, UVR			X	A/S (1A1B or 2A2B or 3A3B), B/A, UVR	X	A/S (1A1B or 2A2B), B/A, UVR	X
A/S (1A1B or 2A2B), UVR			X	A/S (1A1B or 2A2B or 3A3B), UVR	X	A/S (1A1B or 2A2B), UVR	X
B/A	X	X	X	B/A	X	B/A	X
B/A, S/T		X	X	B/A, S/T	X	B/A, S/T	X
B/A, UVR		X	X	B/A, UVR	X	B/A, UVR	X
S/T		X	X	S/T	X	S/T	X
S/T, B/A, UVR			X	S/T, B/A, UVR	X	S/T, B/A, UVR	X
S/T, UVR			X	S/T, UVR	X	S/T, UVR	X
UVR		X	X	UVR	X	UVR	X
CL			X	CL	X	CL	X
CL, A/S (1A1B or 2A2B)			X	CL, A/S (1A1B or 2A2B or 3A3B)	X	CL, A/S (1A1B or 2A2B)	X
CL, B/A, A/S (1A1B or 2A2B)			X	CL, B/A, A/S (1A1B or 2A2B or 3A3B)	X	CL, B/A, A/S (1A1B or 2A2B)	X
CL, B/A			X	CL, B/A	X	CL, B/A	X
CL, B/A, S/T			X	CL, B/A, S/T	X	CL, B/A, S/T	X
CL, S/T			X	CL, S/T	X	CL, S/T	X
CL, B/A, UVR			X	CL, B/A, UVR	X	CL, B/A, UVR	X
CL, UVR			X	CL, UVR	X	CL, UVR	X

¹ Cylinder Lock not available on FA/FH Mag-Gard.

² LEGEND - A/S=Auxiliary Switch, B/A=Bell Alarm, S/T=Shunt Trip, UVR=Undervoltage Trip, CL=Cylinder Lock.

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- Field Installable Accessories

Field installable accessories can be installed, interchanged or replaced in the field without affecting the circuit breaker's UL listing or interrupting ratings. Field installable accessories cannot be used in a mounting location or a pole that has a factory installed only accessory. Field installable electrical accessories and circuit breakers are shipped separately. The following thermal-magnetic circuit breakers, magnetic only circuit breakers and molded case switches accept UL listed, Schneider Electric field installable accessories:

- Q4, LA, and LH Series 4 and higher
- LI and LC Series 1 and higher
- MA and MH Series 2 and higher
- PA, PH, and PC Series 4 and higher
- NA and NC Series 1 and higher

Shunt Trip

The shunt trip accessory is used to trip the circuit breaker from a remote location by using a trip coil energized from a separate circuit. When energized by a push button or other pilot device, the shunt trip causes the circuit breaker to trip. The trip coil has coil clearing contacts to break the coil circuit when the circuit breaker opens.

Shunt trips are available for two and three-pole thermal-magnetic circuit breakers, magnetic only circuit breakers and molded case switches with standard control voltage ratings to 480 Vac or 24 Vdc. Additional ac control voltage ratings to 600 Vac are supplied with a 120 Vac rated coil and a control voltage transformer for user mounting. Control voltages above 480 Vac are not UL listed. A 120 Vac shunt trip operates at 55% or more of rated voltage and all other shunt trips operate at 75% or more of rated voltage.

Ground Fault Shunt Trip

A ground fault shunt trip operates in the same manner as a standard shunt trip, except that since the trip coil is rated for continuous duty, no coil clearing contact is needed. This accessory was designed for use with the Micrologic Ground Fault Module (GFM).

Table 38: Shunt Trip—Selection Data

Trip Type	Control Voltage	Factory Installed Shunt Trip Suffix	Field Installable Shunt Trip Catalog Number ¹
Shunt Trip	24 Vac 50/60 Hz	1042	() 1042
	48 Vac 50/60 Hz	1048	() 1048
	120–240 Vac 50/60 Hz	1021	() 1021
	120–240 Vac 400 Hz	1046 ^s	() 1046 ²
	208–480 Vac 50/60 Hz	—	() 1086 ³
	277–480 Vac 50/60 Hz	1037	() 1037 ⁴
	600 Vac 50/60 Hz	1026 ^s	() 1026 ²
	6 Vdc	1040	() 1040
	12 Vdc	1039	() 1039
	24 Vdc	1027	() 1027
	48 Vdc	1028	() 1028
	72 Vdc	1038	() 1038
	125 Vdc	1029	() 1029
	250 Vdc	1030	() 1030
Ground Fault Shunt Trip	24 Vac 50/60 Hz	G	() G ⁴

¹ Complete accessory catalog number by adding appropriate circuit breaker prefix (LA1, MA1, NA1, or PA1).

² Not UL listed.

³ PA1 prefix only.

⁴ Not available with PA1 prefix.

Legacy Thermal-Magnetic / Magnetic Only Molded Case Circuit Breakers

Figure 21: Ground Fault and Shunt Trip Wiring Diagram

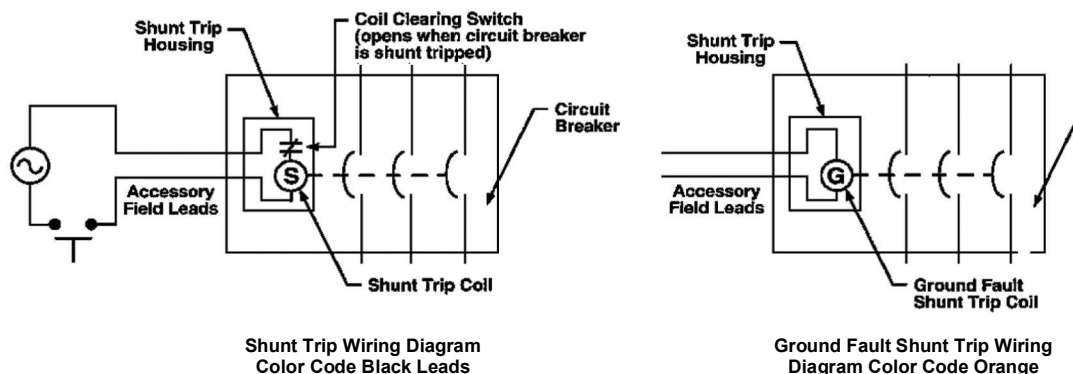


Table 39: Shunt Trip Electrical Specifications¹

Voltage Rating		Maximum Current in Milliamps (RMS)		Coil Burden Max. VA		Minimum Recommended Supply Transformer (VA)
AC	24	850	(3650)	20.4	(88)	25
	48	540	—	26	—	50
	120	240	(4000)	29	(54)	50
	208	515	(500)	107	(104)	50
	240	740	—	154	—	50
	277	50	—	13.9	—	25
	480	93	—	44.6	—	50
DC	6	1714	(6000)	10.3	(36)	—
	12	800	(6000)	9.6	(72)	—
	24	1500	(460)	36	(11)	—
	48	750	(920)	36	(44)	—
	72	200	(208)	14.4	(15)	—
	125	350	(80)	43.7	(10)	—
	250	60	(160)	15	(40)	—

¹ () Values in parenthesis apply to field installable devices used in PA/PC frame circuit breakers.

Table 40: Shunt Trip & Undervoltage Trip Clearing Times

Circuit Breaker	Average Clearing Time, Milliseconds
FA	16
KA	20
LA, Q4	25
MA	33
NA	35
PA, PC	40