

## Description

Single, double and three pole thermal-magnetic circuit breakers with high rupture capacity to UL 489 (5 kA), EN/IEC 60934 (6kA) and UL 1077 (5 kA). With toggle actuation, positively trip-free mechanism, a choice of characteristic curves and a wide range of current ratings in finely graded steps from 0.1 A through 32 A. Auxiliary contacts (make or break contacts) are optionally available. Track-mountable design, width only 12.5 mm. Ease of wiring by means of an integral busbar concept: line entry busbar LINE+ and signal busbars/signal jumpers.

## Typical applications

Protection of power supplies, equipment and cables in centralised control systems and in decentralised installations serving automation, petro-chemical, power plant, steel industry and similar industrial applications.

## Ordering Information

<b>Type number</b>	
4220	thermal-magnetic high performance circuit breaker
<b>Mounting</b>	
T1	track-mounting
<b>Number of poles</b>	
1	single pole
2	double pole
3	three pole
<b>Additional feature</b>	
0	without actuator guard
1	with actuator guard
<b>Main terminals</b>	
K0	screw terminals 16 mm <sup>2</sup> / 10 mm <sup>2</sup>
<b>Characteristic curve</b>	
F1	thermal-magnetic, extremely fast, DC
F2	thermal-magnetic, fast, AC/DC
M1	thermal-magnetic, medium delay, AC/DC
T1	thermal-magnetic, long delay, AC/DC
<b>Auxiliary contacts</b>	
H0	without
H1	with auxiliary contacts in all poles
H2	with auxiliary contacts only in pole 1 (2-pole plus)
H3	with auxiliary contacts only in poles 1+3 (3-pole plus)
H4	with auxiliary contacts only in pole 2 (3-pole plus)
H5	with auxiliary contacts only in the last pole
H6	with auxiliary contacts only in poles 1+2 (3-pole plus)
<b>Auxiliary contact function</b>	
0	without
2	make contact (N/O)
3	break contact (N/C)
A	pole 1 make contact, all other poles break contacts (2-pole plus)
B	poles 1+2 make contacts, other poles break contacts (3-pole plus)
C	pole 1 break contact, other poles make contacts (2-pole plus)
<b>Auxiliary contacts – terminal design</b>	
0	without
1	screw terminals 1 mm <sup>2</sup>
<b>Voltage rating</b>	
A	≤ AC 277 V or ≤ DC 60 V
<b>Current rating range</b>	
	0.1...32 A
<b>Approval logo</b>	
V	UL 489
4220 - T1 1 0 - K0 M1- H1 2 1 - A - 10 A - V ordering example	



## Technical data

For further details please see catalogue section: **Technical Information**

Voltage rating	3 AC 415 V; 3 AC 480 V; AC 277 V; AC 240 V; AC 120 V; DC 60 V
Current rating range	0.1...32 A
Auxiliary circuit	DC 10 - 30 V, 10 - 500 mA
<b>Typical life</b>	
IEC 60934	3 AC 415 V 1,000 cycles at 1 x I <sub>N</sub> , inductive load AC 240 V: 6,000 cycles at 1 x I <sub>N</sub> , inductive load DC 60 V: 6,000 cycles at 1 x I <sub>N</sub> , resistive load
UL 489	AC 120 V: 6,000 cycles at 1 x I <sub>N</sub> , inductive load
UL 1077	3 AC 415 V 3,000 cycles at 1 x I <sub>N</sub> , inductive load AC 277 V: 6,000 cycles at 1 x I <sub>N</sub> , inductive load DC 60 V: 6,000 cycles at 1 x I <sub>N</sub> , resistive load
Ambient temperature	-30...+60°C (-22...+140°F, T60)
Storage temperature	-40 ... 60°C (-40 ... +140°F)
Insulation co-ordination	IEC 60664 2,5 kV / 2 re-inforced insulation in the operating area
<b>Dielectric strength operating area</b>	
IEC 60934	test voltage AC 3,000 V (reinforced insulation)
pole to pole	test voltage AC 1,500 V
main circuit to auxiliary circuit	test voltage AC 1,500 V
open main circuit	test voltage AC 250 V
open auxiliary circuit	test voltage AC 250 V
Insulation resistance	> 100 MΩ (DC 500 V)
<b>Interrupting capacity</b>	
I <sub>nc</sub> PC1	AC 240 V, 6,000 A
IEC 60934	DC 60 V, 6,000 A
<b>Interrupting capacity UL 489</b>	
	AC 120 V, 5,000 A
<b>Interrupting capacity UL 1077</b>	
	AC 277 V, 5,000 A DC 60 V, 5,000 A
Protection class (IEC 60529)	operating area IP30 terminal area IP00
Vibration (sinusoidal)	± 0.38 mm (10-57 Hz), 5 g (57-500 Hz) test to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	25 g (11 ms) test to IEC 60068-2-27, test Ea
Corrosion	96 hrs in 5% salt mist, test to IEC 60068-2-11, test Ka
Humidity	240 hrs in 95% RH, to IEC 60068-2-78, test Cab
Housing material	moulded material
Mounting	on symmetrical rail to EN 50022-35x7.5
Mounting dimension (w x h x d)	12.5 x 89.3 x 87.1

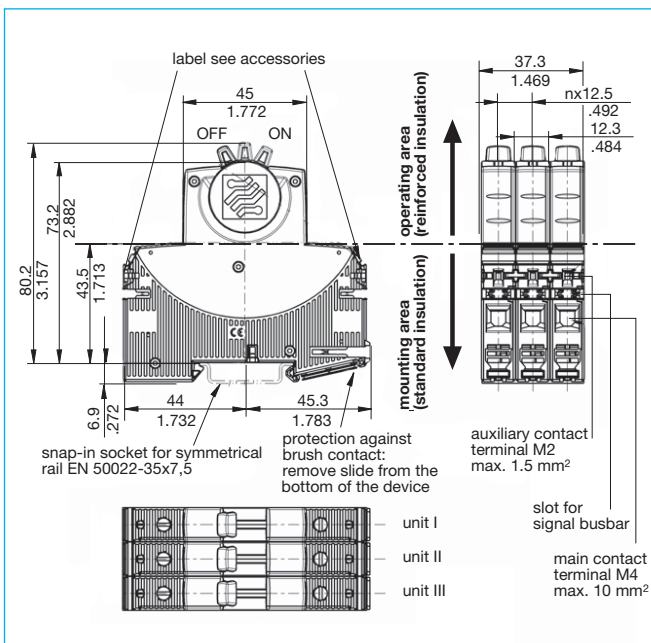
## Technical data

LINE terminal (LINE and/or DC+)	
screw terminals	M5
max. cable cross section	
flexible with wire end ferrule w/wo plastic sleeve	1 – 16 mm <sup>2</sup>
multi-lead connection (2 identical cables)	
flexible with wire end ferrule without plastic sleeve	1 – 6 mm <sup>2</sup>
flexible with TWIN wire end ferrule with plastic sleeve	0.75 – 10 mm <sup>2</sup>
wire stripping length	14 mm
tightening torque	2.5 – 3 Nm
LOAD terminal	
screw terminals	M4
max. cable cross section	
flexible with wire end ferrule w/wo plastic sleeve	0.5 – 10 mm
multi-lead connection (2 identical cables)	
flexible with wire end ferrule without plastic sleeve	0.5 – 2.5 mm <sup>2</sup>
flexible with TWIN wire end ferrule with plastic sleeve	0.5 – 6 mm <sup>2</sup>
wire stripping length	10 mm
tightening torque	1.2 – 1.4 Nm
Auxiliary contact terminals	
screw terminals	M2
max. cable cross section	
flexible with wire end ferrule w/wo plastic sleeve	0.25 – 0.75 mm <sup>2</sup>
multi-lead connection (2 identical cables)	
flexible with wire end ferrule without plastic sleeve	0.25 – 0.34 mm <sup>2</sup>
wire stripping length	6 mm
tightening torque	0.22 – 0.25 Nm
Mass	approx. 90 g per pole with aux. contact

## Current ratings and typical internal resistance values

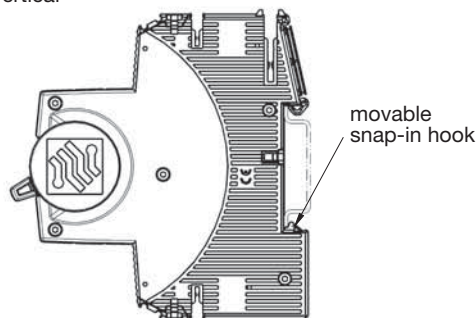
Current rating (A)	Internal resistance per pole (Ω)			
	trip curve F1 fast DC only	trip curve F2 fast AC + DC	trip curve M1 medium delay AC + DC	trip curve T1 long delay AC + DC
0.1	166	148	122	104
0.2	45	41	34	29
0.3	19	17	14	12
0.4	12	11	7.9	7.3
0.5	6.8	5.6	4.7	4.2
0.6	4.9	4.5	3.7	3.4
0.8	2.9	2.7	2.1	1.7
1	1.8	1.6	1.3	1.1
1.5	0.93	0.76	0.62	0.58
2	0.47	0.40	0.34	0.31
2.5	0.30	0.27	0.23	0.21
3	0.22	0.20	0.17	0.15
3.5	0.17	0.16	0.13	0.12
4	0.11	0.11	0.084	0.077
5	0.086	0.082	0.066	0.062
6	0.064	0.062	0.053	0.049
8	0.029	0.026	≤ 0.02	≤ 0.02
10	≤ 0.022	≤ 0.02	≤ 0.02	≤ 0.02
12	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
15	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
16	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
18	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
20	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
25	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
32	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02

## Dimensions



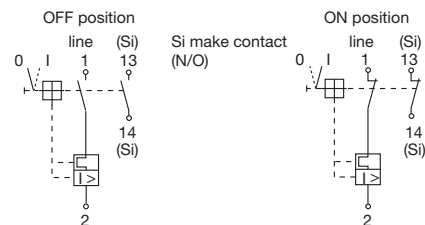
## Installation drawing

allowable mounting position:  
vertical

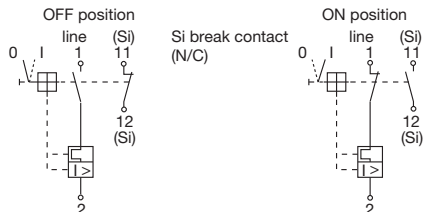


## Internal connection diagrams

### ...-H121-...



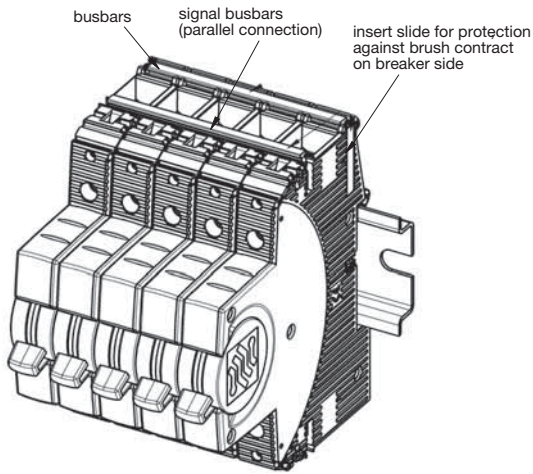
### ...-H131-...



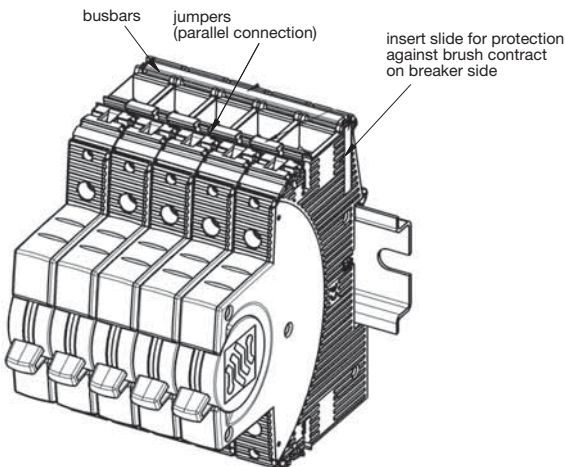
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Termination examples

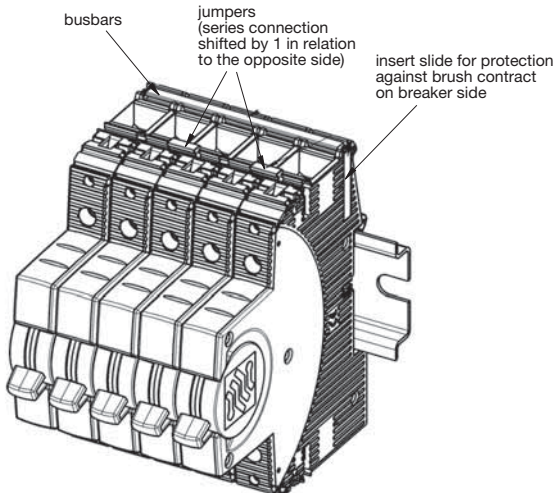
### 4220-T with busbars and signal busbars (auxiliary contacts connected in parallel)



### 4220-T with busbars and jumpers (auxiliary contacts connected in parallel)



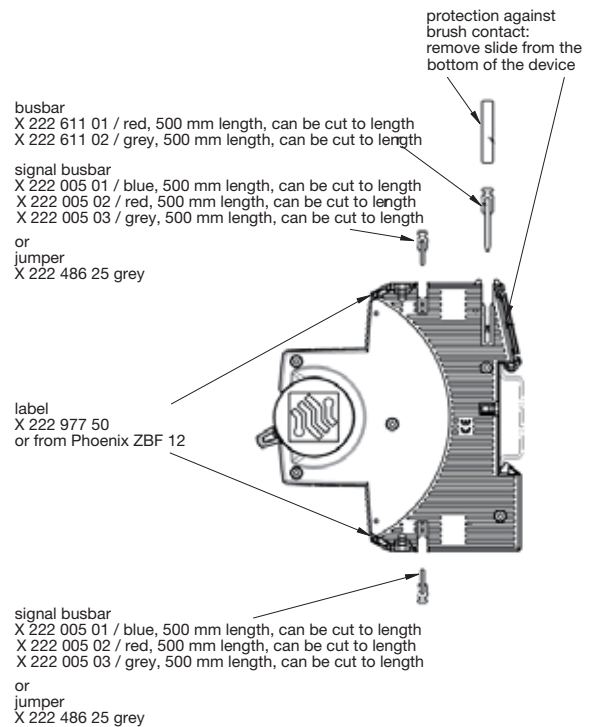
### 4220-T with busbars and signal busbars (auxiliary contacts connected in serie)



Busbars, signal busbars and jumpers: see accessories

## Accessories

Description	Part number
busbar red, 500 mm length, can be cut to length	X 222 611 01
busbar grey, 500 mm length, can be cut to length	X 222 611 02
signal busbar blue, 500 mm length, can be cut to length	X 222 005 01
signal busbar red, 500 mm length, can be cut to length	X 222 005 02
signal busbar grey, 500 mm length, can be cut to length	X 222 005 03
signal busbar grey (packing unit 25 pcs)	X 222 486 25
Label (packing unit 50 pcs) or from Phoenix ZBF 12	X 222 977 50

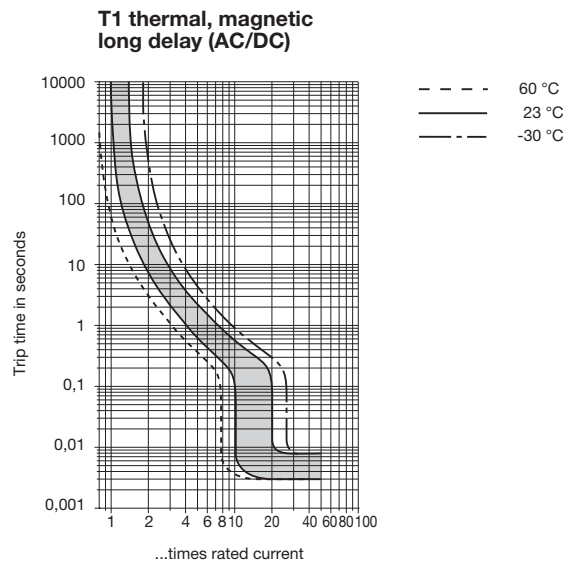
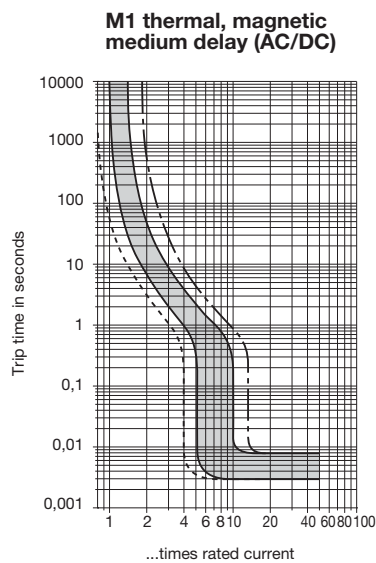
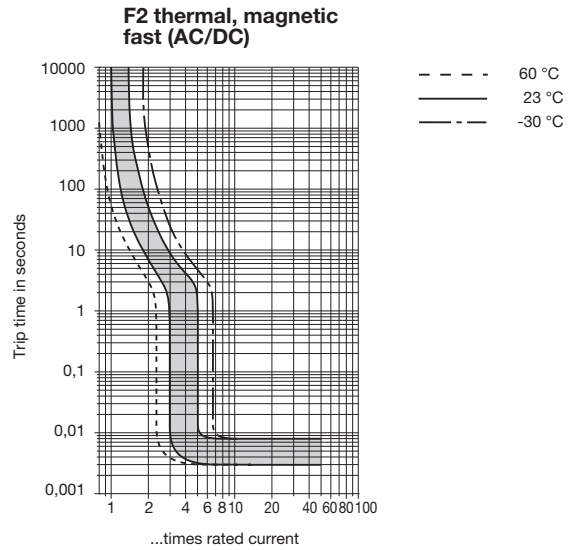
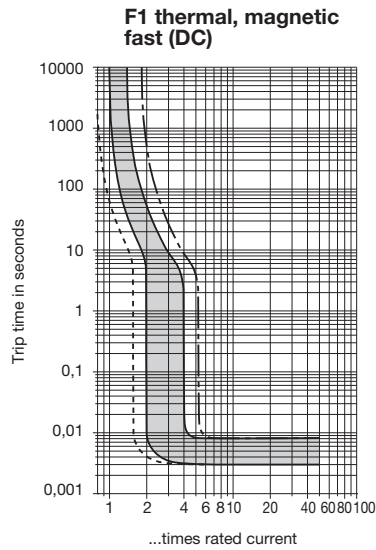


## Typical time/current characteristics

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	+73.4	+86	+104	+122	+140
	°C	-30	-20	-10	0	+10	+23	+30	+40	+50	+60
Derating factor		0,76	0,79	0,83	0,88	0,93	1	1,04	1,12	1,22	1,35

2



Magnetic tripping currents are increased by 30 % on DC supplies.

When several devices are mounted together, an air gap between each is recommended. If this is not possible, each device should carry only 80 % of its rating.

## Approvals

Test authority	Voltage ratings	Current ratings
UL 489	AC 120 V	0.1...32 A
VDE IEC 60934	AC 240 V; DC 60 V	0.1...32 A
UL 1077	AC 277 V; DC 60 V	0.1...32 A

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.