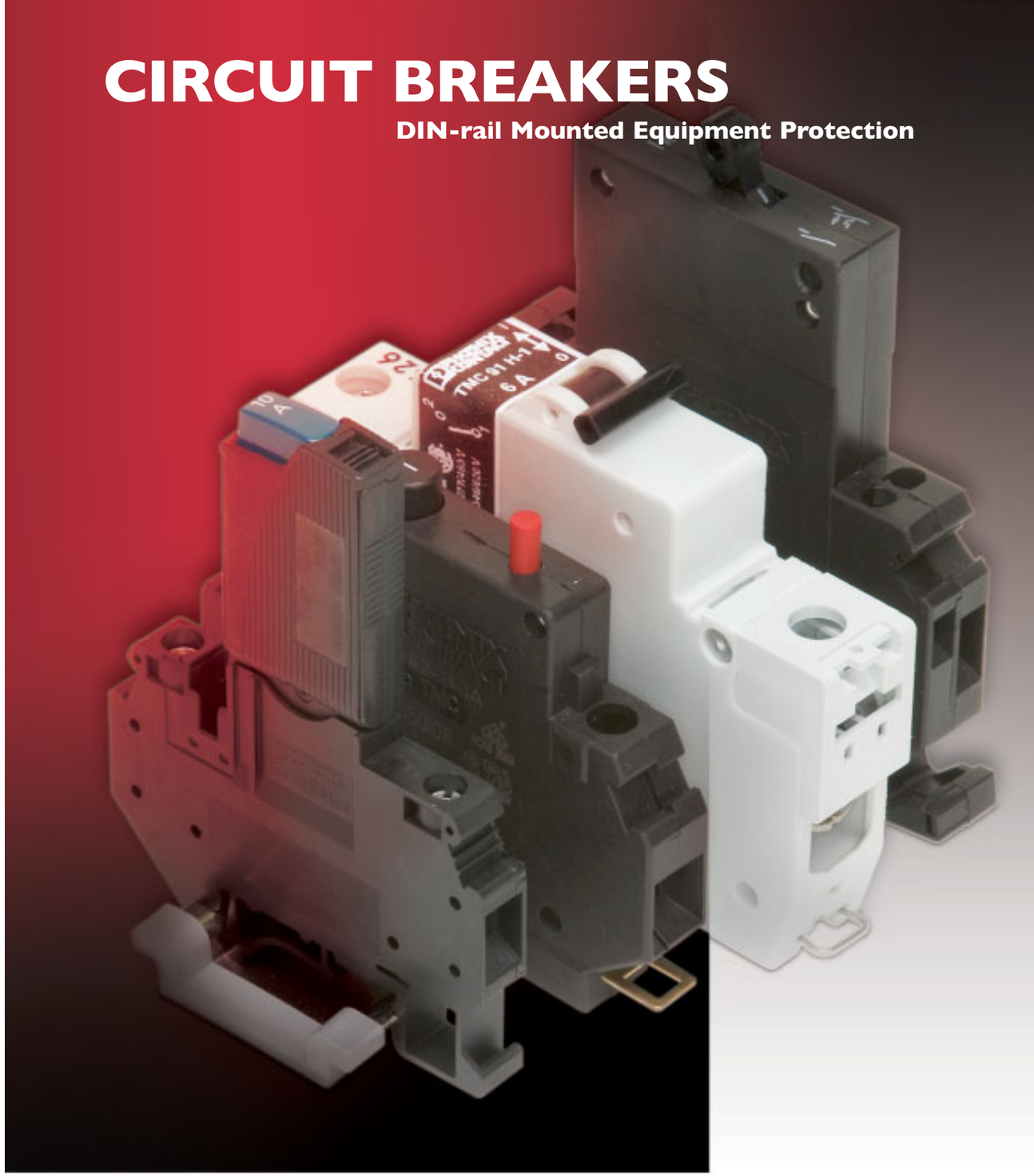
CIRCUIT BREAKERS

DIN-rail Mounted Equipment Protection



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INSPIRING INNOVATIONS

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INSPIRING INNOVATIONS

To choose a **CIRCUIT BREAKER** determine:

What is the normal current load (nominal current)?
Specify the size of the breaker in amps based on the normal current load.

What types of failure might occur?
Match the short-circuit and overload characteristics to the performance capability of the breaker.

What is the rupture capacity?
Specify the breaker knowing the maximum fault current that can be repeatedly (3x minimum) interrupted without failure of the breaker.

What is the maximum interrupting capacity?
Choose the breaker knowing the maximum current at a given voltage that the breaker can interrupt safely without damage to surrounding components.

How fast must the circuit breaker react to a fault condition?
Specify a breaker by selecting a speed that avoids nuisance tripping but protects against component damage.

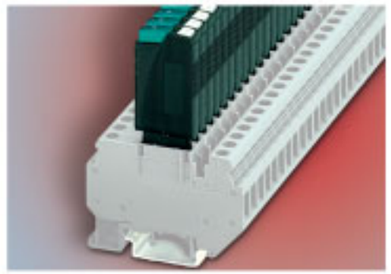
How many poles are needed?
Determine the number of poles connected electrically and structurely that are needed.

What are the functional requirements of the breaker?
Define the requirements for visual inspection, switching, auxiliary circuits, or space.

What size wire must the breaker accommodate?
Determine if the breaker can accept the wire sizes required.

What are the environmental factors: temperature, moisture, vibration?
Determine if there are unusual conditions in which the breaker must operate.

Phoenix Contact offers DIN-rail mounted **THERMAL** and **THERMAL-MAGNETIC** circuit breakers



Thermal Circuit Breakers

Thermal circuit breakers use heat-sensitive bimetallic elements that respond to overload electrical currents.

Thermal Miniature Circuit Breakers TCP are compact breakers designed to interrupt an electric current under overload conditions. The breaker is able to handle ten nominal currents ranging from 0.10 A to 10 A.

TCP breakers are easily reset after a current interruption by pushing the reset button. The breakers can be plugged into UK 6-FSI/C (screw) or ST 4-FSI/C (spring) terminal blocks for convenient DIN-rail mounting.

Thermal-magnetic Circuit Breakers

Thermal-magnetic circuit breakers have a thermal circuit interruption function and a magnetic interruption function. The thermal function uses heat-sensitive bimetallic elements that respond to overload electrical currents. The magnetic function responds to very high current overloads such as those that might occur during short-circuit conditions.

TMC 42 breakers are thermal-magnetic breakers that will interrupt an electrical current under overload or short-circuit conditions. The breakers are available in single pole or double pole for currents ranging from 0.10 to 16 amps. TMC 42 breakers can be snapped directly on a DIN-rail. They are reset by pushing a red reset button.

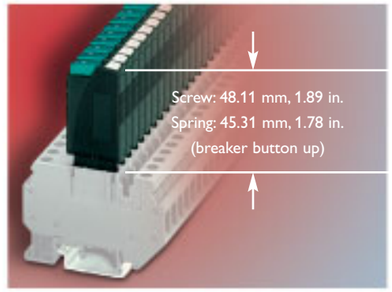
TMC 91 H breakers are thermal-magnetic breakers that will interrupt an electrical current under overload or short-circuit conditions. The breakers are available in single, double, or triple pole configurations for currents ranging from 0.5 to 63 amps. TMC 91 H breakers can be snapped directly on a DIN-rail. They are reset by moving the toggle switch to the green (activation) position.

TMC 1 breakers are thermal-magnetic breakers that will interrupt an electrical current under overload or short-circuit conditions. The breakers are available on single, double, or triple pole configurations for currents ranging from 0.1 to 32 amps. This high density breaker has built-in auxiliary contacts. TMC 1 breakers can be snapped directly on a DIN-rail. They are reset by moving the toggle switch to the I (activation) position.

Thermal Miniature Circuit Breaker TCP

The TCP is a compact circuit breaker designed to interrupt an electric current under overload conditions. The breaker is available to handle ten nominal currents ranging from 0.10 A to 10 A.

The TCP breaker is trip-free and can be easily reset after a current interruption by pushing the reset button. The breaker can be plugged into UK 6-FSI/C or ST 4-FSI/C fuse base terminal blocks for convenient DIN-rail mounting.



	[V AC]	[V DC]
Nominal Voltage	250	65

Technical Data		Type	Order No.	Pcs./Pkt.
Thermal Circuit Breaker	Nominal current [A]			
plugged into UK 6-FSI/C or ST 4-FSI/C	0.10	TCP 0.10	07 12 10 7	1
base terminal blocks	0.25	TCP 0.25	07 12 12 3	1
	0.5	TCP 0.5	07 12 15 2	1
	1.0	TCP 1	07 12 19 4	1
	2.0	TCP 2	07 12 21 7	1
	3.0	TCP 3	07 12 23 3	1
	4.0	TCP 4	07 12 25 9	1
	6.0	TCP 6	07 12 27 5	1
	8.0	TCP 8	07 12 29 1	1
	10.0	TCP 10	07 12 31 4	1
(1) Flat Zack strip, unprinted, 10-section for labeling the upper marker grooves		**ZBF 5:WH: UNPRINTED**	08 08 64 2	10
Technical data in accordance with IEC/DIN VDE				
Nominal voltage	[V AC/DC]		250/65	
Nominal current	[A]		0.10-10	
Ambient temperature	°C		-20...+60	
Interrupting capacity				
for nominal currents of 0.10 - 4 A	[A]		6x rated current	
for nominal currents of 6 - 10 A	[A]		8x rated current	
UL 1077			AC 250 V: 2,000 A / DC 65 V: 200 A	
Insulating material			**Polymide (PA), non-reinforced**	
Inflammability class in accordance with UL 94			VO	
Approval data (UL and c/UL)	[V AC] / [V DC] / [A]		250 AC / 65 DC / 0.1-10 A	

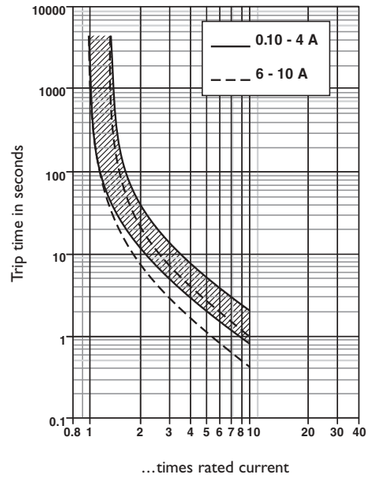
Thermal Miniature Circuit Breaker TCP compared to Glass Fuses

TCP Feature	TCP	Glass Fuses
Convenience	Resettable when overload is resolved	Storing, ordering and locating issues
Deterioration	Virtually no aging	Age with eventual failure at normal loads
Life expectancy	3,000 operations at current rating, 500 operations at 2x current rating	Unknown
Interruption detection	Visual identification	Status not determined until fuse is removed from its holder
ON/OFF capability	Switch duty actuator allows product to operate as an electrical switch	Not applicable
Hot-swappable	May be removed or replaced under load	Not applicable
Controlled trip	Avoids nuisance trips due to high in-rush currents	Not applicable

Technical data for TCP

Time/current characteristic curve

Ambient temperature 23°C



The time/current characteristic curve depends on the ambient temperatures. To avoid a premature or late switch-off, the nominal current of the circuit breaker must be multiplied with a temperature factor.

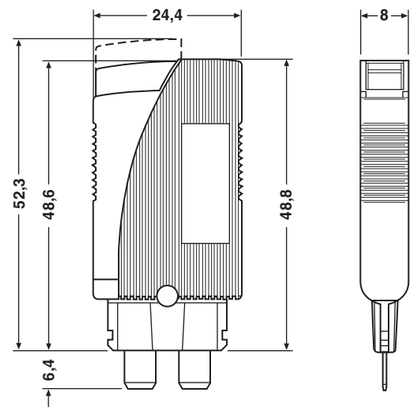
Ambient temperature °C	-20	-10	0	23	40	50	60
Temperature factor	0.76	0.84	0.92	1	1.08	1.16	1.24

NOTE:
If the TCP circuit breakers are mounted side-by-side without a minimum of 1 mm of space for air movement, then do not exceed 80% of their rating.

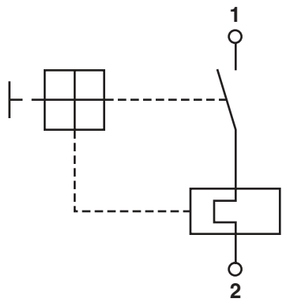
Nominal currents and internal resistances

Nominal current [A]	Internal resistance [Ω]
0.1	81
0.25	14
.5	3.4
1	0.9
2	0.25
3	0.11
4	0.07
6	≤ 0.05
8	≤ 0.05
10	≤ 0.05

Dimensional drawing



Switching diagram

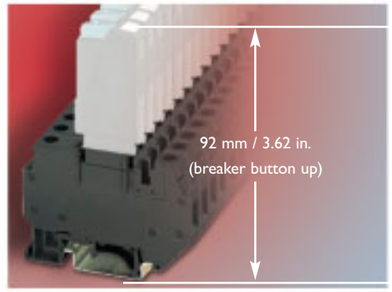


Thermal Miniature Circuit Breaker TCP

Base terminal block with screw connection for accommodating the TCP circuit breaker UK 6-FSI/C

(IEC)	rigid	flexible			
[mm²]	solid	stranded	AWG	[A]	[V]
Connection data	0.2-10	0.2-6	24-8	*	250*

*The current and voltage are determined by the thermal circuit breaker



Technical Data			Type	Order No.	Pcs./Pkt.
Fuse Terminal Block with universal foot for mounting on NS 32 or NS 35 DIN-rails			**UK 6-FSI/C**	**31 18 20 3**	**50**
Fuse Terminal Block	Light indicator/voltage [V]	Current [mA]			
as shown above with light indicator	LED red 12 V DC	2.0 A	**UK 6-FSI/C-LED 12**	**30 01 92 5**	**50**
	LED red 24 V DC	2.0 A	**UK 6-FSI/C-LED 24**	**30 01 93 8**	**50**
(1) Fixed Bridge for cross connections in the terminal center, screw heads with insulating collar, 10 position, divisible, with 10 screws			**FBI 10-8 i_{max}:34 A**	**02 03 26 3**	**50**
(2) Separating Plate for electrical separation of neighboring bridges, can be fitted later, no loss of pitch			**TS-KK 3**	**27 70 21 5**	**100**
(3) Zack Strip 10 section, white			**ZB 8: UNPRINTED**	**10 52 00 2**	**10**
(4) Screwdriver			**SZS 1.0 x 4.0**	**12 05 06 6**	**10**
Dimensions					
Width/length	[mm / in.]		Width: 8.2 mm / 0.32 in.; Length: 64 mm / 2.52 in.		
Height (NS 35:7.5/NS 35:15/NS 32)	[mm / in.]		NS 35:7.5: 7.5 mm / 0.30 in.; NS 35:15: 15 mm / 0.60 in.		
Technical data in accordance with IEC/DIN VDE					
Fuse type ISO/DIS 8820/DIN 72-581-3	-		C		
Maximum current with single arrangement [1])	[A]		30		
Maximum power dissipation					
Rated surge voltage/contamination class	[kV]/-		4/3		
Surge voltage category/insulation material group	-/-		III/I		
Connection capacity					
Stranded with ferrule without/with plastic sleeve	[mm² / in.²]		Without: 0.25-6 mm² / 0.00039-0.00930 in.²; With: 0.25-4 mm² / 0.00039-0.00620 in.²		
Multi-conductor connection (2 cond. with same cross section)					
Solid/stranded	[mm²]		Solid: 0.2-2.5; Stranded: 0.2-2.5		
Stranded with ferrule without plastic sleeve	[mm²]		0.25-2.5		
Stranded with TWIN ferrule with plastic sleeve	[mm²]		0.5-4		
Stripping length	[mm]		10		
Internal cylindrical gauge (IEC 60 947-1)			A5		
Screw thread/torque	-/[Nm] / in. lbs		M 4/1.5-1.6 / M 4/13.3-14.2		
Insulation material			Polyamide (PA), non-reinforced		
Inflammability class in accordance with UL 94			V0		
Approval data (UL and c/UL)[2])	UL: [V]/[A]/AWG		300/30/26-8		
Nom. Voltage/ nom. current/conduc. sizes	c-UL: [V]/[A]/AWG		300/30/26-8		

[1]) *Special arrangement on request*

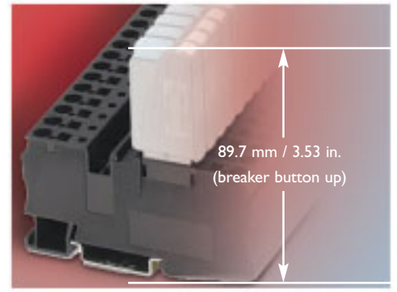
[2]) *File number E 140459*

Thermal Miniature Circuit Breaker TCP

Base terminal block with spring cage connection for accomodating the TCP circuit breaker ST 4-FSI/C

(IEC)	rigid	flexible			
[mm²]	solid	stranded	AWG	[A]	[V]
Connection data	0.2-6	0.2-4	24-10	*	400*

*The current and voltage are determined by the thermal circuit breaker



Technical Data				Type	Order No.	Pcs./Pkt.
Fuse Terminal Block with universal foot for mounting on 35 DIN-rail				**ST 4-FSI/C**	**30 36 37 2**	**50**
Fuse Terminal Block, [1])	Light indicator/voltage [V]	Current [mA]				
as shown above with light indicator	LED red 12 V DC	2.0 A		**ST 4-FSI/C-LED12**	**30 36 49 5**	**50**
	LED red 24 V DC	2.0 A		**ST 4-FSI/C-LED 24**	**30 36 50 5**	**50**
(1) Insulating stop sleeve, prevents unintentional clamping of the insulation in the case of smaller cross sections						
Cross section range	0.25-0.5 mm²/0.0039-0.0077 in.2		Gray	**ISH 4/0.5**	**30 02 88 5**	**50**
	0.75-1 mm²/0.00116-0.00155 in.2		Black	**ISH 4/1**	**30 02 89 8**	**50**
(2) Plug-in bridge, for cross connections in the terminal center			2-position	**FBS 2-8 i_{max}:41 A**	**30 30 28 4**	**10**
			3-position	**FBS 3-8 41A**	**30 30 29 7**	**10**
			4-position	**FBS 4-8 41A**	**30 30 30 7**	**10**
			5-position	**FBS 5-8 41A**	**30 30 31 0**	**10**
			10-position	**FBS 10-8 41A**	**30 30 32 3**	**10**
(3) Test adapter, for 4 mm Ø test adapter PS and 4 mm safety test plugs, making contact in the bridge shaft				**PAI 4**	**30 30 92 5**	**10**
(4) 2.3 mm Ø test plus [2]), consisting of a metal part and a red insulating sleeve				**MPS-RD**	**02 01 55 3**	**10**
(5) Modular test plug, can be labeled with ZBFM 8				**PS 8**	**30 31 00 5**	**10**
(6) Zack marker sheet, flat, 50-section, for labeling in the outer marker grooves				**ZBFM 8/WH: UNPRINTED**	**08 00 73 4**	**10**
(7) Zack strip, 10 section, for labeling in the terminal center				**ZB 8: UNPRINTED**	**10 52 00 2**	**10**
(8) Screwdriver, for actuating the spring cage				**SZF 1 - 0.6x3.5**	**12 04 51 7**	**10**
Dimensions						
Width/length	[mm / in.]		Width 8.2 mm / 0.32 in. / Length 86.5 mm / 3.4 in.			
Height (NS 35:7.5/NS 35:15)	[mm / in.]		NS 35:7.5: 7.5 mm/0.30 in./NS 35:15: 15 mm/0.60 in.			
Technical data in accordance with IEC/DIN VDE						
Fuse type ISO/DIS 8820/DIN 72 581-3	-		C			
Maximum current with single arrangement	[A]		30			
Maximum power dissipation						
Rated surge voltage/contamination class	[kV] / -		6/3			
Surge voltage category/insulation material group	- / -		III/I			
Connection capacity						
Stranded with ferrule without/with plastic sleeve	[mm²] / AWG		0.25-4 mm² / AWG: 24-12			
Stranded with TWIN ferrule with plastic sleeve	[mm²] / AWG		0.5-1 mm² / AWG: 20-18			
Stripping length	[mm / in.]		10 mm / 0.39 in.			
Internal cylindrical gauge (IEC 60 947-1)			A4			
Insulation material			Polyamide (PA), non-reinforced			
Inflammability class in accordance with UL 94			V0			
Approval data (UL and c/UL)	UL: [V] / [A] / AWG		300/30/24-10			
Nominal voltage/nominal current/conduc. sizes	c-UL: [V] / [A] / AWG		300/30/24-10			

[1]) *If the fuse is defective, the downstream circuit is not off-load*

[2]) *Further colors are available on request*

Thermal-Magnetic Circuit Breaker | TMC 42-01/42-02

Single pole thermal-magnetic circuit breaker with tease-free, triple-free, snap action mechanism and two button operation (M-type TMCBE to IEC 934). Featuring a narrow profile housing, recessed terminals, standard DIN-rail mounting and precision CBE performance.

Typical Applications

Circuit protection for process control systems, equpiment manufacturers and instrumentation.

Approvals

Authority	Voltage Ratings	Current Ratings
VDE, Demko	AC 250 V, DC 65 V	0.10 to 16 A
UL 1077, CSA	AC 250 V, DC 80 V	0.10 to 16 A
ABS, BV, LRoS	AC 250 V, DC 65 V	0.3 to 16 A

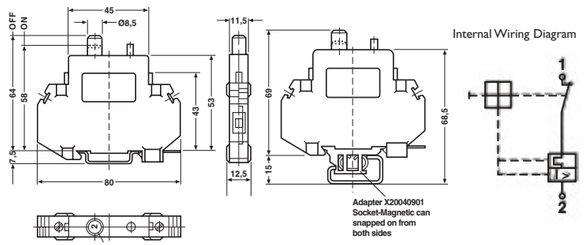
Label Slot

ZB6 Marking System

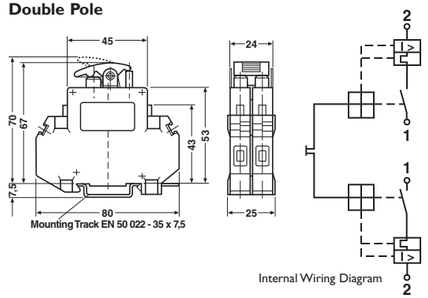
Technical Data			
Maximum Voltage Rating	AC 250 V, 50/60 Hz; DC 80 V		
Current Rating Range	42-01 : 0.10...16 A		
Typical Life	5,000 operations at 2xI_N		
Temperature Range	0° to 55°C (+32° to +131°F)		
Creepage Resistance	PTI 600 to IEC 112		
Insulation Co-ordination			
(IEC 664 and 664A)	Rated Impulse Withstand Voltage		Pollution Degree
Operating Area	4k V		3
Dielectric Strength			
(IEC 664 and 664A)	Test Voltage		
Operating Area	AC 4,000 V (double insulation)		
Insulation Resistance			
Interrupting Capacity	>100 MΩ (DC 500 V)		
(VDE 0660, Part 101, P-2)	0.05 to 0.8 A	Self Limiting	
	1 to 2 A	200 A	
	2.5 to 16 A	400 A	
Interrupting Capacity			
(UL 1077/EN60934 PC1)	I_N	U_N	Self Limiting
	0.05 to 4.5 A	250 V AC	200 A
	0.05 to 16 A	250 V AC	1,000 A
	0.05 to 16 A	80 V DC	1,000 A
Environmental Protection			
(IEC 529/DIN 40050)	Operating Area IP 40, Terminal Area IP 20		
Vibration	5g (57-50 Hz), +0.38 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis		
Shock	25g (11ms) to IEC 68-2-27, Test Ea		
Corrosion	96 hours at 5% saltspray to IEC 68-2-11, Test Ka		
Humidity	240 hours at 95% RH to IEC 68-2-3, Test Ca		
Weight	Approx. 60g		
Conductor Size	0.5-6mm² (AWG 20-AWG 10)		
Recommended Torque	0.8 Nm max		
C-Rail Adapter	5650505		

Dimensions

Single Pole



Double Pole

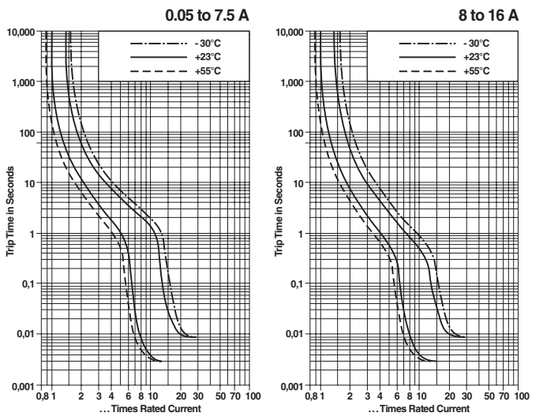


Standard current ratings and typical internal resistance values

Thermal-Magnetic Circuit Breakers					
		TMC 42-01 Single Pole		TMC 42-02 Double Pole	
Ohms	Current Rating	Type	Part#	Type	Part #
131.00	0.10	TMC42-01-0.1 A	5530915*	TMC42-02-0.1 A	5650123*
40.00	0.20	**TMC42-01-0.2 A**	**5650102**	TMC42-02-0.2 A	5650124*
19.30	0.30	TMC42-01-0.3 A	5650103*	TMC42-02-0.3 A	5650127*
10.40	0.40	TMC42-01-0.4 A	5530944*	TMC42-02-0.4 A	5531244*
7.10	0.50	**TMC42-01-0.5 A**	**5650106**	TMC42-02-0.5 A	5531257*
4.30	0.60	TMC42-01-0.6 A	5530960*	TMC42-02-0.6 A	5531260*
2.50	0.80	TMC42-01-0.8 A	5530986*	TMC42-02-0.8 A	5531286*
1.67	1.00	**TMC42-01-1.0 A**	**5650108**	**TMC42-02-1.0 A**	**5531299**
1.22	1.22	TMC42-01-1.2 A	5531008*	TMC42-02-1.2 A	5531309*
0.61	1.50	**TMC42-01-1.5 A**	**5650109**	TMC42-02-1.5 A	5650129*
0.55	1.80	TMC42-01-1.8 A	5650110*	TMC42-02-1.8 A	5531325*
0.38	2.00	**TMC42-01-2.0 A**	**5600314**	**TMC42-02-2.0 A**	**5531388**
0.24	2.50	TMC42-01-2.5 A	5650113*	TMC42-02-2.5 A	5650130*
0.19	3.00	**TMC42-01-3.0 A**	**5650114**	**TMC42-02-3.0 A**	**5650131**
0.16	3.50	TMC42-01-3.5 A	5531053*	TMC42-02-3.5 A	5531367*
0.09	4.00	**TMC42-01-4.0 A**	**5531066**	TMC42-02-4.0 A	5650134*
0.09	4.50	TMC42-01-4.5 A	5650115*	TMC42-02-4.5 A	5650135*
0.06	5.00	**TMC42-01-5.0 A**	**5531082**	**TMC42-02-5.0 A**	**5651396**
0.07	5.50	TMC42-01-5.5 A	5531095*	TMC42-02-5.5 A	5531406*
0.04	6.00	**TMC42-01-6.0 A**	**5531105**	TMC42-02-6.0 A	5650136*
0.04	6.50	TMC42-01-6.5 A	5650116*	TMC42-02-6.5 A	5650137*
0.03	7.00	TMC42-01-7.0 A	5650117*	TMC42-02-7.0 A	5531435*
0.02	8.00	**TMC42-01-8.0 A**	**5650120**	TMC42-02-8.0 A	5650138*
0.02	9.00	TMC42-01-9.0 A	5531147*	TMC42-02-9.0 A	5531451*
<0.02	10.00	**TMC42-01-10 A**	**5650121**	**TMC42-02-10 A**	**5531464**
<0.02	11.00	TMC42-01-11 A	5531163*	TMC42-02-11 A	5531477*
<0.02	12.00	TMC42-01-12 A	5650122*	TMC42-02-12 A	5650141*
<0.02	13.00	TMC42-01-13 A	5531189*	TMC42-02-13 A	5531493*
<0.02	14.00	TMC42-01-14 A	5531192*	TMC42-02-14 A	5531503*
<0.02	15.00	**TMC42-01-15 A**	**5600310**	**TMC42-02-15 A**	**5600309**
<0.02	16.00	**TMC42-01-16 A**	**5531202**	TMC42-02-16 A	5650142*

* Indicates breakers that are made-to-order and may require an 8 week lead time.

Typical time/current characteristics at 23°C



Direct Current – Magnetic tripping currents are increased by 30% in DC circuits with the effect of shifting the magnetic trip range 30% to the right of AC trip curves.

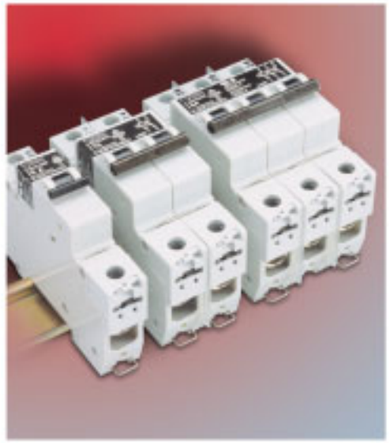
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below.

Ambient temperature								
°F	-22	-4	14	32	73.4	104	122	140
°C	-30	-20	-10	0	23	40	50	60
Derating factor	**0.76**	**0.79**	**0.83**	**0.88**	**1**	**1.08**	**1.16**	**1.24**

Thermal-Magnetic Circuit Breaker | TMC 91 H

Features

- Single, two and three pole circuit breakers
- Thermal-magnetic operation
- DIN/EN rail 50 022- 35 x 7.5 mm or 35 x 15 mm
- High rupture capacity 10 kA
- VDE, EN, UL and CSA approvals
- Auxiliary contacts optional
- S-type CBE according to IEC 934



Approvals

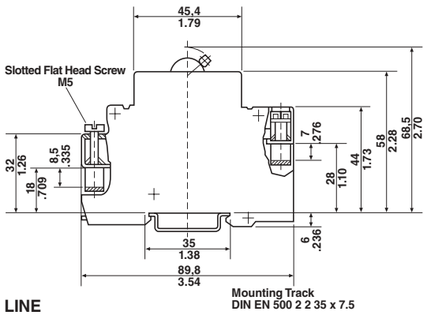
Authority	Voltage Ratings	Current Ratings
UL1077, CSA	AC 347/600 V	0.5 A to 32 A
	AC 277/480 V	0.5 A to 63 A
	DC 48 V	0.5 A to 63 A*
	DC 110 V	0.5 A to 50 A**
VDE	AC 240/415 V	

* Per pole, per DC Current ** For 2-pole, +and– of the same circuit

Switching Capacities

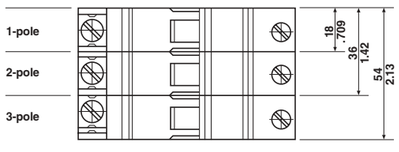
Current Ratings	Maximum Rupture Capacity
0.5 A to 50 A	10 000 A AC 277/480 V
63 A	10 000 A with series fuse 250 A class RK 1
0.5 A to 32 A	2 000 A AC 347/600 V

Dimensions

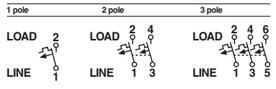


LINE

Auxiliary Contact SH/HH



Internal Wiring Diagram



Technical Data

Maximum Voltage Rating	AC 277/480 V;AC 347/600 V (CSA)		
Current Rating Range	0.05 A to 63 A		
Auxiliary Circuit	AC 660 V (CSA tested at 2,000 A) (DC models upon request)		
Temperature Range			
Operating Temperature	-25° to +55°C (-13° to +131°F)		
Storage Temperature	-55° to +55°C (-67° to +131°F)		
Creepage Resistance	PTI 250 to IEC 112		
Insulation Values (IEC 664 and 664A)	Rated Impulse Withstand Voltage		Pollution Degree
Operating Area	4.0 kV		3
Dielectric Strength (IEC 664 and 664A)	Test Voltage		
Interrupting Capacity	10,000 Amps		
Operating Area	AC 4,400 V		
Auxiliary Contact Ratings	AC 220/240 V	5 A	
	AC 277 V	3 A	
	DC 24 V	4 A	
	DC 60 V	1 A	
	DC 220 V	0.4 A	
Insulation Resistance	>100 MΩ (DC 500 V)		
Life at Rated	6,000 operations (UL tested)		
Current Mechanical	10,000 operations		
Cable Size	max 35 mm² / AWG 2 (LINE)		
	max 25 mm² / AWG 3 (LOAD)		
	max 2.5 mm² / AWG 12 (auxiliary circuits)		
Minimum 1 mm² or AWG 16 for all circuits. Use a ferrule with wire sizes smaller than 16 AWG.			
Recommended Torque	0.5 Nm max		
Vibration	3 g (10 to 55 Hz) to IEC 68-2-6		
Shock	20 g (10 ms)		
Weight	1 pole	2 pole	3 pole
	130 g	280 g	430 g

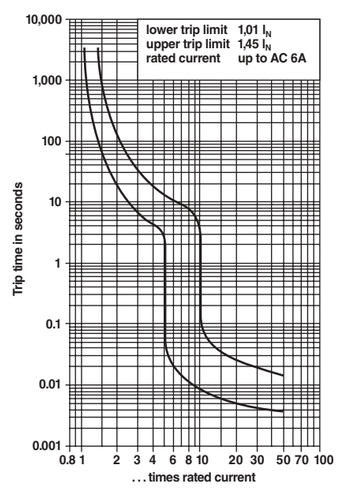
Standard current ratings and typical internal resistance values

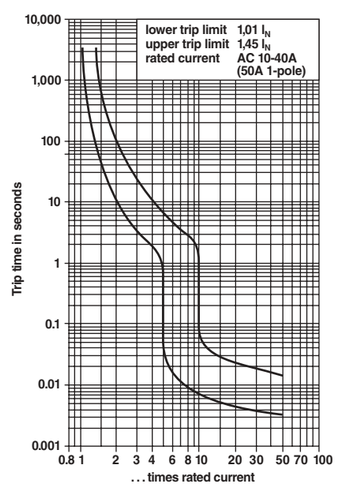
Thermal-Magnetic Circuit Breakers

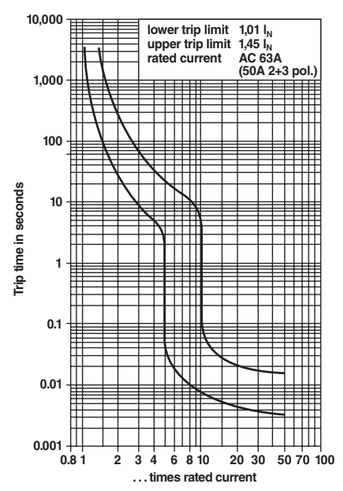
Internal Resistance per Pole (ohms)	Current Ratings (amps)	Single Pole		Double Pole		Triple Pole	
		Description	Part #	Description	Part #	Description	Part #
6.2	0.5	**TMC 91-H-1-0.5 A**	**5650305**	TMC 91-H-2-0.5 A	5650448*	TMC 91-H-3-0.5 A	5650458*
1.7	1	**TMC 91-H-1-1 A**	**5650304**	**TMC 91-H-2-1 A**	**5650449**	TMC 91-H-3-1 A	5650459*
0.45	2	**TMC 91-H-1-2 A**	**5650302**	TMC 91-H-2-2 A	5650450*	TMC 91-H-3-2 A	5650460*
0.22	3	**TMC 91-H-1-3 A**	**5650306**	**TMC 91-H-2-3 A**	**5531529**	TMC 91-H-3-3 A	5650461*
0.13	4	TMC 91-H-1-4 A	5650221*	TMC 91-H-2-4 A	5650451*	TMC 91-H-3-4 A	5650315*
0.05	6	**TMC 91-H-1-6 A**	**5650223**	**TMC 91-H-2-6 A**	**5650452**	**TMC 91-H-3-6 A**	**5650466**
≤0.02	10	**TMC 91-H-1-10 A**	**5650220**	TMC 91-H-2-10 A	5531587*	TMC 91-H-3-10 A	5650268*
≤0.02	13	**TMC 91-H-1-13 A**	**5650303**	TMC 91-H-2-13 A	5650453*	**TMC 91-H-3-13 A**	**5650462**
≤0.02	16	**TMC 91-H-1-16 A**	**5650307**	**TMC 91-H-2-16 A**	**5531590**	**TMC 91-H-3-16 A**	**5650465**
≤0.02	20	**TMC 91-H-1-20 A**	**5650219**	**TMC 91-H-2-20 A**	**5650285**	**TMC 91-H-3-20 A**	**5600407**
≤0.02	25	TMC 91-H-1-25 A	5650300*	TMC 91-H-2-25 A	5650454*	**TMC 91-H-3-25 A**	**5650464**
≤0.02	32	**TMC 91-H-1-32 A**	**5650309**	**TMC 91-H-2-32 A**	**5650377**	**TMC 91-H-3-32 A**	**5650269**
≤0.02	40	TMC 91-H-1-40 A	5650310*	TMC 91-H-2-40 A	5650455*	TMC 91-H-3-40 A	5531600*
<0.02	50	**TMC 91-H-1-50 A**	**5650311**	TMC 91-H-2-50 A	5650456*	TMC 91-H-3-50 A	5650463*
<0.02	63	**TMC 91-H-1-63 A**	**5650312**	**TMC 91-H-2-63 A**	**5650457**	**TMC 91-H-3-63 A**	**5531561**
Auxiliary Con.		TMC 91-H-X21	5650550*	TMC 91-H-X21-21	5650551*	-	-

* Indicates breakers that are made-to-order and may require an 8 week lead time.

Typical time/current characteristics at 30°C







Direct Current – Magnetic tripping currents are increased by 30% in DC circuits with the effect of shifting the magnetic trip range 30% to the right of AC trip curves.

(multipole types: all poles symmetrically loaded)

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factors shown in the table below.

Amps	Temperature °C -20°	-15°	-10°	-5°	0°	+5°	+10°	+15°	+20°	+25°	+30°	+35°	+40°	+45°	+50°
0.5 – 4.0	0.84	0.85	0.87	0.88	0.89	0.91	0.93	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.09
8.0 – 10	0.75	0.77	0.78	0.81	0.83	0.85	0.88	0.90	0.93	0.96	1.00	1.04	1.09	1.14	1.20
13 – 40	0.79	0.80	0.82	0.84	0.86	0.88	0.90	0.93	0.94	0.97	1.00	1.03	1.06	1.11	1.15
50 – 60	0.81	0.83	0.84	0.85	0.87	0.89	0.91	0.93	0.94	0.97	1.00	1.02	1.05	1.09	1.12

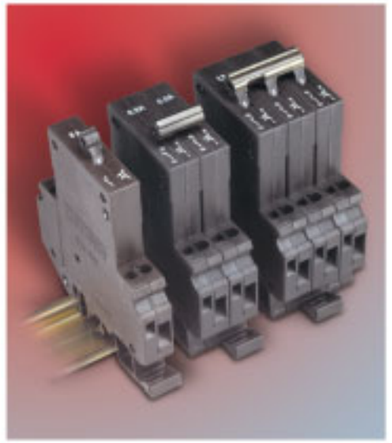
Ordering Information

1 Type	TMC 91 H	Thermal-magnetic circuit breaker
2 Number of poles	1 1 pole	
	2 2 pole	
	3 3 pole	
3 Current ratings	0.5 1 2 3 4 6 10 13 16 20 25 32 40 50 63 A	

TMC 91 H – 1 – 10 = ordering information for breaker, single pole, 10 A

Thermal-Magnetic Circuit Breaker | TMC 1

One, two and three pole thermal-magnetic circuit breakers with tease-free, trip-free, snap action mechanism and toggle actuation (S-type: IEC 934). Breaker has a universal mounting foot so it can be snapped on both NS 35 and NS 32 mounting rail profiles. Available with auxiliary contact (1 x N/O or 1 x N/C) for status signaling. Two and three pole models are internally linked to ensure that both/all poles trip in the event of an overload on one pole, even if the actuator is held in the ON position. This circuit breaker can be supplied in current ratings to 32 A with a choice of characteristic curves. All screw terminals are recessed for safety.



Technical Data

Maximum Voltage Rating	AC 277 V; 3 AC 480 V (50/60 Hz)	
	DC 65 V	
Current Rating Range	0.1…32 A non-inductive	
Auxiliary Circuit	1 A, AC 277 V / DC 65 V	
Typical Life	10,000 operations at $1xI_N$	
Temperature Range	0…+55°C (+32…+131°F)	
Creepage Resistance	PTI 400 to IEC 112	
Insulation Co-ordination		
(IEC 664 and 664A)	Rated Impulse Withstand Voltage	Pollution Degree
Operating Area	2.5 kV	2
Main/Auxiliary Circuit	2.5 kV	2
Pole/Pole	2.5 kV	2
Dielectric Strength		
(IEC 664 and 664A)	Test Voltage	
Operating Area	AC 3,000 V (double insulation)	
Main/Auxiliary Circuit	AC 3,000 V	
Pole/Pole	AC 1,500 V	
Insulation Resistance	>100 MΩ (DC 500 V)	
Interrupting Capacity	0.1…5 A 400 A; 6…32 A 800 A	
(VDE 0660, Part 101, P-2)	Curve T2; 0.1…32 A 15 I_N	
(AC 250/415 V, DC 65 V)	Curve M3; 0.1…2 A 200 A AC	
Interrupting Capacity	I_N	U_N Self Limiting
(UL 1077/EN 60934 PC 1)	0.1…16 A	AC 277 V 5,000 A
	20…32 A	AC 277 V 2,000 A
	0.1…16 A	3 AC 480 V 5,000 A
	20…32 A	3 AC 480 V 2,000 A
	0.1…32 A	DC 65 V 2,000 A
Environmental Protection	Operating Area IP 30	
(IEC 529/DIN 40050)	Terminal Area IP 20	
Vibration	Curve F1:	
	3g (57-500 Hz) ±0.23 mm (10-57 Hz)	
	Curves M1, M3, T1, T2:	
	5g (57-500 Hz ±0.38 mm (10-57 Hz) to IEC 68-2-6, Test FC 10 Frequency Cycles/Axis	
Shock	Curve F1: 25g (11 ms), directions 1-5	
	10g (11 ms), direction 6	
	Curves M1, M3, T1, T2	
	25g (11 ms), directions 1-5	
	20g (11 ms), direction 6 to IEC 68-2-27, Test Ea	
Corrosion	96 hours at 5% saltspray to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95% RH to IEC 68-2-3, Test Ca	
Weight	Approximately 60g per Pole	

Typical Applications

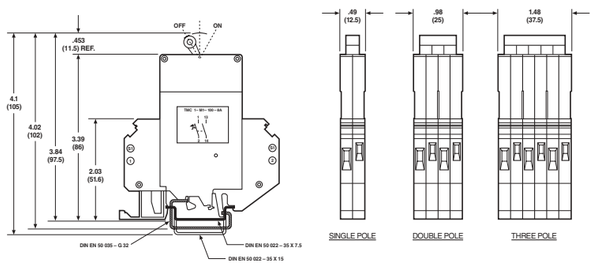
Process control equipment, robotics, machine tool control, communications systems, instrumentation.

TMC Type Key for Orders

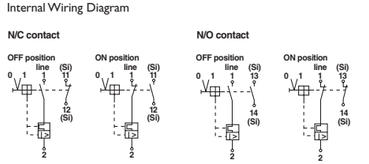
TMC 1 M1 100 1A

- **Nominal Current** 0.2; 0.3; 0.4; 0.5; 0.6; 0.8; 1.5; 2; 2.5; 3; 4; 5; 6; 8; 10; 12; 15; 16; 20
- **Auxiliary Contact Variants** 100: 1 position: 1 N/O contact; 200: 1 position: 1 N/C contact; 120: 2 position: 1 N/O, 1 N/C contact; 122: 3 position: 1 N/O, 2 N/C contact
- **Characteristic Curve** F1: Therm. 1.05-1.4 I_N, magn. 2-4 IN DC (fast), only for DC applications; M1: Therm. 1.05-1.4 I_N, magn. 6-12 IN AC, 7, 8-15, 6 DC (normal below)
- **Number of Main Current Paths** 1: 1 position: 2: 2 position: 3: 3 position
- **Type Designation** Thermal-magnetic Circuit Breaker

Dimensions



Internal Wiring Diagram



In the OFF position (contacts between terminals 1 and 2 are open), the auxiliary contacts between terminals 11 and 12 are considered N/C

In the OFF position (contacts between terminals 1 and 2 are open), the auxiliary contacts between terminals 13 and 14 are considered N/O

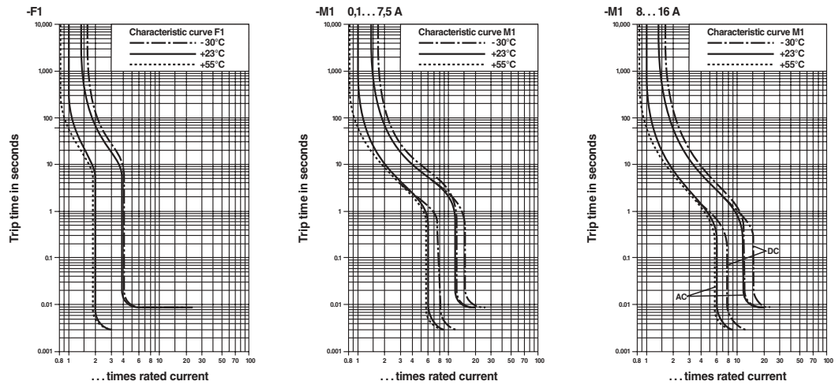
Standard current ratings and typical internal resistance values

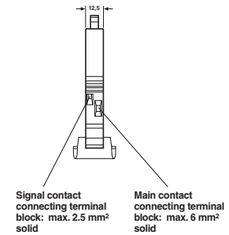
Thermal-Magnetic Circuit Breakers

Internal Resistance per Pole (ohms)	Current Ratings (amps)	TMC 1 M1 100 Single Pole N/O Aux.Con. Part #	TMC 1 M1 200 Single Pole N/C Aux. Con. Part #	TMC 1 F1 100 Single Pole N/O Aux.Con. Part #	TMC 1 F1 200 Single Pole N/C Aux.Con. Part #	TMC 2 M1 120 Double Pole NO/NC Aux.Con. Part #	TMC 3 M1 122 Triple Pole 1N/O 2N/C Aux.Con. Part #
92	0.1	5650299*	5650418*	N/A	N/A	5650425*	5650467*
26.1	0.2	**5531422**	5531040*	5650525*	**5531231**	5650426*	5650470*
11.6	0.3	5650267*	5650416*	5650526*	N/A	5650427*	5650471*
6.6	0.4	5650411*	5650417*	5650527*	N/A	5650428*	5650472*
4.1	0.5	**5531370**	5531752*	**5650528**	5651057*	5650429*	5650473*
3	0.6	5650412*	5650419*	5531817*	N/A	5650430*	5650435*
1.65	0.8	**5531273**	5650420*	5650529*	N/A	5650431*	5650436*
1.1	1.0	**5531723**	5531341*	**5531914**	**5531532**	**5650254**	**5532997**
0.47	1.5	5531176*	**5531558**	5650530*	5650282*	5650385*	5650437*
0.28	2.0	**5531820**	5531448*	**5530928**	5650352*	5517967*	5650438*
0.183	2.5	5531079*	5650421*	5650531*	N/A	**5650432**	5650439*
0.124	3.0	**5531927**	5531545*	**5531024**	N/A	**5650255**	5650440*
0.077	4.0	**5530973**	5531354*	**5531875**	5650829*	**5650266**	5650441*
0.063	5.0	**5530931**	**5531642**	**5531121**	5650830*	**5512014**	**5650384**
0.045	6.0	**5531969**	5600358*	5650532*	5650366*	**5530863**	5650442*
≤0.02	8.0	**5531037**	5531749*	5531228*	**5650831**	**5517954**	5650443*
≤0.02	10	**5531862**	**5530957**	**5650533**	5650283*	**5511170**	**5650354**
≤0.02	12	**5531134**	5531846*	5650534*	N/A	5650433*	**5518979**
≤0.02	15	**5510757**	5650475*	N/A	N/A	**5600432**	**5650353**
≤0.02	16	**5531765**	5531943*	**5531574**	5651032*	**5530892**	**5530876**
≤0.02	20	5650413*	5650422*	N/A	N/A	**5650308**	**5650445**
≤0.02	25	5650414*	5650423*	N/A	N/A	5650476*	5650446*
≤0.02	32	5650415*	5650424*	N/A	N/A	**5650434**	**5650447**

* Indicates breakers that are made-to-order and may require an 8 to 10 week lead time.

Typical time/current characteristics at 23°C





Direct Current – Magnetic tripping currents are increased by 30% in DC circuits with the effect of shifting the magnetic trip range 30% to the right of AC trip curves.

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below.

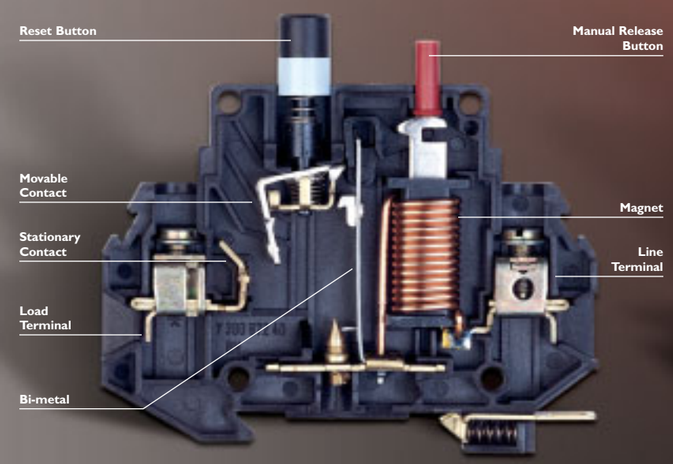
Ambient temperature °F	-22	-4	+14	+32	+50	+73.5	+86	+104	+122	+140
°C	-30	-20	-10	0	+10	+23	+30	+40	+50	+60
Multiplication factor										

Circuit Breaker Comparison Sheet

Breaker	Type (1)	Breaker Construction	Mechanism	Poles	Amps	UL Voltage	Interrupting Capacity (2) (3)	Maximum Interrupting Capacity (4)	Trip Speed (5)	AWG	Overall Size (mm) HxDxW	Auxiliary Contacts (6)	Trip Free (7)	Tease Free (8)	Bus Connection Available (9)	Characteristics
TMC 42	Thermal-Magnetic	Single Body	Push Button	1, 2	.1-16	AC 250	Self Limiting (.1-8 A)	200A @ AC 250V (0.05-4.5A)	Medium *[similar to C-type breaker]*	20-8 Sol. 20-10 Str.	70 x 80 x 12	None	Yes	Yes	Yes	General Purpose, High Density Pkg.
1						AC 250	200 A (1-2 A)	1,000A @ AC 250/125 (0.05-16A)								
2						DC 80	400 A (2.5-16 A)	1,000 @ DC 80V (0.05-16A)								
TMC 1	Thermal-Magnetic	Single Body	Toggle	1, 2, 3	.1-32	AC 277	400 A (.1-5 A)	5,000A @ AC 277/480V (.1-16A)	Delayed *[similar to B-type breaker]*	Main – Up to 10 Sol. Aux. – Up to 16 Sol.	90 x 80 x 12	1 N/O or N/C	Yes	Yes	No	Trip Speed Options, Aux. Contacts
2						3 AC 480	800 A (6-32 A)	2,000A @ AC 277/480V (20-32A)	Medium *[similar to D-type breaker]*			2 N/O, N/C				
3						DC 65		2,000A @ DC 65V	Fast *[similar to C-type breaker]*			3 N/O, 2 N/C				
TMC 91H	Thermal-Magnetic	Single Body	Toggle	1, 2, 3	.5-63	AC 347/600 (.5-32 A) AC 277/480 (40-63 A)	10,000 A	10,000A @ AC 277/480V (.5-63A)	Medium *[C-type breaker]*	Line to 2 Load to 3	70 x 95 x 18	Available	Yes	No	Yes	Low to High AC Amperage
1								2,000A @ AC 347/600V (.5-32A)								
2								6,000A @ DC 48V								
3																
TCP Plugs into UK6-FSI/C Screw or ST 4-FSI/C Spring Blk.	Thermal	Two Piece: TCP Plugs in Terminal Blocks	Push Button	1	.1-10	AC 250 DC 65	6 x Inductive Load (.1-5 A) 8 x Inductive Load (6-10 A)	AC 250V: 2,000A DC 65V: 200A	Slow *[similar to D-type breaker]*	26-8 Screw Block; 24-10 Spring Block	92.0 x 64.0 x 8.2 Screw; 89.7 x 86.5 x 8.2 Spring	None	Yes	Yes	Yes Bridge possible on Base Blocks	Plug-in, Thermal only, LED Available on Base Block

(1) Thermal-magnetic – Thermal provides overload protection; magnetic provides short circuit protection.
(2) Interrupting capacity is the maximum fault current that can be repeatedly (3x minimum) interrupted without failure of the breaker.
(3) Self limiting means that internal resistance is high enough to restrict the flow of current to a level that will not harm the circuit breaker.
(4) Maximum current at a given voltage at which the circuit breaker can interrupt safely without damage to surrounding components.
(5) Review trip curve for precise trip behavior of the breaker.
(6) N/O means auxiliary contacts are open and N/C means auxiliary contacts are closed when main terminal contacts are open.
(7) Trip free means the breaker contacts cannot be forced or held closed during any fault condition (overloads or short circuits).
(8) Tease Free means breaker contacts cannot be forced close enough for current to arc (and potentially weld together) under a fault condition.
(9) A bus bar can connect to the supply terminal and can feed a series of breakers.

TMC 42 SERIES



TMC 1 SERIES (with Alarm Contact)