

# Miniature circuit breakers

## Din-T6 series 6 kA MCB

- Standards AS/NZS 4898
- Approval No. N17481
- Current range 2-63 Amps 1, 2 and 3 pole
- Sealable and lockable handle
- Available in curve type C and D
- Mounts on CD chassis (250 A and 355 A)

### 1 pole 1 module

In (A)	D – Curve 10-20 In
2	DTCB6102D
4	DTCB6104D
6	DTCB6106D
10	DTCB6110D
13	<sup>i</sup> DTCB6113D
16	DTCB6116D
20	DTCB6120D
25	DTCB6125D
32	DTCB6132D
40	DTCB6140D
50	DTCB6150D
63	DTCB6163D

### 2 pole 2 modules

2	DTCB6202D
4	DTCB6204D
6	DTCB6206D
10	DTCB6210D
13	<sup>i</sup> DTCB6213D
16	DTCB6216D
20	DTCB6220D
25	DTCB6225D
32	DTCB6232D
40	DTCB6240D
50	DTCB6250D
63	DTCB6263D

### 3 pole 3 modules

2	<sup>i</sup> DTCB6302D
4	<sup>i</sup> DTCB6304D
6	<sup>i</sup> DTCB6306D
10	DTCB6310D
13	<sup>i</sup> DTCB6313D
16	DTCB6316D
20	DTCB6320D
25	DTCB6325D
32	DTCB6332D
40	DTCB6340D
50	DTCB6350D
63	DTCB6363D

DTCB6  
1 pole



### Short circuit capacity 6 kA

In (A)	2 - 63
1 P	240 V AC
2 P	240 - 415 V AC
3 P	240 - 415 V AC

DC use	1 P	2 P <sup>1)</sup>
Short circuit	20 kA	25 kA
Max.voltage (DC)	48 V	110 V

### Use at DC

When using Din-T6 in a DC application the magnetic tripping current is approximately 40 % higher than in AC 50/60 Hz.

### Shock resistance (In X, Y, Z directions).

20 g with shock duration 10 ms (minimum 18 shocks).  
40 g with shock duration 5 ms (minimum 18 shocks).

### Vibration resistance (In X, Y, Z directions).

3 g in frequency range 10 to 55 Hz  
(operating time at least 30 min).  
According to IEC 60068-2-6.

### Storage temperature

From -55 °C to +55 °C, according to IEC 88 part 2 - 1  
(duration 96 hours).

### Operating temperature

From -25 °C to +55 °C, according to  
VDE 0664 parts 1 and 2.

### Use at 400 Hz

At 400 Hz the magnetic trip current is approximately  
50 % higher than in AC 50/60 Hz.

Notes: <sup>1)</sup> 2 pole MCB connected in series.

**The line side is the "OFF" (bottom) side of the MCB, and connects to CD chassis tee-offs.**  
<sup>i</sup> Available on indent only.

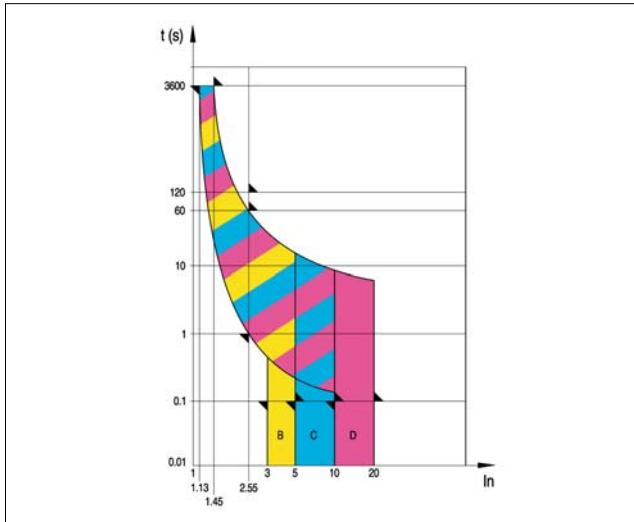
# Din-T MCBs Technical data

## Characteristics according to BS EN 60898

Miniature Circuit Breakers are intended for the protection of wiring installations against both overloads and short-circuits in **domestic** or **commercial** wiring installations where operation is possible by **uninstructed** people

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### Tripping characteristic curves



### Magnetic release

An electromagnet with plunger ensures instantaneous tripping in the event of short-circuit. The NHP Din-T range has 3 different types, following the current for instantaneous release: types B, C and D curve.

IC <sub>n</sub> (A)	Test current	Tripping time	Applications
B	3 x I <sub>n</sub> 5 x I <sub>n</sub>	0.1 < t < 45 s (I <sub>n</sub> ≤ 32 A) 0.1 < t < 90 s (I <sub>n</sub> > 32 A) t < 0.1 s	Only for resistive loads eg: <ul style="list-style-type: none"> <li>electrical heating</li> <li>water heater</li> <li>stoves.</li> </ul>
C	5 x I <sub>n</sub> 10 x I <sub>n</sub>	0.1 < t < 15 s (I <sub>n</sub> ≤ 32 A) 0.1 < t < 30 s (I <sub>n</sub> > 32 A) t < 0.1 s	Usual loads such as: <ul style="list-style-type: none"> <li>lighting</li> <li>socket outlets</li> <li>small motors</li> </ul>
D	10 x I <sub>n</sub> 20 x I <sub>n</sub>	0.1 < t < 4 s (**) (I <sub>n</sub> ≤ 32 A) 0.1 < t < 8 s (I <sub>n</sub> > 32 A) t < 0.1 s	Control and protection of circuits having important transient inrush currents (large motors)

### Thermal release

The release is initiated by a bimetal strip in the event of overload. The standard defines the range of releases for specific overload values. Reference ambient temperature is 30 °C.

Test current	Tripping time
1.13 x I <sub>n</sub>	t ≥ 1 h (I <sub>n</sub> ≤ 63 A) t ≥ 2 h (I <sub>n</sub> > 63 A)
1.45 x I <sub>n</sub>	t < 1 h (I <sub>n</sub> ≤ 63 A) t < 2 h (I <sub>n</sub> > 63 A)
2.55 x I <sub>n</sub>	1 s < t < 60 s (I <sub>n</sub> ≤ 32 A) 1 s < t < 120 s (I <sub>n</sub> > 32 A)

### Rated short-circuit breaking capacity (I<sub>cn</sub>)

Is the value of the short-circuit that the MCB is capable of withstanding in the following test of sequence of operations: O-t-CO.

After the test the MCB is capable, without maintenance, to withstand a dielectric strength test at a test voltage of 900 V. Moreover, the MCB shall be capable of tripping when loaded with 2.8 I<sub>n</sub> within the time corresponding to 2.55 I<sub>n</sub> but greater than 0.1s.

### Service short-circuit breaking capacity (I<sub>cs</sub>)

Is the value of the short-circuit that the MCB is capable of withstanding in the following test of sequence of operations: O-t-CO-t-CO.

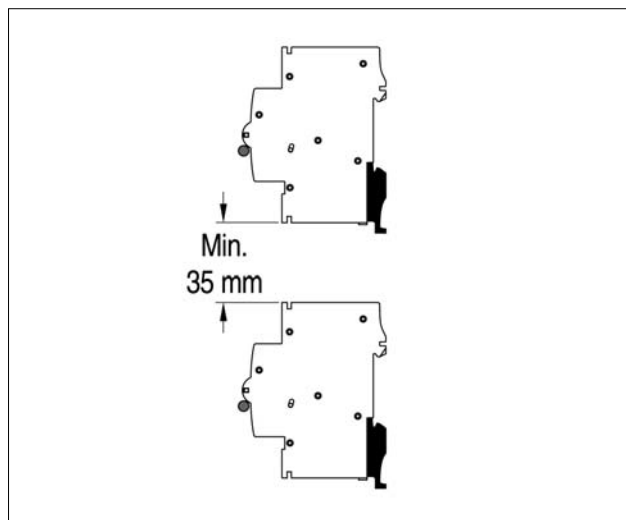
After the test the MCB is capable, without maintenance, to withstand a dielectric strength test at a test voltage of 1500 V. Moreover, the MCB shall not trip at a current of 0.96 I<sub>n</sub>. The MCB shall trip within 1h when current is 1.6 I<sub>n</sub>.

- O - Represents an opening operation
- C - Represents a closing operation followed by an automatic opening.
- t - Represents the time interval between two successive short-circuit operations: 3 minutes.

The relation between the rated short-circuit capacity (I<sub>cn</sub>) and the rated service short-circuit breaking capacity (I<sub>cs</sub>) shall be as follows:

I <sub>cn</sub> (A)	I <sub>cs</sub> (A)
≤ 6000	6000
> 6000 ≤ 10000	0.75 I <sub>cn</sub> min. 6000
> 10000	0.75 I <sub>cn</sub> min. 7500

In both sequences all MCBs are tested for emission of ionized gases during short-circuit (grid distance), in a safety distance between two MCBs of 35 mm when devices are installed in two different rows in the enclosure. This performance allows the use of any NHP/Terasaki enclosure.



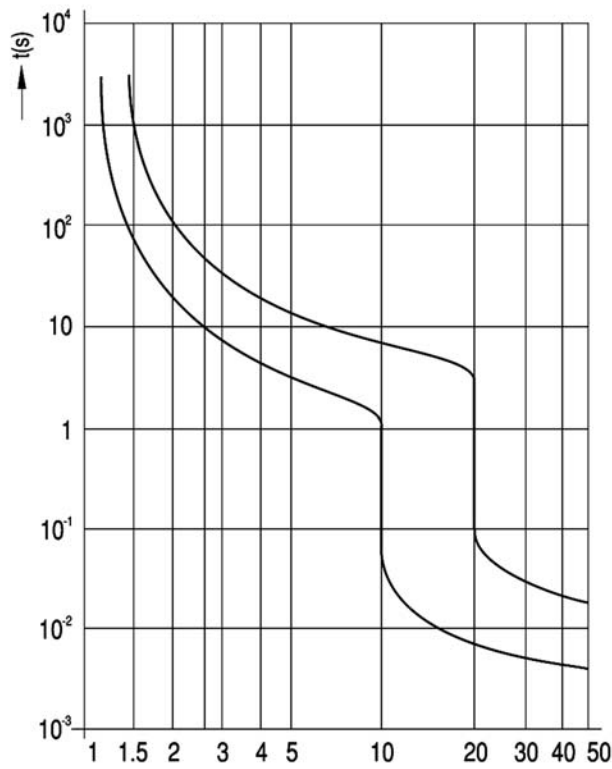
## Din-T MCBs Technical data

### Tripping curves according to EN 60898

The following tables show the average tripping curves of the Terasaki Din-T MCBs based on the thermal and magnetic characteristics.

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Curve D



## Din-T MCBs Technical data

### Influence of ambient air temperature on the rated current

The maximum value of the current which can flow through an MCB depends on the nominal current of the MCB, the conductor cross-section and the ambient air temperature.

The values shown in the table below are for devices in free air. For devices installed with other modular devices in the same switchboard, a correction factor (K) shall be applied relative to the mounting situation of the MCB, the ambient temperature and the number of main circuits in the installation.

No of devices	K <sup>1)</sup>
2 or 3	0.9
4 or 5	0.8
6 or 9	0.7
> 10	0.6

#### Calculation example

Within a distribution board consisting of eight 2 Pole, 16 A, 'C' curve type MCBs, with an operating ambient temperature of 45 °C, which is the highest temperature the MCB can operate at without unwanted tripping?

#### Calculation

The correction factor  $K = 0.7$ , for use in an eight circuit installation:  $16 \text{ A} \times 0.7 = 11.2 \text{ A}$

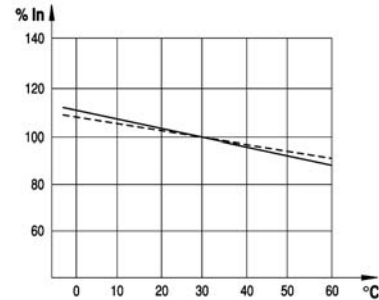
As the MCB is working at 45 °C it shall be given another factor (90 % = 0.9):

In at 45 °C = In at 30 °C  $\times$  0.9 = 11.2 A  $\times$  0.9 = 10.1 A.

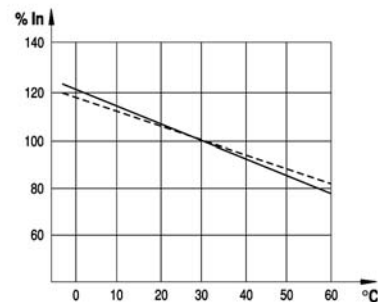
**Note:** <sup>1)</sup> Applicable for MCBs working at maximum rated currents.

The thermal calibration of the MCBs was carried out at an ambient temperature of 30 °C. Ambient temperatures different from 30 °C influence the bimetal and this results in earlier or later thermal tripping.

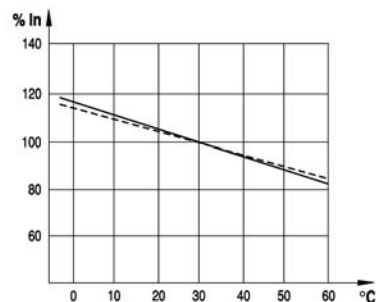
#### 0.5 - 6 A



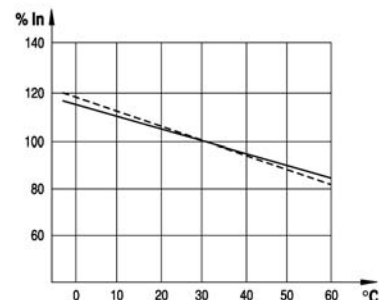
#### 10 A



#### 16 - 40 A



#### 50 - 63 A



———— : 1P (single pole)

----- : mP (multi-pole)

## Din-T MCBs Technical data

### Effects of frequency on the tripping characteristic

All the MCBs are designed to work at frequencies of 50-60 Hz, therefore to work at different values, consideration must be given to the variation of the tripping characteristics. The thermal tripping does not change with variation of the frequency but the magnetic tripping values can be up to 50 % higher than the ones at 50-60 Hz.

#### Tripping current variation

60 Hz	100 Hz	200 Hz	300 Hz	400 Hz
1	1.1	1.2	1.4	1.5

### Power losses

The power losses are calculated by measuring the voltage drop between the incoming and the outgoing terminals of the device at rated current.

#### Power loss per pole

In (A)	Voltage drop (V)	Energy loss (W)	Resistance (mOhm)
0.5	2.230	1.115	4458.00
1	1.270	1.272	1272.00
2	0.620	1.240	310.00
3	0.520	1.557	173.00
4	0.370	1.488	93.00
6	0.260	1.570	43.60
8	0.160	1.242	19.40
10	0.160	1.560	15.60
13	0.155	2.011	11.90
16	0.162	2.586	10.10
20	0.138	2.760	6.90
25	0.128	3.188	5.10
32	0.096	3.072	3.00
40	0.100	4.000	2.50
50	0.090	4.500	1.80
63	0.082	5.160	1.30
80	0.075	6.000	0.90
100	0.075	7.500	0.75
125	0.076	9.500	0.60

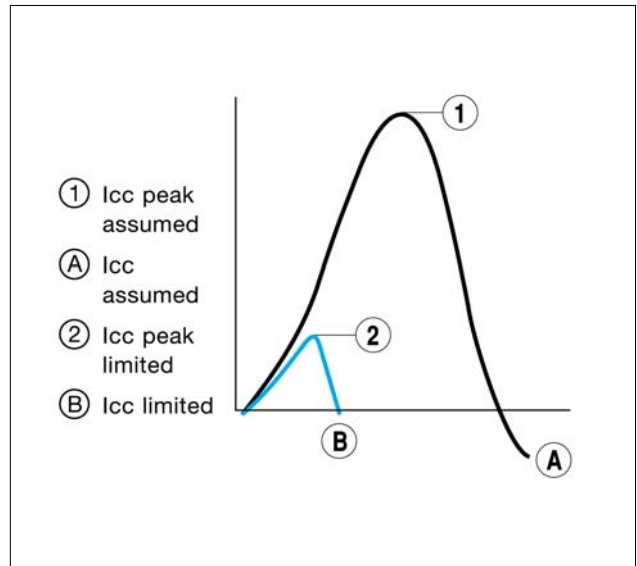
### Limitation curves

#### Let-through energy $I^2t$

The limitation capacity of an MCB in short-circuit conditions, is its capacity to reduce the value of the let-through energy that the short-circuit would be generating.

#### Peak current $I_p$

Is the value of the maximum peak of the short-circuit current limited by the MCB.



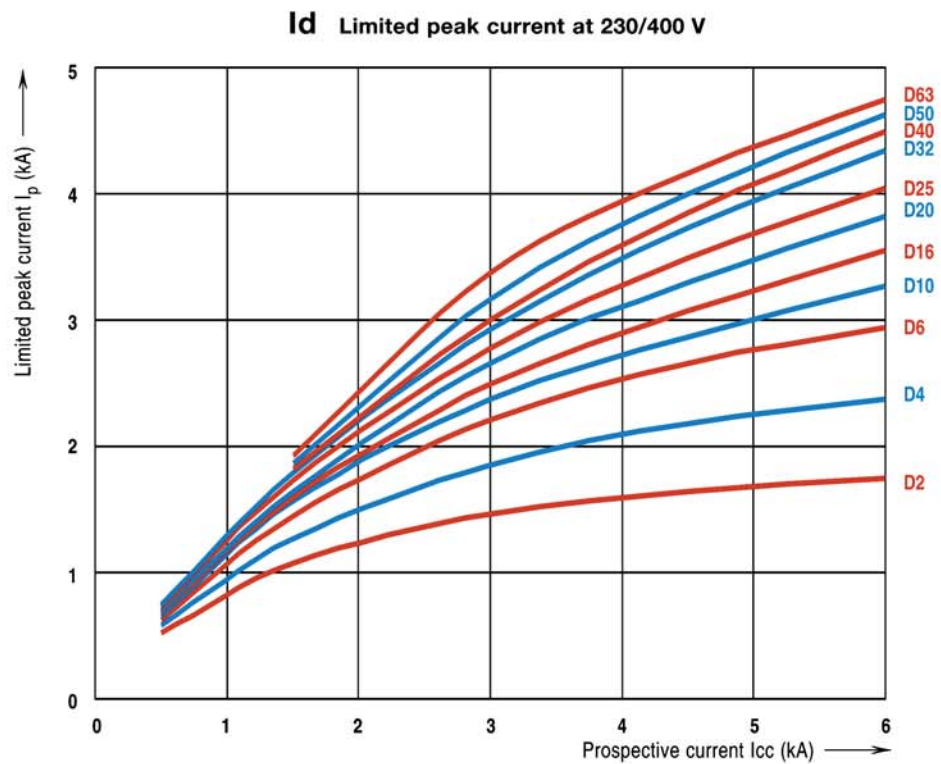
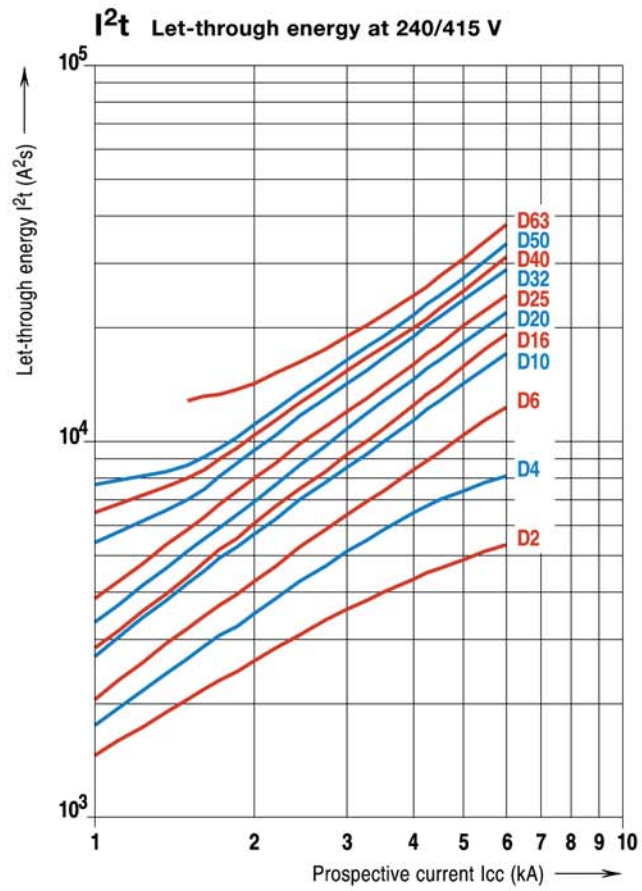
See following pages

# Din-T MCBs Technical data

Din-T 6

6 kA

D curve



## Din-T MCBs Technical data

### Use of standard MCB for DC use

For MCBs designed to be used in alternating current but used in installations in direct current, the following should be taken into consideration:

- For protection against overloads it is necessary to connect the two poles to the MCB. In these conditions the tripping characteristic of the MCB in direct current is similar to alternating current.

- For protection against short-circuits it is necessary to connect the two poles to the MCB. In these conditions the tripping characteristic of the MCB in direct current is 40% higher than the one in alternating current.

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### Use in DC selection table

Series	Rated current (A)	48 V 1 pole Icu (kA)	110 V 2 poles in series Icu (kA)	250 V 1 pole Icu (kA)	440 V 2 poles in series Icu (kA)
Din-T 6	0.5....63 A	20	25	-	-

# Din-T MCBs Technical data

## Text for specifiers

### MCB Series Din-T 6 and 10

- According to EN 60898 standard
- For DIN rail mounting according to DIN EN 50022; EN 50022; future EN 60715; IEC 60715 (top hat rail 35 mm)
- Grid distance 35 mm
- Working ambient temperature from -25 °C up to +50 °C
- Approved by CEBEC, VDE, KEMA, IMQ.
- 1 pole is a module of 18 mm wide
- Nominal rated currents are:  
0.5/1/2/3/4/6/10/13/16/20/25/32/40/50/63 A
- Tripping characteristics: B,C,D (B curve Din-T 10 only).
- Number of poles: 1 P, 1 P+N, 2 P, 3 P, 3 P+N, 4 P
- The short-circuit breaking capacity is: 6/10k A, energy limiting class 3
- Terminal capacity from 1 up to 35 mm<sup>2</sup> rigid wire or 1.5 up to 25 mm<sup>2</sup> flexible wire.
- Screw head suitable for flat or Pozidrive screwdriver
- Can be connected by means of both pin or fork busbars
- The toggle can be sealed in the ON or OFF position
- Rapid closing
- Both incoming and outgoing terminals have a protection degree of IP 20 and they are sealable
- Isolator function thanks to Red/Green printing on the toggle.
- Maximum voltage between two phases; 440 V~
- Maximum voltage for utilisation in DC current: 48 V 1 P and 110 V 2 P
- Two position rail clip
- Mechanical shock resistance 40 g (direction x, y, z) minimum 18 shocks 5 ms half-sinusoidal acc. to IEC 60068-2-27
- Vibration resistance: 3 g (direction x, y, z) minimum 30 min. according to IEC 60068-2-6
- Extensions can be added on both left or right hand side
  - ☛ Auxiliary contact
  - ☛ Shunt trip
  - ☛ Undervoltage release
  - ☛ Motor operator
  - ☛ Panelboard switch
- Add-on RCD can be coupled.



## Din-T MCBs Technical data

Series				Din-T6 AS/NZS 4898		
Standards (Aust / NZ / International)				IEC 60898		
Tripping characteristics				C, D		
Nominal current				A	C/D(0.5-63)	
Calibration temperature				°C	30	
Number of poles (# mod)				1/2/3/4		
Neutral pole protected				yes		
Nominal voltage Un	AC	1 P	V	240/415		
		3 P/4 P	V	415		
	DC	1 P <sup>1)</sup>	V DC	48		
		2 P (in series) <sup>1)</sup>	V DC	110		
Frequency				Hz	50/60	
				Hz	DC: magn.trip +40%	
				Hz	400: magn.trip +50%	
Maximum service voltage U <sub>bmax</sub> between two wires				V	250/440; 53/120	
Minimum service voltage U <sub>bmin</sub>				V	12; 12	
Selectivity class (IEC 60898)				3		
Isolator application IEC 60947-2				yes		
Rated insulation voltage	Pollution degree 2		V	500		
	Pollution degree 3		V	440		
Impulse withstand test voltage				kV	6	
Insulation resistance				mOhm	10,000	
Dielectric rigidity				kV	2.5	
Vibration resistance (in x, y, z direction) (IEC 77/16.3)				3 g		
Endurance	Electrical at Un, In		10,000			
	mechanical		20,000			
Utilisation category (IEC 60947-2)				A		
Protection degree (outside / inside, in enclosure with door)				IP 20/IP 40		
Self-extinguish degree (according to UL94)				V2		
Tropicalisation (according to IEC 60068-2 / DIN 40046) °C/RH				+55 °C/95 % RH		
Operating temperature				°C	-25/+55	
Storage temperature				°C	-55/+55	
Terminal capacity	Rigid cable min/max (top)		mm <sup>2</sup>	1/35		
	Flexible cable min*/max (top)		mm <sup>2</sup>	0.75/25		
	Rigid cable min/max (bottom)		mm <sup>2</sup>	1/35		
	Flexible cable min*/max (bottom)		mm <sup>2</sup>	0.75/25		
	(* Flexible cable 0.75/1/1.5 mm <sup>2</sup> with cable lug)					
	Torque		Nm	4.5		
Add-on devices (side add-on)	Auxiliary contacts		yes			
	UVT		yes			
	Shunt trip		yes			
	Motor operator		yes			
	Panelboard switch		yes			
Busbar systems	Pin (top/bottom)		yes/yes			
	Fork (top/bottom)		-/yes			
Accessories				yes		
Dimensions, weights, packaging						
(HxDxW) 86x68xW			mm/mod.	18		
Weight/mod.			g	120		
Package			mod.	12		
<b>Short-circuit capacity AC (kA)</b>				<b>AS/NZS 4898</b>		
IEC 60898	I <sub>cn</sub>	1 P	230/400 V	6		
		2 P	230/400 V	6		
		3 P/4 P	230/400 V	6		
I <sub>cs</sub> (service)				100 % I <sub>cn</sub>		
IEC 60947-2	I <sub>cu</sub> (ultimate)	1 P	127 V	20		
			240 V	10		
			415 V	3		
		2 P	127 V	-		
			240 V	15		
			415 V	10		
	3 P, 4 P	240 V	15			
		415 V	10			
	440 V			6		
		I <sub>cs</sub> (service)		75 % I <sub>cu</sub>		
NEMA AB1 (120/240V)				20		
<b>Short-circuit capacity DC (kA)</b>						
IEC 60947-2	I <sub>cu</sub> (ultimate)	1 P	≤60 V	20		
			≤220 V	-		
	2 P	≤125 V	25			
		≤440 V	-			
I <sub>cs</sub> (service)				100 % I <sub>cu</sub>		

**Notes** Refer pages 3 - 23, 24 for information on SAFE-T MCBs.

<sup>1)</sup> Preferred values of rated control supply voltage (IEC 60947 - 2): 24 V, 48 V, 110 V, 125 V, 250 V

<sup>2)</sup> 0.5-4 A/6-25 A/32-40 A/50-63 A

<sup>3)</sup> 10 (125 V DC)

<sup>4)</sup> 10 (250 V DC)

<sup>5)</sup> On request.

## Din-T MCBs Technical data

### Miniature circuit breakers - Din-T 6

Dimensions in mm.

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