

Description

The electronic circuit protector type EBU (Electronic Breaker Unit) provides selective overcurrent protection in AC 230 V UPS systems. It consists of an MCB approved for short circuit interruptions up to 10 kA and of an add-on electronic circuitry, taking over measuring and evaluation tasks. The product is available with the typical MCB ratings 4 A, 6 A, 10 A and 16 A with B and C characteristics and is directly operated at the output of the corresponding UPS.

UPS units often do not supply sufficient power in the event of a short circuit to trip standard MCBs. The electronic AC circuit breaker can individually be adjusted to the UPS unit and will therefore reliably trip in the event of a short circuit. Optimal adjustment of the load's current rating allows detection and disconnection of an overload in the load circuit. This helps exclude the fatal disconnection of the entire output voltage of the UPS unit.

The Electronic Breaker Unit EBU allows a reduction in size of one third for UPS units because power reserves do no longer have to be kept available for tripping. The EBU increases system availability, reduces overall costs and simplifies electrical planning.

Typical applications

Electronic overcurrent protection by means of electronic AC circuit breakers is ideally suited to the selective protection of uninterruptible power supplies (UPS) in industrial plants. EBU ensures the power safety provided by AC UPS systems.

Benefits

- Enhanced system availability through effective protection
- Reduction of overall costs by a 1/3 more efficient rating
- Easy planning with a variable overcurrent protection

Order numbering code

Type No.	Description
EBU	Electronic circuit breaker for AC UPS applications
Mounting method	
T	rail mounting
Design	
A	adjustability I_N UPS + I_N load
Number of poles	
1	1-pole, 1-pole protected electronically
2	2-pole, 1-pole protected electronically
Version	
0	with physical isolation by means of MCB 4230-T
Signal input	
0	without signal input
Signal output	
3	auxiliary change-over contact
Operating voltage	
AC 230 V	voltage rating AC 230 V
Characteristic curve	
B	thermal 1.05 - 1.30 I_N ; magnetic 3.2 - 4.8 I_N
C	thermal 1.05 - 1.30 I_N ; magnetic 6.4 - 9.6 I_N
Current rating range	
4 A	(only Characteristic curve C)
6 A	
10 A	
16 A	
EBU10 - T A 1 - 0 0 3 - AC 230 V - C - 10 A	ordering example
Preferred types Characteristic curve C	



Technical data

Rated voltage U_N	AC 230 V $\pm 10\%$					
Current ratings I_N	4 A, 6 A, 10 A, 16 A					
Frequency	50 Hz					
Rated insulation voltage	AC 250 V					
Rated voltage and current rating range of the auxiliary contact	DC 110 V / 0.3 A - 33 W DC 30 V / 1.1 A - 33 W AC 120 V / 0.5 A - 60 VA AC 240 V / 0.25 A - 60 VA					
Min. load of aux. contact (valid for standard industrial surroundings, no aggressive gases)	3 mA at 24 V					
Reference ambient temperature	-35 °C...+60 °C					
Method of operation	S-type					
Mode of trip / degree of trip-free behaviour	mechatronic / trip free (positively trip-free)					
Max.* cable length (outgoing wire) from generator to EBU						
B6	B10	B16	C4	C6	C10	C16
31 m/ mm ²	19 m/ mm ²	12 m/ mm ²	24 m/ mm ²	17 m/ mm ²	10 m/ mm ²	6 m/ mm ²
Typical electrical operational values						
Voltage drop in V at 1 x I_N						
I_N (A)	4	6	10	16		
V	0,77	0,53	0,35	0,3		
Insulation co-ordination (except signalling)	Rated impulse voltage 4 kV; overvoltage category III; pollution degree 2; reinforced insulation in the actuating area					
Insulation co-ordination of the signalling	Rated impulse voltage: 2.5 kV					
Note: The Si contacts are not suitable for connection to SELV control voltage.						
Insulation resistance	> 100 MOhm (DC 500 V)					
Degree of protection	II					
Endurance						
mechanical (contacts)	20,000 cycles					
electronic potentiometer	> 15 years within specification min. 1000 steps					

Technical data	
Operating behaviour (endurance) IEC 60947-2	1500 cycles; U_N (AC); $1 \cdot I_N$; $\cos \phi = 0.8$ + 8500 cycles mechanically + 12 cycles; U_N (AC); $6 \cdot I_N$; $\cos \phi = 0.5$
Rated service short-circuit rupture capacity (Ics) to IEC 60947-2	3 cycles (O-CO-CO); U_N (AC); 7500 A; $\cos \phi = 0.5$
Rated ultimate short-circuit rupture capacity (Icu) IEC 60947-2	2 cycles (O-CO); U_N (AC); 10,000 A; $\cos \phi = 0.5$
Signalling	
Auxiliary contacts	1 change over contact (terminals 11, 12, 14) terminals 11-12 closed in OFF or error condition terminals 11-14 open in OFF or error condition
LED status indication	normal condition: green after adjustment I_N UPS / load: orange blinking for 5 s error condition (electrical trip): red error condition (no voltage applied): off
Mounting values	
Mounting method	symmetrical rail
Mounting position	any

Technical data	
Terminals	- screw terminals input side (cage clamps) horizontal busbar connection possible with comb busbars - push-in terminal on output side and on aux. contacts
Cable cross section	
Line	1...25 mm ²
N	1...10 mm ²
Load	0.5...4 mm ²
Si	0.5...1.5 mm ²
Tightening torque	2 Nm max.
Mass	approx. 230 g 1-pole approx. 330 g 2-pole
Environmental tests (typical values)	
Vibration (sinusoidal)	test to IEC 60068-2-6, ± 0.38 mm (10 – 57 Hz), 5 g (57 – 500 Hz) 10 frequency cycles per axis
Shock	30 g (11 ms) test to IEC 60068-2-27, test Ea
Humidity	48 hours at 95% RH, temperature +40°C test to IEC 60068-2-78, test Cab
Degree of protection	operating area IP 40 terminal area IP00
Storage temperature	-40 °C ...+70 °C

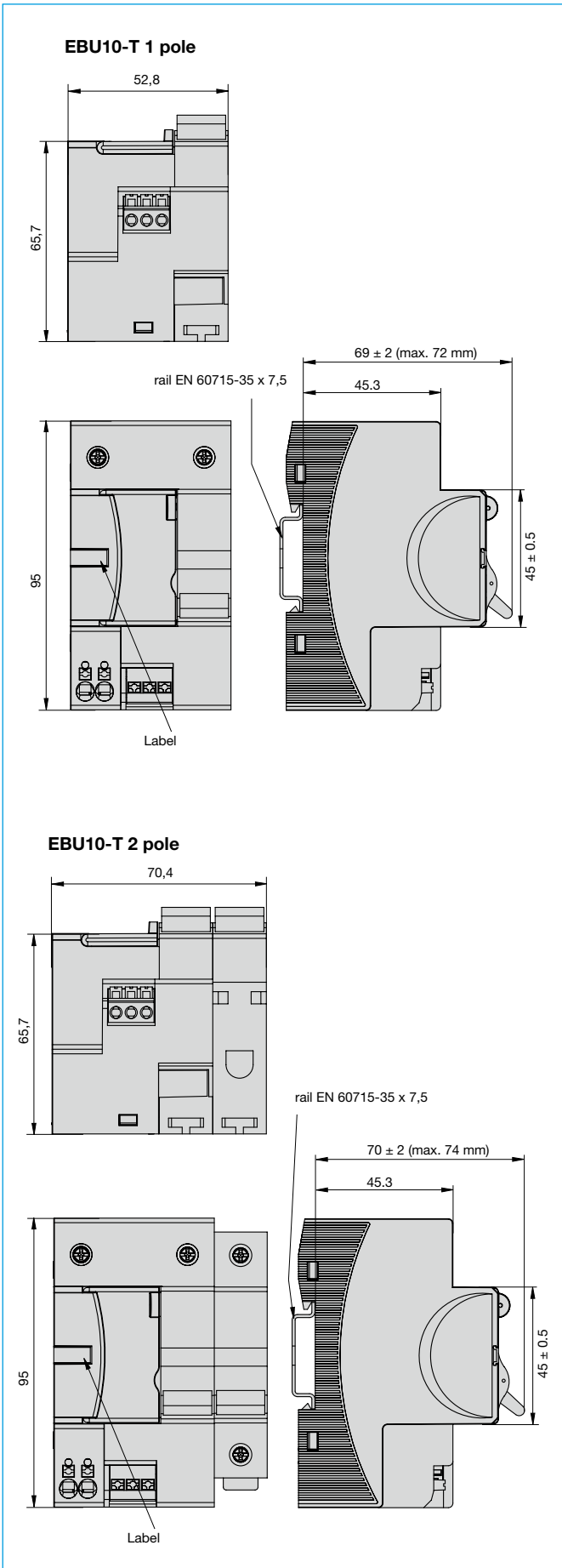
Max. operating currents depending on ambient temperature

Rated current I_N (A)	Max. operating currents depending on ambient temperature T (A)									
	-35°C	-30°C	-25°C	-20°C	-15°C	-10°C	-5°C	0°C	+5°C	+10°C
4	5.08	5.00	4.92	4.84	4.76	4.68	4.60	4.52	4.40	4.32
6	7.70	7.58	7.46	7.34	7.21	7.09	6.96	6.83	6.70	6.56
10	13.89	13.62	13.35	13.07	12.81	12.53	12.23	11.93	11.63	11.33
16	20.78	20.43	20.08	19.75	19.40	19.05	18.70	18.33	17.96	17.58

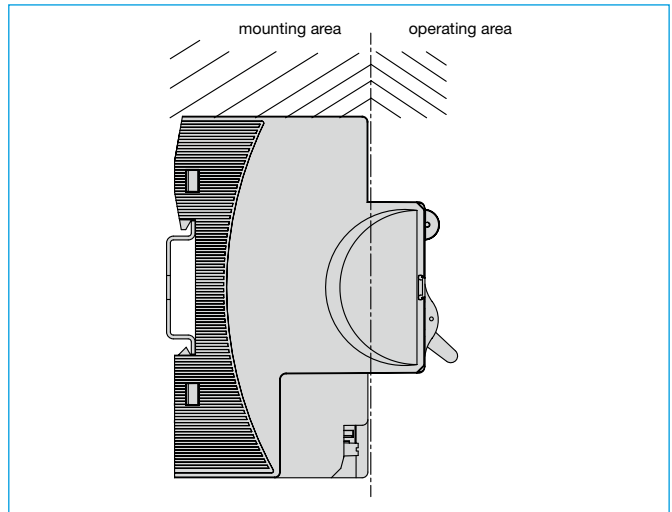
Rated current I_N (A)	Max. operating currents depending on ambient temperature T (A)									
	+15°C	+20°C	+25°C	+30°C	+35°C	+40°C	+45°C	+50°C	+55°C	+60°C
4	4.24	4.20	4.08	4.00	3.88	3.76	3.64	3.56	3.44	3.32
6	6.42	6.27	6.14	6.00	5.84	5.68	5.52	5.36	5.19	5.01
10	11.01	10.67	10.34	10.00	9.63	9.24	8.85	8.45	8.01	7.55
16	17.20	16.80	16.40	16.00	15.55	15.11	14.66	14.20	13.71	13.21

All dimensions without tolerances are for reference only. E-T-A reserves the right change specifications at any time 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.

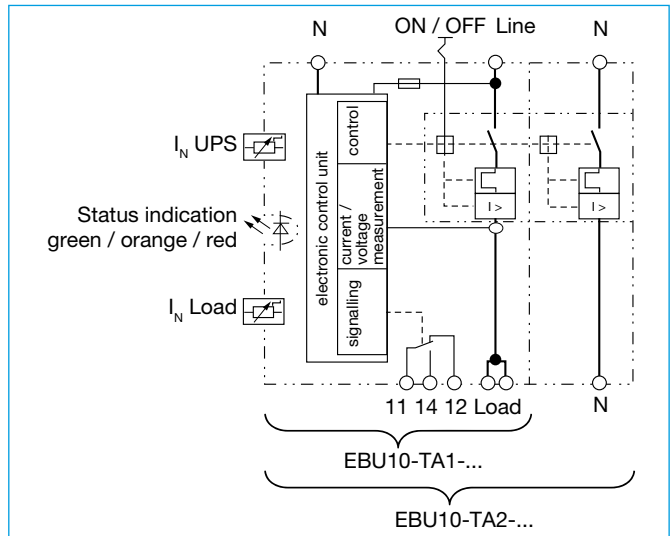
Dimensions



Installation drawing

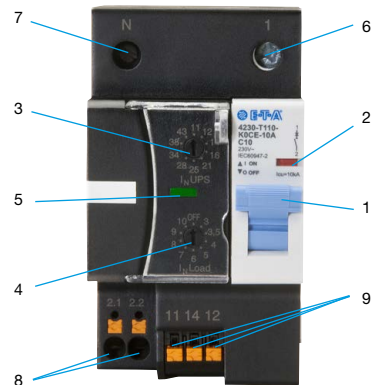


Schematic diagram

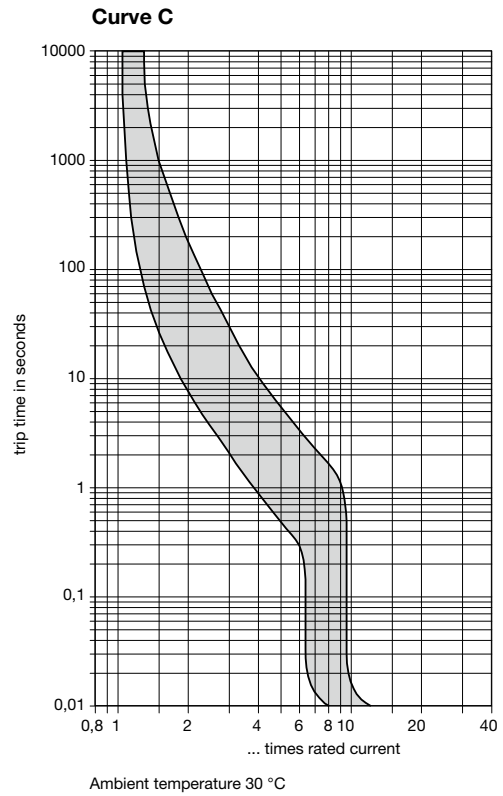
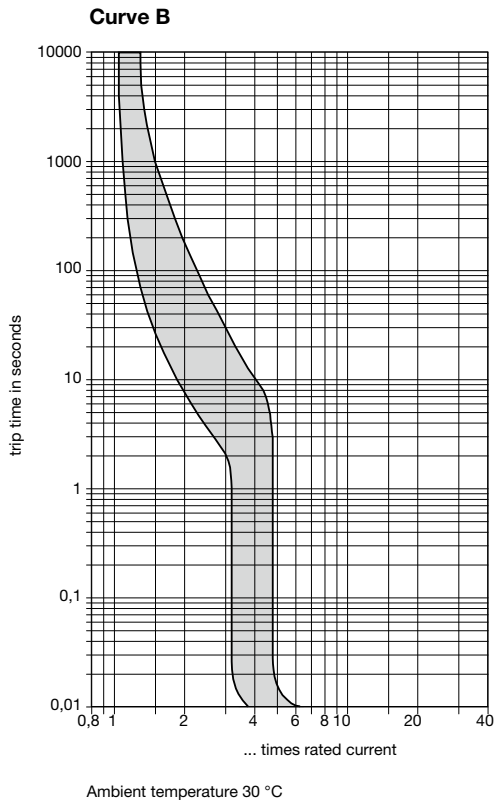


Connection and operating elements

- 1 Toggle MCB
- 2 Status indication MCB
- 3 Adjustment of operating range UPS (I_N UPS in [A])
- 4 Adjustment of trip range load (I_N load in [A])
- 5 LED status indication of EBU10-T
- 6 Screw terminal line (1)
- 7 Screw terminal neutral conductor (N)
- 8 Push-in terminal load (2, 1/2, 2)
- 9 Push-in terminal signalling (change over contact) (11/12/14)



Time/current characteristics



Electronic trip curve:

	thermal	magnetic	electronically variable
Type B	1.05 ... 1.30 $\times I_N$	3.2 ... 4.8 $\times I_N$	$I(t > 100 \text{ s}) = 1.05 \times I_N, \text{ load}$ $I(t > 10 \text{ s}) = 1.6 \times I_N, \text{ load}$ $I(t > 1 \text{ s}) = 2.7 \times I_N, \text{ load}$ $I(t < 20 \text{ ms}) = 1.5 \times I_N, \text{ UPS}$
Type C	1.05 ... 1.30 $\times I_N$	6.4 ... 9.6 $\times I_N$	$I(t > 300 \text{ s}) = 1.05 \times I_N, \text{ load}$ $I(t > 30 \text{ s}) = 1.3 \times I_N, \text{ load}$ $I(t > 3 \text{ s}) = 2.3 \times I_N, \text{ load}$ $I(t > 0.3 \text{ s}) = 5.2 \times I_N, \text{ load}$ $I(t < 20 \text{ ms}) = 1.5 \times I_N, \text{ UPS}$

Tolerance of electronic trip curve (at 23°C)

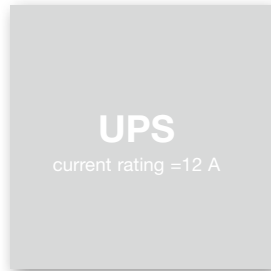
	t > 100 s	t < 20 ms
Type B	1,05...1,17 I_N Load	1,33...1,5 I_N , UPS
	t > 300 s	t < 20 ms
Type C	1,05...1,17 I_N Load	1,31...1,5 I_N , UPS

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Adjustment of electronic time-current characteristics (example)

**Step 1:
selection of EBU**

uninterruptible
power supply / UPS
current rating = 12 A



Selection of trip characteristic and current rating:

Characteristic curve C ⇒ inrush current SMPS
Current rating: ⇒ 10 A cable protection
for cable cross section 1.5mm²

EBU10-TA1-003-AC230V-C-10A



Load SMPS DC 24 V: $I_N = 3 A$

**Step 2:
adjustment of EBU to
UPS rating**



EBU ⇒ I_N UPS:
adjustment to 12 A
⇒ rated current UPS = 12 A

**Step 3:
adjustment of EBU
to load**



EBU ⇒ I_N UPS:
adjustment to 3 A
⇒ rated current load = 3 A

Setting options:

I_N , UPS: single phase rated current of the UPS unit at cont. load
 I_N , load: rated current of the connected load

Recommendation:

I_N , UPS: smaller or equal to the determined value
 I_N , load: higher or equal to the determined value

Setting parameters:

B6		B10		B16		C4		C6		C10		C16	
I_N , UPS	I_N , load	I_N , UPS	I_N , load	I_N , UPS	I_N , load	I_N , UPS	I_N , load	I_N , UPS	I_N , load	I_N , UPS	I_N , load	I_N , UPS	I_N , load
7	OFF	11	OFF	17	OFF	4.3	OFF	7	OFF	11	OFF	17	OFF
7.5	2	12	3	19	4	5.5	1.3	8	2	12	3	21	4
8	2.5	13	3.5	21	5	6.5	1.6	9	2.5	14	3.5	25	5
8.5	3	14	4	23	6	7	2.0	11	3	16	4	28	6
9	3.5	15	5	25	7	8.5	2.3	12	3.5	21	5	34	7
9.5	4	16	6	28	8	10	2.6	14	4	25	6	38	8
10	4.5	17	7	29	10	11	3.0	16	4.5	28	7	43	10
11	5	19	8	31	12	13	3.3	18	5	34	8	57	12
12	5.5	21	9	34	14	14.5	3.6	21	5.5	38	9	64	14
13	6	22	10	35	16	17	4.0	25	6	43	10	68	16

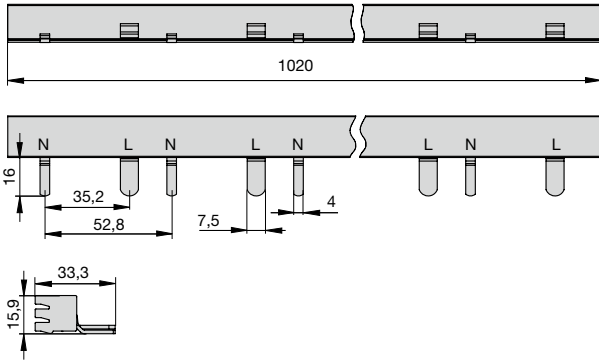
In the OFF condition the electronic trip curve only takes effect in the short circuit range

Accessories

Busbar

EBU10-Tx1 16mm² 80 A / 250 V AC (1-pole devices)

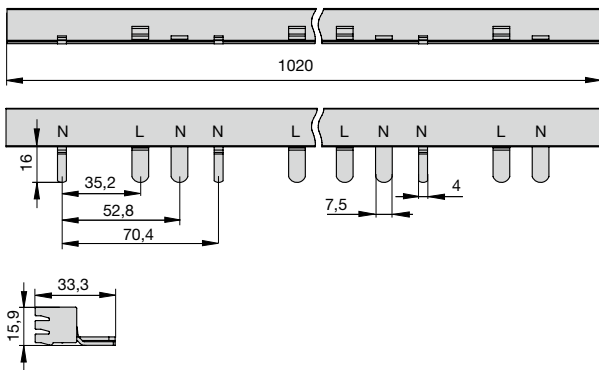
Y 312 284 01



Busbar

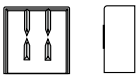
EBU10-Tx2 16 mm² 80 A / 250 V AC (2-pole devices)

Y 312 285 01



End cap for busbars, 2-/3-pole

Y 308 506 01



Label, packing unit 50 pcs

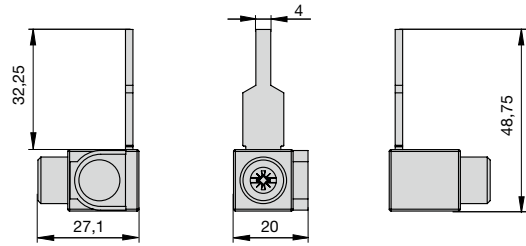
X 222 977 50



Screw terminal

6 – 50 mm² connection from the side, 32 x 4 mm

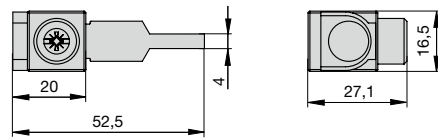
Y 312 288 01



Screw terminal

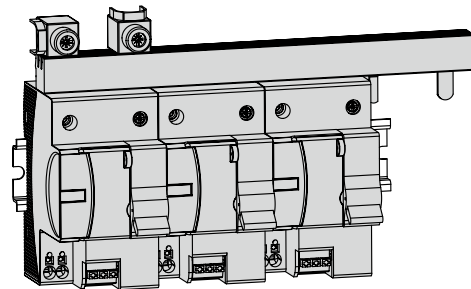
6 – 50 mm² connection from above, 32 x 4 mm

Y 312 289 01



Mounting examples

Mounting examples (1-pole; end caps not shown)



Mounting examples (2-pole; end caps not shown)

