

Miniature circuit breakers

Din-T15 series 15 kA, 20 kA, 25 kA MCBs

- Standards AS/NZS 3947-2
- Current range 6-63 Amp 1, 2, 3 and 4 pole
- Sealable and lockable handle
- Modular design
- Mounts on CD chassis (250 A and 355 A)
- Industrial applications



DTCB15
1 pole

1 pole 1 module ³⁾

In (A)	Icu (kA)	C - Curve 5 - 10 In
6	25	DTCB15106C
10	25	DTCB15110C
13	25	<i>i</i> DTCB15113C
16	25	DTCB15116C
20	25	DTCB15120C
25	25	DTCB15125C
32	20	DTCB15132C
40	20	DTCB15140C
50	15	DTCB15150C
63	15	DTCB15163C

2 pole 2 modules ³⁾

In (A)	Icu (kA)	C - Curve 5 - 10 In
6	25	<i>i</i> DTCB15206C
10	25	<i>i</i> DTCB15210C
13	25	<i>i</i> DTCB15213C
16	25	<i>i</i> DTCB15216C
20	25	<i>i</i> DTCB15220C
25	25	<i>i</i> DTCB15225C
32	20	<i>i</i> DTCB15232C
40	20	<i>i</i> DTCB15240C
50	15	<i>i</i> DTCB15250C
63	15	<i>i</i> DTCB15263C

In (A)	6 - 63
1 P	240 V AC
2 P	240/415 V AC
3 P	240/415 V AC
4 P	240/415 V AC

Shock resistance (in x, y, z direction)

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

Vibration resistance (in x, y, z direction)

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

3 pole 3 modules ³⁾

6	25	DTCB15306C
10	25	DTCB15310C
13	25	<i>i</i> DTCB15313C
16	25	DTCB15316C
20	25	DTCB15320C
25	25	DTCB15325C
32	20	DTCB15332C
40	20	DTCB15340C
50	15	DTCB15350C
63	15	DTCB15363C

4 pole 4 modules ²⁾ ³⁾

6	25	<i>i</i> DTCB15406C
10	25	<i>i</i> DTCB15410C
13	25	<i>i</i> DTCB15413C
16	25	<i>i</i> DTCB15416C
20	25	<i>i</i> DTCB15420C
25	25	<i>i</i> DTCB15425C
32	20	<i>i</i> DTCB15432C
40	20	<i>i</i> DTCB15440C
50	15	<i>i</i> DTCB15450C
63	15	<i>i</i> DTCB15463C

Storage temperature

from -55 °C to +55 °C according to
VDE 0664 parts 1 and 2

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 tripping current
is approximately 50 % higher than at AC
50/60 Hz



DTCB15
2 pole



DTCB15
3 pole

Notes: ¹⁾ 2 P MCB connected in series.
The LINE-side is the OFF or bottom of the MCB and connects to CD chassis tee-offs.

²⁾ All poles include overcurrent and short circuit protection.

³⁾ Refer Section 3 for kA ratings at 240/415 V. The above ratings are at 415 V AC.

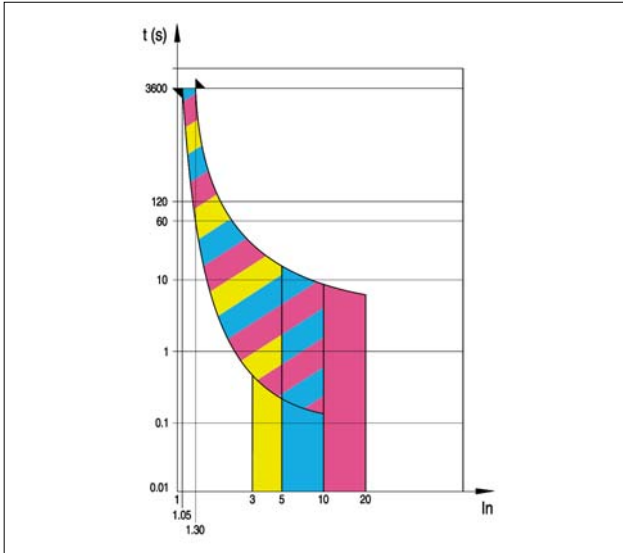
i Available on indent only.

Din-T MCBs Technical data

Characteristics according to EN 60947-2

Miniature Circuit Breakers are intended for the protection of the lines against both overloads and short-circuits in **industrial** wiring installations where normal operation is done by **instructed** people

Tripping characteristic curves



Magnetic release

An electromagnet with plunger ensures instantaneous tripping in the event of short-circuit. The standard leaves the calibration of magnetic release to the manufacturers discretion.

NHP offers instantaneous tripping ranges:

- release between 5 and 10 In
- release between 10 and 20 In

Thermal release

The release is initiated by a bimetal strip in the event of overload. The standard defines the range of release for two special overload values. Reference ambient temperature is 40 °C.

Test current	Tripping time
1.05 x In	t ≥ 1 h (In ≤ 63 A) t ≥ 2 h (In > 63 A)
1.30 x In	t < 1 h (In ≤ 63 A) t < 2 h (In > 63 A)

Rated ultimate short-circuit breaking capacity (Icu)

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 1000 V. Moreover the MCB shall be capable of tripping when loaded with 2.5 In within the time corresponding to 2 In but greater than 0.1 s.

Rated service short-circuit breaking capacity (Ics)

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 twice its rated insulation voltage with a minimum of 1000 V.

A verification of the overload releases on In and moreover the MCB shall trip within 1 h when current is 1.45 In (for In < 63 A) and 2 h (for In > 63 A).

- 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.

Category A: Without a short-time withstand current rating.

Utilization category

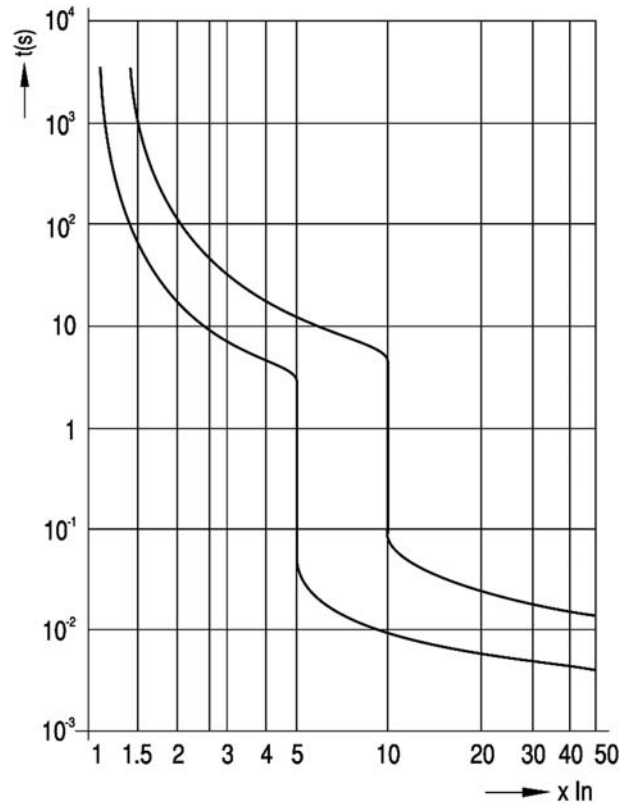
category	Application with respect to selectivity
A	Circuit breakers not specifically intended for selectivity under short-circuit conditions with respect to other short-circuit protective devices in series on the load side, i.e. without an intentional short-time delay provided for selectivity under short-circuit conditions, and therefore without a short-time withstand current rating according to 4.3.5.4
B	Circuit breakers specifically intended for selectivity under short-circuit conditions with respect to other short-circuit protective devices in series on the load side, i.e. without an intentional short-time delay (which may be adjustable), provided for selectivity under short-circuit conditions. Such circuit-breakers have a short-time withstand current rating according to 4.3.5.4

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.

Curve C



Din-T MCBs Technical data

Definitions related to circuit breakers

MCB = Miniature Circuit Breaker

Short-circuit (making and breaking) capacity

Alternating component of the prospective current, expressed by its RMS value, which the circuit breaker is designed to make, to carry for its opening time and to break under specified conditions.

Ultimate or rated short-circuit breaking capacity (I_{cn} - EN 60898)

A breaking capacity for which the prescribed conditions, according to a specified test sequence, do not include the capability of the MCB to carry 0.96 times its rated current for the conventional time.

Ultimate short-circuit breaking capacity (I_{cu} - EN 60947-2)

A breaking capacity for which the prescribed conditions, according to a specified test sequence, do not include the capability of the MCB to carry its rated current for the conventional time.

Service short-circuit breaking capacity (I_{cs} - EN 60898)

A breaking capacity for which the prescribed conditions, according to a specified test sequence, include the capability of the MCB to carry 0.96 times its rated current for the conventional time.

Prospective current

The current that would flow in the circuit, if each main current path of the MCB were replaced by a conductor of negligible impedance.

Conventional non-tripping current (I_{nt})

A specified value of current which the circuit breaker is capable of carrying for a specified time without tripping.

Open position

The position in which the predetermined clearance between open contacts in the main circuit of the MCB is secured.

Closed position

The position in which the predetermined continuity of the main circuit of the MCB is secured.

Maximum prospective peak current (I_p)

The prospective peak current when the initiation of the current takes place at the instant which leads to the highest possible value.

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 ¹⁾
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: $16 \text{ A} \times 0.7 = 11.2 \text{ A}$

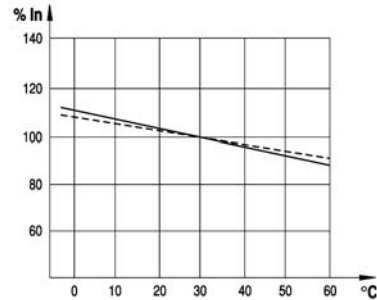
As the MCB is working at 45 °C it shall be given another factor (90 % = 0.9):

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

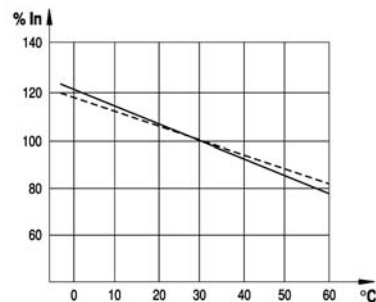
Note: ¹⁾ Applicable for MCBs working at maximum rated currents.

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.

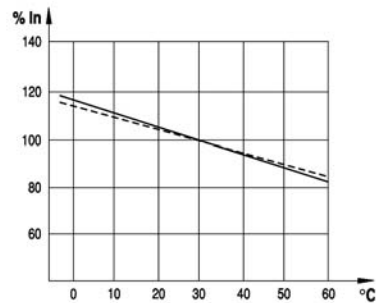
0.5 - 6 A



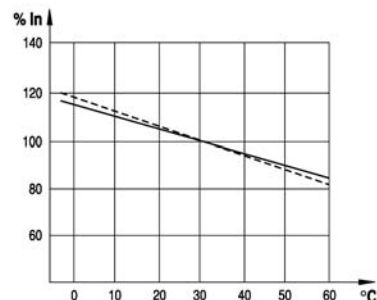
10 A



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

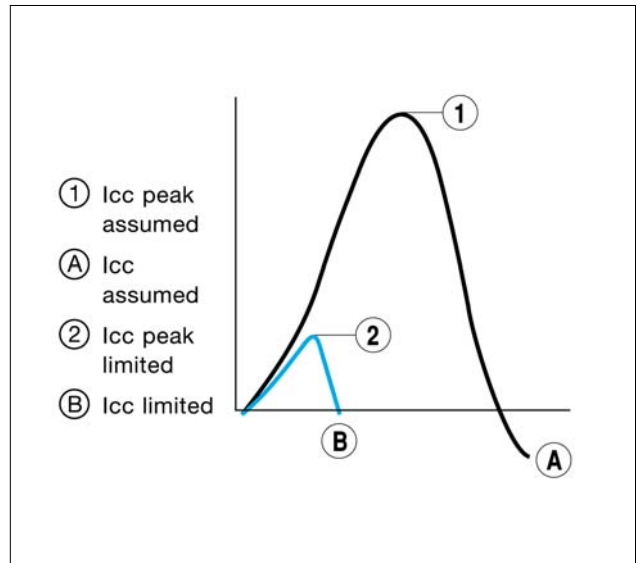
Limitation curves

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.



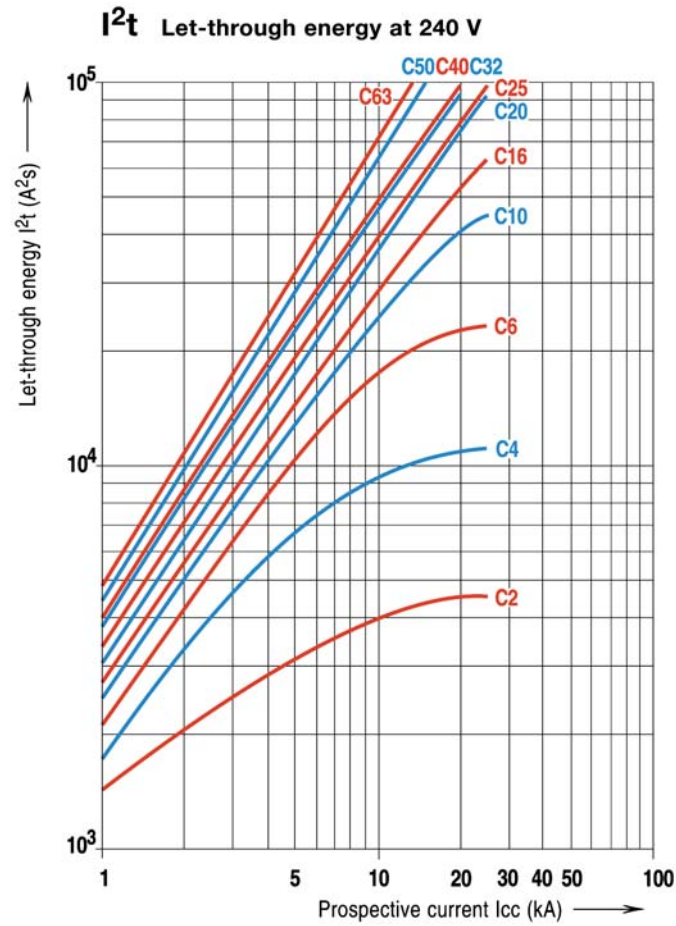
See following pages

Din-T MCBs Technical data

Din-T 15

15 kA

C 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 15	6...25 A	10	10	-	-

Installation of Din-T DC MCBs in direct current

Din-T MCBs + RCDs Technical data

Text for specifiers

MCB Series Din-T 15

- According to EN 60947.2 standard
- For DIN rail mounting according to DIN EN 50022; EN 50022; future EN 60715; IEC 60715 (top hat rail 35 mm)
- Working ambient temperature from -25 °C up to +50 °C
- 1 pole is a module of 18 mm wide
- Nominal rated currents are:
6/10/13/16/20/25/32/40/50/63 A
- Tripping characteristic: C
- Number of poles: 1 P, 2 P, 3 P, 4 P
- Short-circuit capacity is: 15 kA
- Terminal capacity from 1 up to 35 mm² rigid wire or 1.5 up to 25 mm² 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-T15 AS/NZS 3947-2		
Standards (Aust / NZ / International)		IEC 60947-2		
Tripping characteristics		C		
Nominal current	A	0.5-63		
Calibration temperature	°C	40		
Number of poles (# mod)		1/2/3/4		
Neutral pole protected		-		
Nominal voltage Un	AC 1 P	V	240/415	
	3 P/4 P	V	415	
	DC 1 P ¹⁾	V DC	48	
	2 P (in series) ¹⁾	V DC	110	
Frequency		Hz	50/60	
		Hz	DC: magn.trip +40%	
		Hz	400: magn.trip +50%	
Maximum service voltage U _{max} between two wires	V	250/440; 53/120		
Minimum service voltage U _{min}	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	mΩ	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	4000		
	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 ²	1/35	
	Flexible cable min*/max (top)	mm ²	0.75/25	
	Rigid cable min/max (bottom)	mm ²	1/35	
	Flexible cable min*/max (bottom)	mm ²	0.75/25	
	(* Flexible cable 0.75/1.5 mm ² 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	
Short-circuit capacity AC (kA)			AS/NZS 3947-2	
IEC 60898	I _{cn}	1 P	230/400 V	-
		2 P	230/400 V	-
		3 P/4 P	230/400 V	-
	I _{cs} (service)			-
IEC 60947-2	I _{cu} (ultimate)	1 P	127 V	50
			240 V	50/25/20/15 ²⁾
			415 V	-
	2 P	127 V	-	
		240 V	50/50/40/30 ²⁾	
		415 V	50/25/20/15 ²⁾	
	3 P, 4 P	240 V	50/50/40/30 ²⁾	
		415 V	50/25/20/15 ²⁾	
		440 V	50/20/15/10 ²⁾	
	I _{cs} (service)			75 % I _{cu}
	NEMA AB1 (120/240V)			-
Short-circuit capacity DC (kA)				
IEC 60947-2	I _{cu} (ultimate)	1 P	≤60 V	25
			≤220 V	-
	2 P	≤125 V	30	
		≤440 V	-	
	I _{cs} (service)			100 % I _{cu}

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

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

²⁾ 0.5-4 A/6-25 A/32-40 A/50-63 A
³⁾ 10 (125 V DC)

⁴⁾ 10 (250 V DC)
⁵⁾ On request.

Din-T MCBs + RCDs Technical data

Miniature circuit breakers - Din-T 15

Dimensions in mm.

3

