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DC applications

h3+ can be used for protection in DC applications. This form of power is mostly produced by sources such as PV solar cells and batteries.

The offer at a glance:

- Three frame sizes: P160 – P250 – x630
- Thermo-magnetic MCCBs and switch disconnectors
- Rated current (In) from 25A to 630A
- Available in 3P and 4P
- Operational voltage 125 V DC / pole
- Same accessories and auxiliaries used in AC applications.

h3+ MCCB and Switch disconnectors DC Characteristics

General Characteristics

Frame size		P160	P250	x630
Number of poles		3,4	3,4	3,4
Rated current @50°C In (A)		160	250	630
Rated current range (A)		25-160	50-250	250-630
Operational voltage Ue (V)	1P	125	125	125
	2P	250	250	250
	3P	375	375	375
	4P	500	500	500
Rated insulation voltage Ui (V)		690/ 800	690/800	690/800
Rated impulse voltage Uimp (kV)		8	8	8
Suitability for isolation		Yes	Yes	Yes
Breaking time (ms)		<15	<15	<20
Utilisation category		A	A	A
Pollution degree		3	3	3
Mechanical endurance (nb. of cycles)		40 000	40 000	40 000
Electrical endurance (nb. cycles)	500 V DC In	1000	1000	1000
	500 V DC In/2	1500	1500	1500
Protection		Yes	Yes	Yes
MAG (ICB): Ii adjustable		Yes	Yes	Yes
TM (Thermal-Magnetic): Ir and Ii adjustable		Yes	Yes	Yes

MCCB Characeristics

ultimate short-circuit breaking capacity (Icu) and service short-circuit breaking capacity (Ics)

Icu (kA)	P160 – P250				x630			
Letter	H	N	M	E	H	N	M	E
DC 125V 1P	5	10	15	20	6	6	7.5 (<= 400A) 6 (630A)	10 (<= 400A) 8 (630A)
DC 250V 2P	5	10	15	20	6	6	7.5 (<= 400A) 6 (630A)	10 (<= 400A) 8 (630A)
DC 375V 3P	5	10	15	20	6	6	7.5 (<= 400A) 6 (630A)	10 (<= 400A) 8 (630A)
DC 500V 4P	5	10	15	20	6	6	7.5 (<= 400A) 6 (630A)	10 (<= 400A) 8 (630A)

Ics (kA)	P160 – P250				x630			
Letter	H	N	M	E	H	N	M	E
DC 125V 1P	5	5	7.5	10	6	6	7.5 (<= 400A) 6 (630A)	10 (<= 400A) 8 (630A)
DC 250V 2P	5	5	7.5	10	6	6	7.5 (<= 400A) 6 (630A)	10 (<= 400A) 8 (630A)
DC 375V 3P	5	5	7.5	10	6	6	7.5 (<= 400A) 6 (630A)	10 (<= 400A) 8 (630A)
DC 500V 4P	5	5	7.5	10	6	6	7.5 (<= 400A) 6 (630A)	10 (<= 400A) 8 (630A)

Protection settings

h3+ P160 – P250 and h3 x630 thermal magnetic breakers can be used for protection against current overloads and short circuits in DC applications.

Thermal rated current (Ir) and instantaneous current (Ii) can be adjusted via the knobs located on the front of the product. Time delays are fixed.

Magnetic tripping level Ii has to be calculated using the formula below:

[Ii DC] = [Ii AC] x [DC/AC ratio]

In	Ii setting in AC	DC/AC ratio

P160	Up to 125A	6xIn	1,25
		12xIn	1,25
	160A	6xIn	1,25
		10xIn	1,25
P250	Up to 160 A	6xIn	1,25
		13xIn	1,25
	200 A	6xIn	1,25
		12xIn	1,25
	250 A	6xIn	1,25
		10xIn	1,25
x630	250A	5x In	0,85
		10 xIn	1,10
	400A	5x In	0,85
		10 xIn	1,15
	630A	4x In	1,00
		8 xIn	1,25

Switch disconnector characteristics

			P160		P250		x630 / P630	
Number of poles			3,4		3,4		3,4	
Nominal current (A)			125	160	200	250	400	630
Operational current Ie (A)	DC23A	125 V DC 1P	125	160	200	250	400	630
		250 V DC 2P	125	160	200	250	400	630
		375 V DC 3P	125	160	200	250	400	630
		500 V DC 4P	125	160	200	250	400	630
Short-circuit making capacity @500 V DC 4P Icm (kA) peak			2	2	4	4	7.5	9
Short time withstand current Icw (kA) 1s			2	2	3.6	3.6	5	7.6
Rated insulation voltage Ui (V)			800					
Impulse withstand voltage Uimp (kV)			8					
Suitability for isolation			Yes					
Pollution degree			3					
Mechanical endurance in number of operations			20000	20000	20000	20000	30000	30000
Electrical endurance in number of cycles		In/2 500 V DC	1500	1500	1500	1500	1500	1500
		In 500 V DC	1000	1000	1000	1000	1000	1000

Insulation accessories

The table below illustrates the cases where the use of insulation accessories can be unnecessary, possible or mandatory depending on the type of connection and the type of conductor.

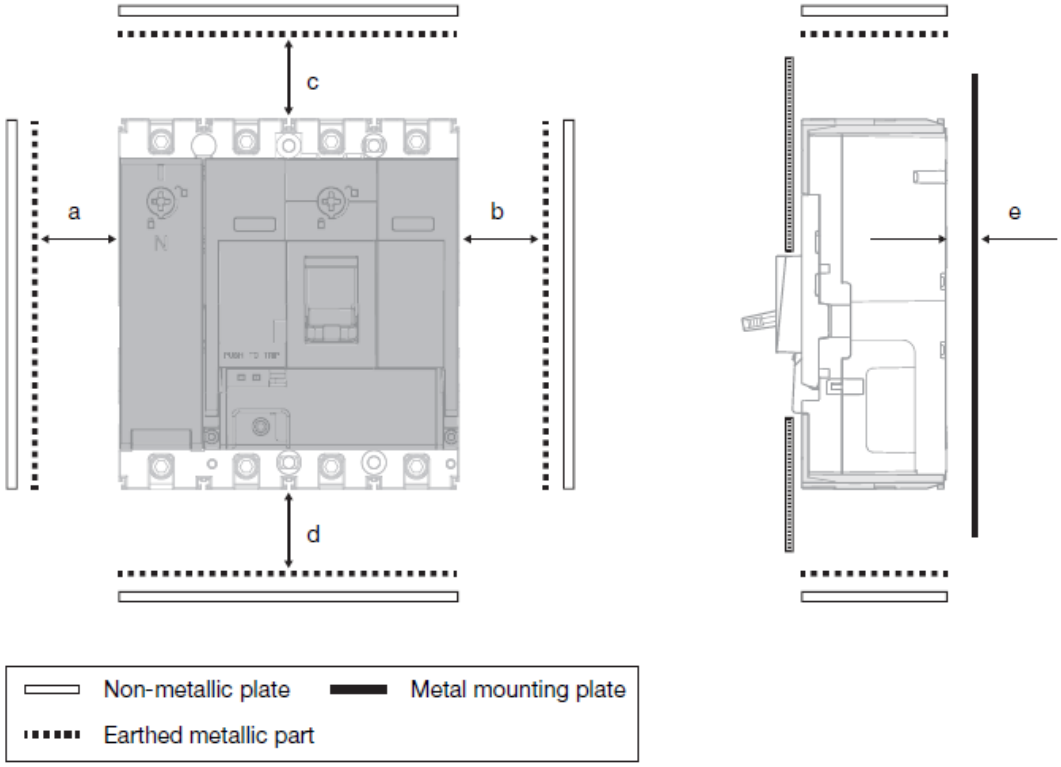
Front connection

Accessories		No insulation accessory 	Interphase barriers 	Earth plate 	Terminal covers 
Type of conductor					
	Insulated bars or cables	No	Mandatory *	Possible	Possible
	Non insulated bars or ring lugs	No	Mandatory *	Possible	Mandatory for IP20 *
	Extension terminals	No	Mandatory *	Mandatory	Mandatory for IP20 *
	Cables with external cable terminals	No	Mandatory *	Mandatory	Mandatory for IP20 *

Installation and operating recommendations

Insulation distances

the insulation distances present in the below have to be respected in order to prevent arcing between the breaker and its surroundings.



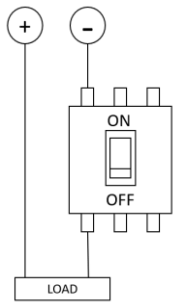
Ue ≤ 500 V DC	Earthed metallic plate			Non-metallic plate		
	P160	P250	x630/ P630	P160	P250	x630/ P630
a (mm)	≥ 50	≥ 50	≥ 80	0	0	0
b (mm)	≥ 50	≥ 50	≥ 80	0	0	0
c (mm)	≥ 50	≥ 50	≥ 120	≥ 75	≥ 100	≥ 100
d (mm)	≥ 50	≥ 50	≥ 120	≥ 75	≥ 100	≥ 100
e (mm)	0	0	0	0	0	0

Connection methods

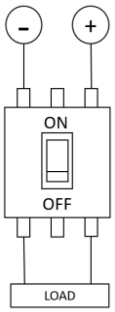
Difference between connection in series and connection in parallel

Connection in series
It allows breaking higher voltages for a same nominal current.

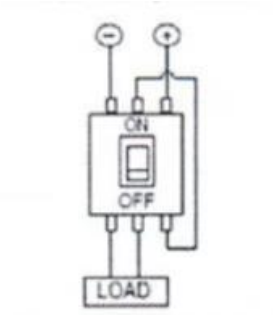
Connection in parallel
It allows breaking higher currents for the same operational voltage



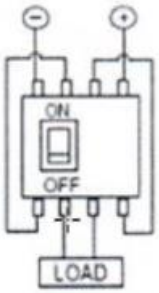
1P connected in series



2P connected in series



3P connected in series



4P connected in series

Cable between two poles in series should have a length of a least 2 meters.