

# MANUAL

## EASY-B CIRCUIT BREAKER



## Electronic circuit breakers Easy-B

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## 1. ORDER DATA

The following table shows the ordering data for the 24V circuit breaker modules.

*Table 1: Order numbers*

Variant	Input voltage	Channels
<b>EB-2724-XX0-0</b>	24 Vdc	1-2
<b>EB-2824-XX0-0</b>	24 Vdc	1
<b>EB-0824-100-0</b>	24 Vdc	1
<b>EB-1824-XX0-0</b>	24 Vdc	1
<b>EB-3824-100-0</b>	24 Vdc	1
<b>EB-0724-100-0F</b>	24 Vdc	1
<b>EB-1724-XX0-0F</b>	24 Vdc	1
<b>EB-2724-XX0-0F</b>	24 Vdc	1
<b>EB-3724-(X)XX0-0F</b>	24 Vdc	1-2
<b>EB-0748-100-0</b>	48 Vdc	1
<b>EB-1748-XX0-0</b>	48 Vdc	1

## 2. GENERAL INFORMATIONS

### 2.1 Safety instructions

Please read these warnings and safety instructions carefully before operating the appliance. The appliance may only be installed by skilled and qualified personnel. In the event of malfunctions or damage, switch off the supply voltage immediately and send the device to BLOCK Transformatoren-Elektronik GmbH for inspection. The device does not contain any service parts. If an internal fuse blows, there is most likely an internal defect in the appliance. The data provided is for product description purposes only and should not be construed as guaranteed characteristics in the legal sense.

### 2.2 Qualified personnel

The product associated with this documentation may only be handled by qualified personnel in compliance with the documentation associated with the respective task, in particular the safety instructions and warnings contained therein. Qualified personnel can ensure, on the basis of their training and experience, that the use of the described product complies with all safety requirements and the applicable provisions, regulations, standards and laws.

### 2.3 Intended use

This device is designed for installation in an enclosure and is suitable for use in general electronic devices such as industrial control systems, office equipment, communication devices or measuring devices. Do not use this device in control systems of airplanes, trains or nuclear facilities where a malfunction could lead to serious injury or danger to life.

### 2.4 Disclaimer

The contents of this publication have been checked with the utmost care to ensure that they correspond to the hardware and software described. Nevertheless, there may be discrepancies between the product and the documentation. Deviations may also arise due to the continuous further development of the product. For this reason, we cannot guarantee complete conformity. Should this documentation contain errors, we reserve the right to make any necessary corrections without prior notice.



**ATTENTION**

Switch off the input voltage before carrying out installation, maintenance or modification work and secure it against unintentional reconnection.



**ATTENTION**

Do not make any changes or attempts to repair the device. Do not open the device!



**ATTENTION**

Prevent the ingress of foreign objects such as paper clips and metal parts.



**ATTENTION**

Do not operate the appliance in a damp environment or in an environment where condensation or condensation is to be expected.



**ATTENTION**

Do not touch the housing during operation or shortly after switching off. Hot surfaces can cause injuries.

## 3. Product description

### 3.1 Description of the overall system

The circuit breakers in the EasyB single-channel circuit breaker series are available both with and without current limiting. For comprehensive system monitoring, variants are available for connecting to an EasyB coupling module with an interface to a higher-level control system. Depending on the application and the number of channels to be protected, the modules can be combined as required. The aim in developing the electronic circuit breakers was to create a particularly flexible system. This is why the circuit breaker modules can be operated individually or form a functional unit both electrically and mechanically by being connected in series. The 24 V supply, as well as the 48 V supply, can be provided with up to 40 A at the feed contact of any circuit breaker channel. If higher currents are required, additional feed contacts can be added. The current is distributed to the individual fuse channels via the continuous cross-connector, which can carry up to 80 A. The resulting network is just as suitable for protecting small units with only a few load circuits as it is for large systems in which up to 40 circuits need to be protected.

When setting up a system, the designer can arrange the required circuit breaker modules on the DIN rail depending on the application. The signal contacts also connect automatically, making installation quick and easy. The advantage of the 1-channel concept is that the scope of the system can be adapted exactly to the current requirements, while still allowing for later expansions. If more than two loads are to be supplied per circuit breaker channel, potential distribution modules with eight additional outputs each are available. Up to three of these potential distributors can be easily connected to a circuit breaker channel, so that a maximum of 24 additional output contacts are available. If the potentials are to be combined again when feeding back to the supplying power supply unit, this can be done quickly and easily with the EB-GNDx modules.

The 12 mm wide electronic circuit breakers offer various communication options as standard: For example, a collective message from all bayed modules can be tapped via a message output in order to monitor up to 40 bayed circuit breakers. For comprehensive evaluation, further variants are available which, in combination with a coupling module that can also be connected in series, offer an interface to the fieldbus level and provide dynamic data such as channel status, current current and input voltage as well as static data such as serial number and rated current. In this way, for example, the rated current of a module can also be set digitally. As all rated currents can be covered with one module, stock levels can be significantly reduced. The channels address themselves automatically when they are switched on, eliminating the need for time-consuming manual address assignment.

### 3.2 Variant overview

The available circuit breakers can be divided into several groups in terms of their protection characteristics and range of functions:

**EB-07:** Electronic circuit breaker with thermomagnetically fast characteristic curve and adjustable output current mechanically on the device or via interface.

**EB-17:** Electronic circuit breaker with thermomagnetic fast characteristic curve and a fixed output current. Transmission of the signaling signals through communication capability.

**EB-27:** Electronic circuit breaker with thermomagnetic characteristic curve and transmission of the signal for tripped and switched-off channels to connected channels. Entry-level version for the electronic fuse protection of 24 V loads.

**EB-37:** Electronic circuit breaker with thermomagnetic fast characteristic curve. Adjustable output current via communication interface.

**EB-28:** Electronic circuit breaker with current-limiting characteristic curve and forwarding of the signal for tripped and switched-off channels to connected channels. Entry-level version for the electronic fuse protection of 24 V loads when active current limiting is required.

**EB-08, EB-18, EB-38:** Electronic circuit breaker with current-limiting characteristic and comprehensive communication with the connected modules. Suitable for the advanced protection of 24 V loads and the possibility of ability to read out detailed power supply parameters and actively control the channels.

### 3.2.1 Easy-B Equipment

## ALLE EASYB SCHUTZSCHALTER VARIANTENÜBERSICHT

## ALL EASYB CIRCUIT BREAKERS OVERVIEW

	EB-2724-XX0-Y*	EB-2724-XX0-0F	EB-2724-2XX0-0	EB-2724-2XX0-0F	EB-0724-100-0F	EB-1724-XX0-0F	EB-3724-100-0F	EB-3724-2160-0F	EB-1724-2XXX-0F	EB-2824-XX0-Y*	EB-0824-100-Y*	EB-1824-XX0-0	EB-3824-100-0	EB-0748-100-0	EB-1748-XX0-0
Thermomagnetische Kennlinie Thermomagnetic characteristic	•		•											•	•
Thermomagnetisch flinke Kennlinie Thermomagnetic fast tripping characteristic		•		•	•	•	•	•	•						
Strombegrenzung 1,25 x Nennstrom Current limiting 1.25 x rated current										•	•	•	•		
Zwei abgesicherte Kanäle Two protected channels			•	•				•	•						
Zweiter Lastausgang Second load output	•	•								•					
Fest voreingestellte Auslöseströme Preset tripping currents	•	•	•	•		•			•	•		•			•
Über Drehschalter oder Schnittstelle einstellbare Auslöseströme Tripping currents adjustable via current selector switch or interface					•					•				•	
Über Schnittstelle einstellbare Auslöseströme Tripping currents adjustable via interface					•		•	•		•		•		•	
Unterspannungsabschaltung im Verbund Undervoltage switch-off as group					•	•	•	•	•	•	•	•	•	•	•
Unterspannungsabschaltung einzeln Undervoltage switch-off on individual basis	•	•	•	•						•					
NEC Class 2 bis 4 A NEC Class 2 up to 4 A		•		•		•			•	•					
Kommunikationsschnittstelle Communication interface					•	•	•	•	•		•	•	•	•	•
Automatische Adressierung der Kanäle Automatic addressing of channels					•	•	•	•	•		•	•	•	•	•
Sammelreset Common reset					•	•	•	•	•		•	•	•	•	•
Selektives Einschalten bei U <sub>in</sub> > 18 V lastabhängig im Verbund Selective switch-on at U <sub>in</sub> > 18 V, load-dependent					•	•	•	•	•		•	•	•	•	•
Erkennung und Signalisierung Strom > 90% vom Nennstrom Current detection and signaling > 90% of rated current	•	•	•	•	•	•	•	•	•		•	•	•	•	•
Aufladbare Kapazität > 40 000 µF Inrush capacity > 40 000 µF	•	•	•	•	•	•	•	•	•					•	•
Aufladbare Kapazität > 70 000 µF Inrush capacity > 70 000 µF										•	•	•	•		
Sammelmeldung für ausgelöste und ausgeschaltete Kanäle Common feedback contact for tripped/switched off channels	•*	•	•	•	•	•	•	•	•	•*	•*	•	•	•	•
Taster ON/OFF ON/OFF button	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Beschriftungsmöglichkeit Labeling option	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Zustandsanzeige farblich in Taster Colored status indicator on button	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

\* Varianten mit Sammelmeldesignal (-0) und Einzelmeldesignal (-4)  
\* Versions with a common status signal (-0) and single status signal (-4)

### 3.2.2 Article number system

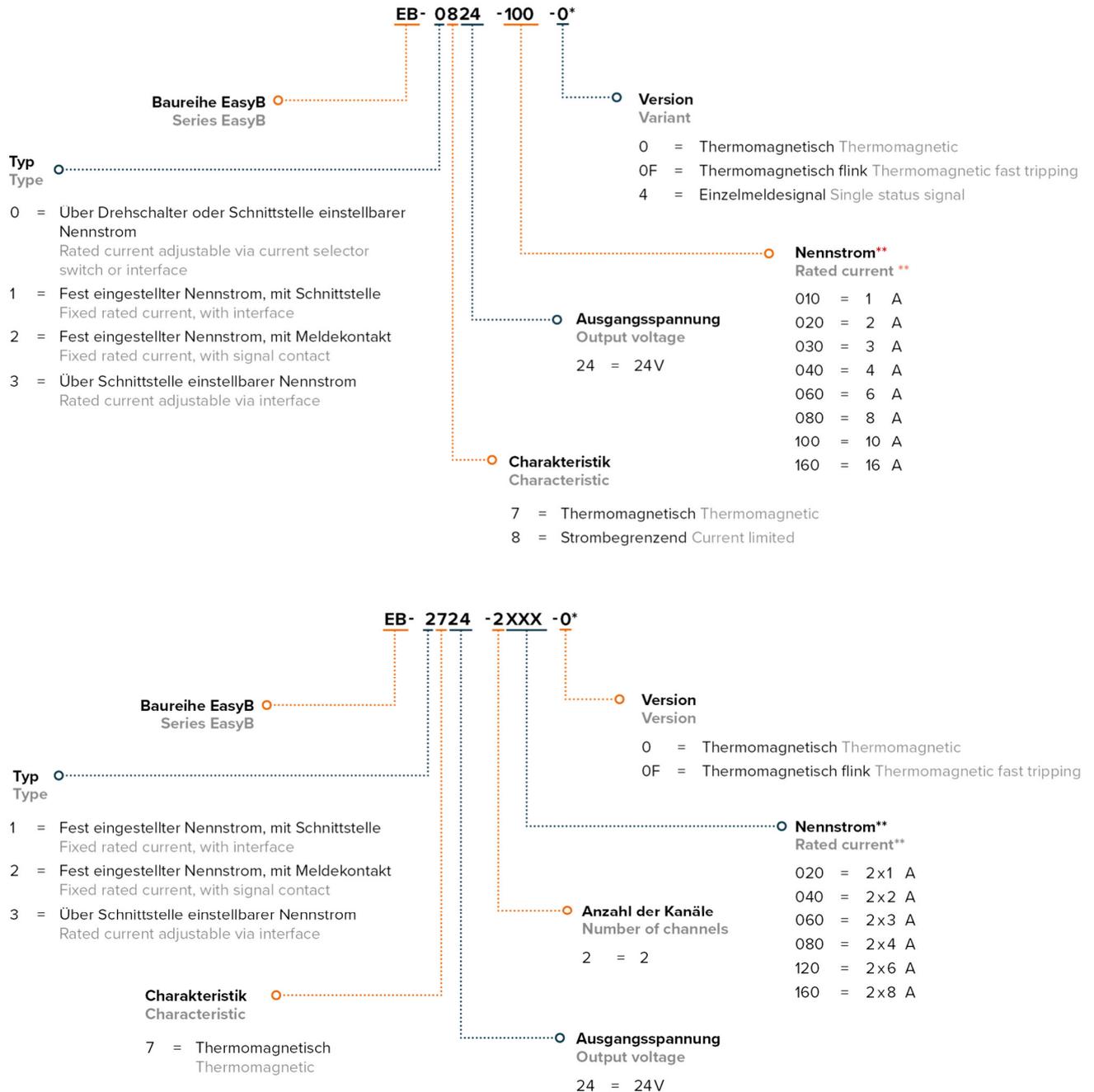


Figure 2: Article number system

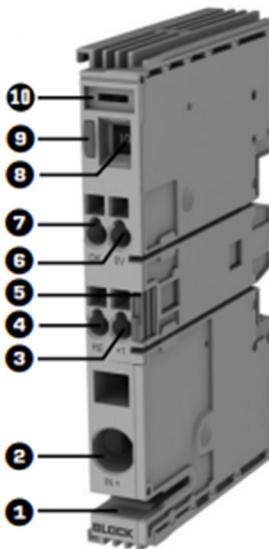
### 3.3 Coupling modules

Coupling modules are used for communication between the electronic EasyB circuit breaker system and a higher-level control system (PLC, PC). In order to be compatible with various bus systems and communication standards widely used in automation, various coupling modules are available or are being planned. Some modules offer additional contacts, such as a collective reset input and several potential-free collective signaling contacts, and the coupling module is connected to the circuit breaker on the left-hand side. The use of several coupling modules on a circuit breaker network is not permitted.

Detailed information on the individual coupling modules can be found in the download area of the respective coupling modules on the BLOCK homepage [www.block.eu](http://www.block.eu).

### 3.4 Connections and controls

#### 3.4.1 EB-07, EB-17, EB-27, EB-37



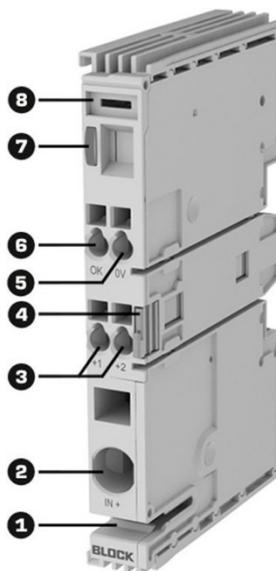
- ❶ Mounting cross connector EB-BAR
- ❷ Feed terminals up to max. 40A
- ❸ Output +1 (EB-0\*/-1\*/-3\*)  
+2 (EB-2\*)
- ❹ Output +1 (EB-2\*)  
Reset Input RE (EB-0\*/-1\*/-3\*)
- ❺ Release tab
- ❻ Connection 0Vdc for internal supply
- ❼ Single / collective Signal OK
- ❽ Current Setting Wheel / Fixed tripping current
- ❾ Switch / LED
- ❿ Labeling field for 5mm marking system

#### Clamping data

	❷	❸ + ❺ + ❻
a)	1,5 ... 16 mm <sup>2</sup> / AWG 16 ... 6	0,08 ... 2,5 mm <sup>2</sup> / AWG 28 ... 14
b)	1,5 ... 16 mm <sup>2</sup> / AWG 16 ... 6	0,08 ... 2,5 mm <sup>2</sup> / AWG 28 ... 14
c)	1,5 ... 10 mm <sup>2</sup> / AWG 16 ... 8	0,08 ... 1,5 mm <sup>2</sup> / AWG 28 ... 16
d)	14 mm	8 mm

Figure 3: Connections, operating elements EB-07, EB-17, EB-27, EB-37

#### 3.4.2 EB-28



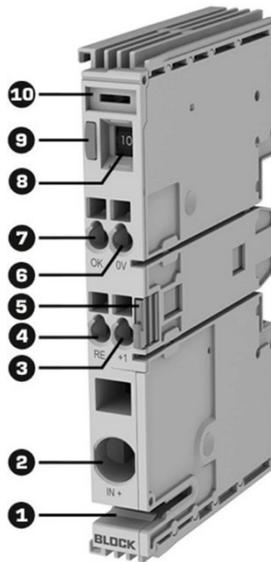
- ❶ Mounting cross connector EB-BAR
- ❷ Feed terminal up to max. 40A
- ❸ Outputs +1, +2 (bridged)
- ❹ Release tab
- ❺ 0V Connection for internal supply
- ❻ Summation signal OK
- ❼ Switch / LED
- ❽ Labeling field for 5mm marking system

#### Clamping data

	❷	❸ + ❺ + ❻
	1,5 ... 16 mm <sup>2</sup>	0,08 ... 2,5 mm <sup>2</sup>
	1,5 ... 10 mm <sup>2</sup>	0,08 ... 2,5 mm <sup>2</sup>
AWG	16 ... 8	28 ... 14
	14 mm	8 mm

Figure 4: Connections, operating elements EB-28

### 3.4.3 EB-08, EB-18, EB-38



- 1 Mounting cross connector EB BAR
- 2 Feed terminal up to max. 40A
- 3 Output +1
- 4 Reset Input RE
- 5 Release tab
- 6 0V Connection for internal supply
- 7 Summation signal OK
- 8 Current Setting wheel
- 9 Switch / LED
- 10 Labeling field for 5mm marking systems

Clamping data

	2	3 + 5 + 6
	1,5 ... 16 mm <sup>2</sup>	0,08 ... 2,5 mm <sup>2</sup>
	1,5 ... 10 mm <sup>2</sup>	0,08 ... 2,5 mm <sup>2</sup>
AWG	16 ... 8	28 ... 14
	14 mm	8 mm

Figure 5: Connections, operating elements EB-08, EB-18, EB-38

## 3.5 Operating states

### 3.5.1 Operating states, signaling normal operation EB-28

	Operating status / description	Output	LED	Signal output (individual/collective signal)	Button is pressed, => transition to ...
Z0	Module initialization <sup>1)</sup>	off	off	0 V	---
Z1	Output switched on, function OK	on	green	24 V	Z3
Z2	Output current >90% of rated current <sup>2)</sup>	on	green flashing	24 V	Z3
Z2	Output current > 1,25 x rated current (EB 2824) <sup>2)</sup>	on	green flashing	24 V	Z3
Z3	Output is switched off	on	red	0 V	Z1
Z4	Output is switched off due to an overcurrent, thermal expansion active <sup>4)</sup>	off	red flashing	0 V	---
Z5	Output is switched off due to an overcurrent, thermal expansion has ended	off	orange flashing	0 V	Z3
Z6	Device error (defective fuse detected)	off	red fast flashing	0 Vdc	---

1) Once module initialization is complete, the outputs are switched on

2) The Output is automatically switched off in the Event of overcurrent according to the tripping characteristic.

On switch-off, Transition according to operating state Z 4

3) The status of the Output us saved when the device is switched off.

4) After a waiting time (thermal Expansion) Transition operating state Z 5. When the appliance is switched off, the remaining waiting time is saved and waited for when the appliance is switched on again. This reliably prevents the switching element from bein overloaded even if the appliance is switched on again immediately.

### 3.5.2 Operating states, signaling, reactions: EB-07, EB-17, EB-27, EB-37

	Operating status / description	Output	LED	Signal output (individual/collective signal)	Button is pressed, => transition to ...
Z0	Module initialization <sup>1)</sup>	off	off	0 V	---
Z1	Output switched on, function OK	on	green	24 V	Z4
Z2	Output current >90% of tripping current	on	green flashing	24 V	Z4
Z3	Output current > rated current <sup>2)</sup>	on	green flashing	24 V	Z4
Z3	Very high inrush capacity (double rated current)	on	very fast green flashing (1sec.)	24 V	Z4
Z4	Output is switched off	off	red	0 V	Z1
Z5	Output is switched off due to an overcurrent, thermal expansion is active	off	red flashing	0 V	---
Z6	Output is switched off due to an overcurrent, thermal expansion has ended	off	orange flashing	0 V	Z4
Z7	Device error (defective fuse)	off	red fast flashing	0 V	---

- <sup>1)</sup> Once module initialization is complete, the last available Status is assumed.
- <sup>2)</sup> The Output is automatically switched off in the event of overcurrent according to the tripping characteristic. After the circuit breaker has tripped, it changes to state Z 5.
- <sup>3)</sup> After a waiting time (thermal Expansion), Transition to operating state Z 6. When the appliance is switched off, the remaining waiting time is saved and waited for when ist switched on again. This reliably prevents the switching element from beeing overloaded even if the appliance is switched on again immediately.

### 3.5.3 Operating states, signaling, reactions EB-08, EB-18, EB-38

	Operating status / description	Output	LED	Signal output (individual/collective signal)	Button is pressed, => transition to ...
Z 0	Module initialization <sup>1)</sup>	off	off	0 V	---
Z 1	Output switched on, function OK	on	green	24 V	Z 4
Z 2	Output current >90% of tripping current	on	green flashing	24 V	Z 4
Z 3	Output current > 1.10 x rated current <sup>2)</sup>	on	green flashing	24 V	Z 4
Z 4	Output is switched off	off	red	0 V	Z 1
Z 5	Output is switched off due to an overcurrent, thermal expansion is active	off	red flashing	0 V	---
Z 6	Output is switched off due to an overcurrent, thermal expansion has ended	off	orange flashing	0 V	Z 4
Z 7	Device error (defective fuse)	off	red fast flashing	0 V	---

<sup>1)</sup> Once module initialization is complete, the latest available Status is adopted.

<sup>2)</sup> The Output is automatically switched off in the Event of overcurrent according to the tripping characteristic. After the circuit breaker has tripped, it changes to state Z 5.

<sup>3)</sup> After a waiting time (thermal Relaxation), Transition to operating state Z 6. When the appliance is switched off, the remaining waiting time is saved and waited for when it is switched on again. This reliably prevents the switching element from being overloaded even if the appliance is switched on again immediately.

### 3.5.4 Switch-on behavior

#### 3.5.4.1 **EB-07, EB-17, EB-27, EB-37**

As soon as the input voltage has reached the switch-on wave of  $17.5V \pm 0.7V$ , the channels switch on after an initialization time of approx. 27ms. Each channel acts independently and switches on independently of the adjacent channels.

#### 3.5.4.2 **EB-28:**

See 2.5.2.1 The module initialization time is approx. 52ms.

#### 3.5.4.3 **EB-08, EB-18, EB-38:**

A communicative network is created by connecting the circuit breakers in series. When the supply voltage is applied and the switch-on threshold of  $17.7V \pm 0.7V$  is exceeded with a rise rate of at least 8V/s, channel 1 (far left) switches on after an initialization time of 52ms. Channel 2 is located to the right of channel 1 and switches on after 85ms if the current flowing in channel 1 is less than its rated current. If the current in channel 1 exceeds the nominal value, the switching on of channel 2 is delayed until the current in channel 1 is less than the nominal current. Only then is channel 2 switched on with a delay of 85 ms. If the current in channel 1 permanently exceeds the rated current, channel 2 is switched on after a maximum waiting time of 5 seconds. The process is repeated with the following channels. Only then is the "OK" signal contact set.

## 3.6 Automatic addressing

The circuit breakers with extended communication properties (EB 08, EB 18, EB 38 & EB 07, EB 17, EB 37) address themselves automatically when the supply voltage is switched on. For this purpose, an optical procedure is used in which the installed modules are assigned a consecutive number one after the other. The module on the far left is assigned the number 1. The time sequence is described in section 2.5.2.3.

For reliable addressing, it is necessary that all connected circuit breakers are supplied with voltage at the same time.

## 3.7 Undervoltage cut-off

### 3.7.1 **EB-27 / EB-28 / EB-07 / EB-17 / EB-37**

If the input voltage falls below the switch-off threshold of  $16.7V \pm 0.7V$  during operation, the circuit breaker channel switches off and blocks the current flow. Each channel acts independently and, due to tolerances, has a slightly different voltage value from which the switch-off is realized. When switching back on, the last state is restored when the switch-on threshold (section 2.5.2) is exceeded.

### 3.7.2 **EB-08, EB-18, EB-38**

If the input voltage of the communicating circuit breakers falls below the switch-off threshold of  $17.45V \pm 0.7V$ , all channels with a current flow of more than 100% of the rated current are initially switched off and stored. The switch-off takes place channel by channel. There is a delay time of 16 ms in between. If the input voltage drops further, all remaining channels are switched off.

## 3.8 Accessories

### 3.8.1 Necessary accessories



#### 3.8.1.1 EB-BARx cross-connector:

The EB-BARx cross-connector is used to forward the +24V / +48V supply voltage to all connected modules. The current carrying capacity is 80A. The standard cross-connector is 492 mm long for 41 modules to be connected in series. Shortened cross connectors are available as an option.



#### 3.8.1.2 EB-COV side cover:

The EB-COV cover serves as a cover and protection against unintentional contact with the contacts protruding to the left of the modules.

### 3.8.2 Optional accessories

#### 3.8.2.1 Communication modules:

Various communication modules are available for connecting communication-capable EasyB circuit breaker channels to a higher-level control system. The communication modules are connected to the left of the circuit breaker group. You can find more information on the individual communication modules in the product area at [www.block.eu](http://www.block.eu).



#### 3.8.2.2 EB-PM potential distribution module:

If more than the output contacts available on the circuit breaker channel are required to distribute the output current, up to three EB-PMM potential distribution modules can be added to the right of the circuit breaker channel. This provides up to 24 additional output contacts. The potential distribution modules are automatically connected to the circuit breaker channel.

#### 3.8.2.3 0 V common terminal EB-GNDx:

The EB-GND4 and EB-GND8 modules are used as 0V bus terminals with four and eight contacts respectively. The  $2.5\text{mm}^2_{\text{contacts}}$  can be loaded with up to 10A. A total current of 40A is permitted per module. The current is distributed via cross-connectors EB-BAR and can be fed back to the power supply unit via the  $16\text{mm}^2_{\text{contact}}$  on EB-GND4.



#### 3.8.2.4 Labeling options:

EasyB modules are labeled with standard 5 or 6 mm labels.

### 3.9 Functional diagram

#### 3.9.1 EB-27, EB-28

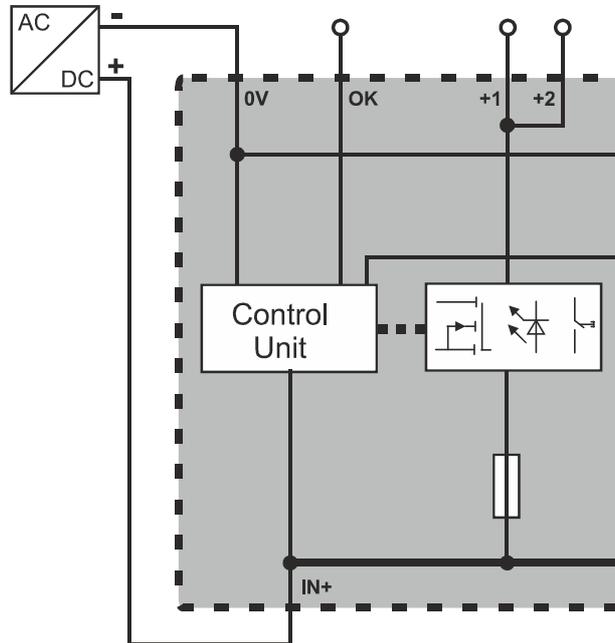


Figure 6: Functional diagram EB-27, EB-28

#### 3.9.2 EB-07, EB-17, EB-37

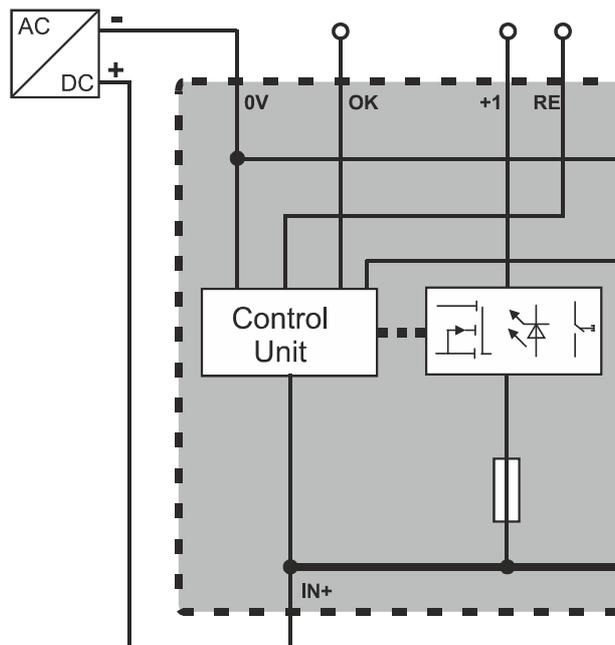


Figure 7: Functional diagram EB-07, EB-17, EB-37

### 3.9.3 EB-37 2-channel

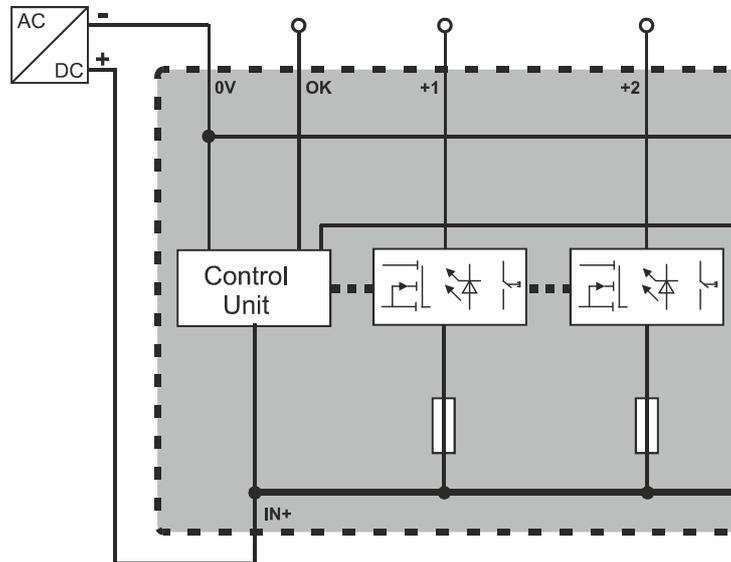


Figure 8: Functional diagram EB-37 2 channels

### 3.9.4 EB-1724-160-0F

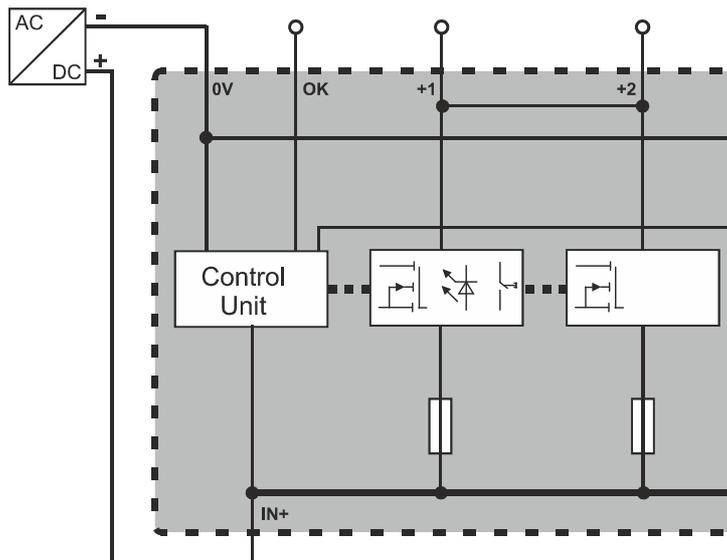


Figure 9: Functional circuit diagram EB-1724-160-0F

### 3.9.5 EB-08, EB-18, EB-38

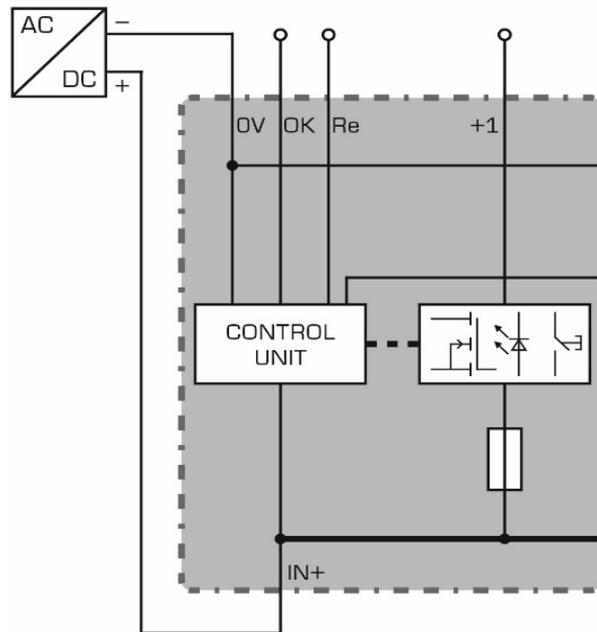


Figure 10: EB-08, EB-18, EB-38

## 4. Installation

### 4.1 Schematic diagram Installation

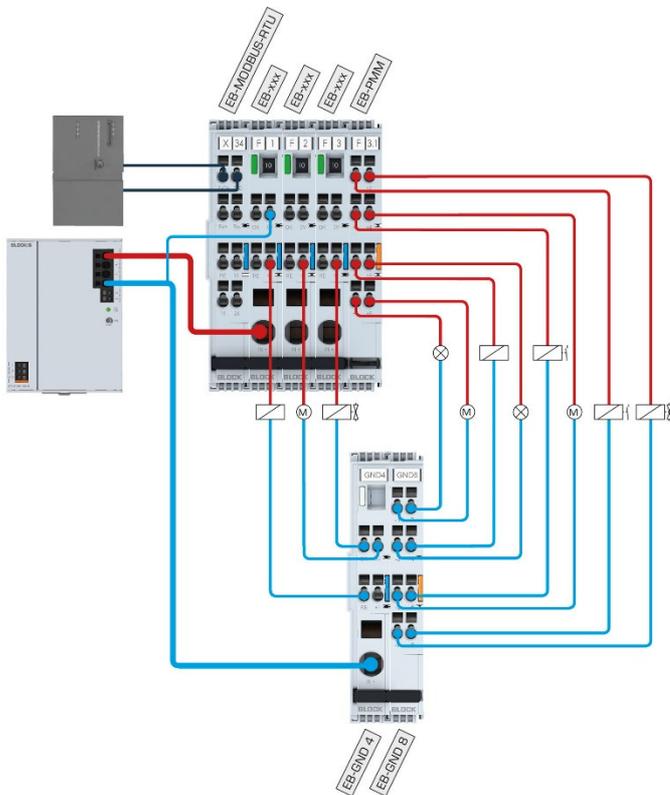


Figure 11: EasyB schematic diagram

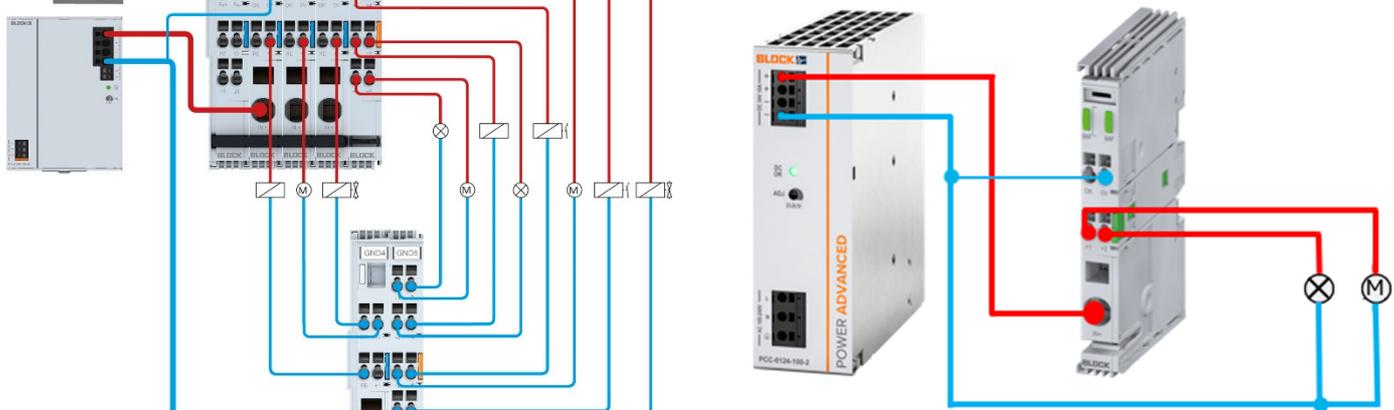
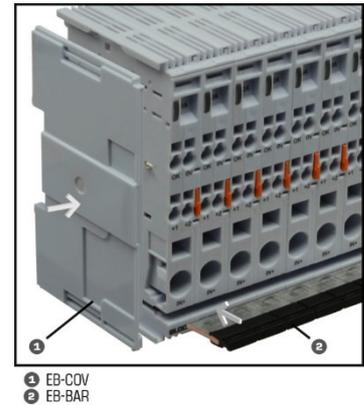


Figure 12: Principle circuit diagram Easy-B 2 channels

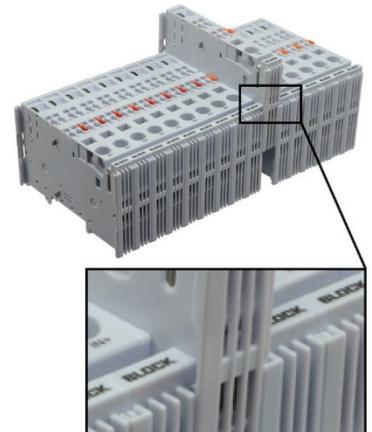
## 4.2 Assembly

The appliance must be mounted horizontally on the standard profile rail TH 35-15/7.5 (EN 60715). The appliance must be aligned so that the ventilation slots are at the top or bottom. A minimum distance of 30 mm must be maintained at the top and bottom. Additional modules are inserted at the side. Secure positioning and connection is achieved using a tongue and groove system. The EB-COV cover is required on the left-hand module on the left-hand side of the housing.



## 4.3 Connection

Dimension the cables according to the max. input or output current. Refer to Figure 2-3 or Figure 2-4 for the permissible cable cross-sections. Connect the +24V supply voltage to the In+ supply terminal. The +24V supply voltage is bridged across all modules by the EB-BAR cross-connector. All other signal connections are automatically bridged by the series connection. For currents >40 A, several feed terminals must be used. Select the feed terminals so that the current in the cross-connector does not exceed 80 A.



## 4.4 Use of different equipment variants

It is possible to connect circuit breaker channels of different equipment variants with each other. It should be noted that the communication capability of the circuit breakers (EB-08, EB-18, EB-38) is deactivated if they are connected to circuit breakers with equipment variants EB07, EB-17, EB-27, EB-37 or EB28. In this case, only the function of the collective signal is retained.

### 4.4.1 Use of different voltages in one block 24V & 48V

Please note that the electronic circuit breakers of the EASY B system must not be installed with different voltages in the same block. Mixing 24V and 48V systems within a block can lead to malfunctions and damage to the components. Therefore, make sure that only circuit breakers with the same rated voltage are used within a block.

## 4.5 Accessories on the housing

There are two plastic parts on the back of the housing that can be broken off by gently levering them off the housing. The lower part is used to close the housing opening for the cross-connector on the right-hand module. The upper demolition part can be used to close the opening of the current selector switch of EB-08.



## 4.6 Dismantling

Remove the EB-BAR cross connector and all connected cables from the EasyB module to be dismantled. Pull the module out of the assembly using the release tab.

## 5. Technical data

### 5.1 Thermomagnetic input

	EB-07	EB-17	EB-27	EB-37
Nominal input voltage	24 Vdc / 48 Vdc		24 Vdc	
Input voltage range	18 – 30 Vdc / 32 – 58 Vdc		18 – 30 Vdc	
Max. Residual ripple/ripple of the input voltage	3 %			
Switch-on threshold	17,5 ± 0,4 Vdc / 31,4 ± 0,4 Vdc		17,5 Vdc ± 0,7 Vdc	
Duty cycle	27 ms			
Switch-off threshold	16,7 ± 0,7 Vdc / 31,0 ± 0,4Vdc		16,7 ± 0,7 Vdc	
Max. Continuous current per contact (0V)	10 A			
Max. Continuous current per contact (In +)	40 A			
Overvoltage protection	33 V			
No-load power loss	0,3 W			

### 5.2 Thermomagnetic output

	EB-07	EB-17	EB-27	EB-37
Rated output voltage	24 Vdc / 48 Vdc		24 Vdc	
Rated output current	0,5A / 1A / 2A / 3A / 4A / 6A / 7,5A / 8A / 10A / 16A			
Current limitation	-			
Maximum voltage drop between input and output	< 140mV (10A)			
Module initialization time	27 ms			
Switch-on delay of the channels	-			
Waiting time after shutdown of an output (thermal relaxation)	500 ms (Short circuit) – 5s (Over current)			
Maximum power loss	3,3 W			
Maximum load capacity per output	10mF (0,5A) / 20mF (1&2A) / 30mF (3A) / 40mF (4/6/8/10A) / 60mF (16A)			
Integrated output fuses	1 A / 2A / 3,15A / 4A / 6,3A / 10A / 15A Depending on the circuit breaker			
Backfeed resistance	Max. 35 Vdc / Max. 58 Vdc			
Parallel connection of outputs	Not permitted			
Series connection of outputs	Not permitted			

### 5.3 Input current limiting

	EB-08	EB-18	EB-28	EB-38
Nominal input voltage	24 Vdc			
Input voltage range	18 – 30 Vdc			
Max. residual ripple of the input voltage	3%			
Switch- on threshold	17,7 V ± 0,7V			
Switch-on duration	min. 52ms			
Switch-off duration	17,45 ± 0,7V			
Max. continuous current per contact (0V)	10A			
Max. continuous current per contact (IN +)	40A			
Overvoltage protection	33V			
No-load power loss	1,17W			

### 5.4 Output current limiting

	EB-18	EB-28	EB-08	EB-38
Nominal output voltage	24 Vdc			
Nominal output current	1A / 2A / 3A / 4A / 6A / 8A / 10A		Adjustable. 1A / 2A / 3A / 4A / 6A / 8A / 10A	
Current limiting	1,25 x I <sub>R</sub>		1,25 x I <sub>Adj.</sub>	
Maximum voltage drop between input and output	<140mV (10A)			
Module initialization time	52 ms			
Switch-on delay of the channels	Load-dependent,, min. 85ms, max. 5s			
Waiting time after shutdown of an output (thermal relaxation)	500ms (short circuit) - 5s (overload)			
Maximum power loss	1,2 W ... 2,5 W			
Maximum load capacity per channel	70 mF ... 110 mF			
Integrated output fuse	15 A			
Backfeed resistance	Max. 35 Vdc			
Parallel connection of outputs	Not permitted			
Series connection of outputs	Not permitted			

## 5.5 Trip characteristics

### 5.5.1 EB-x7-xxx-xF

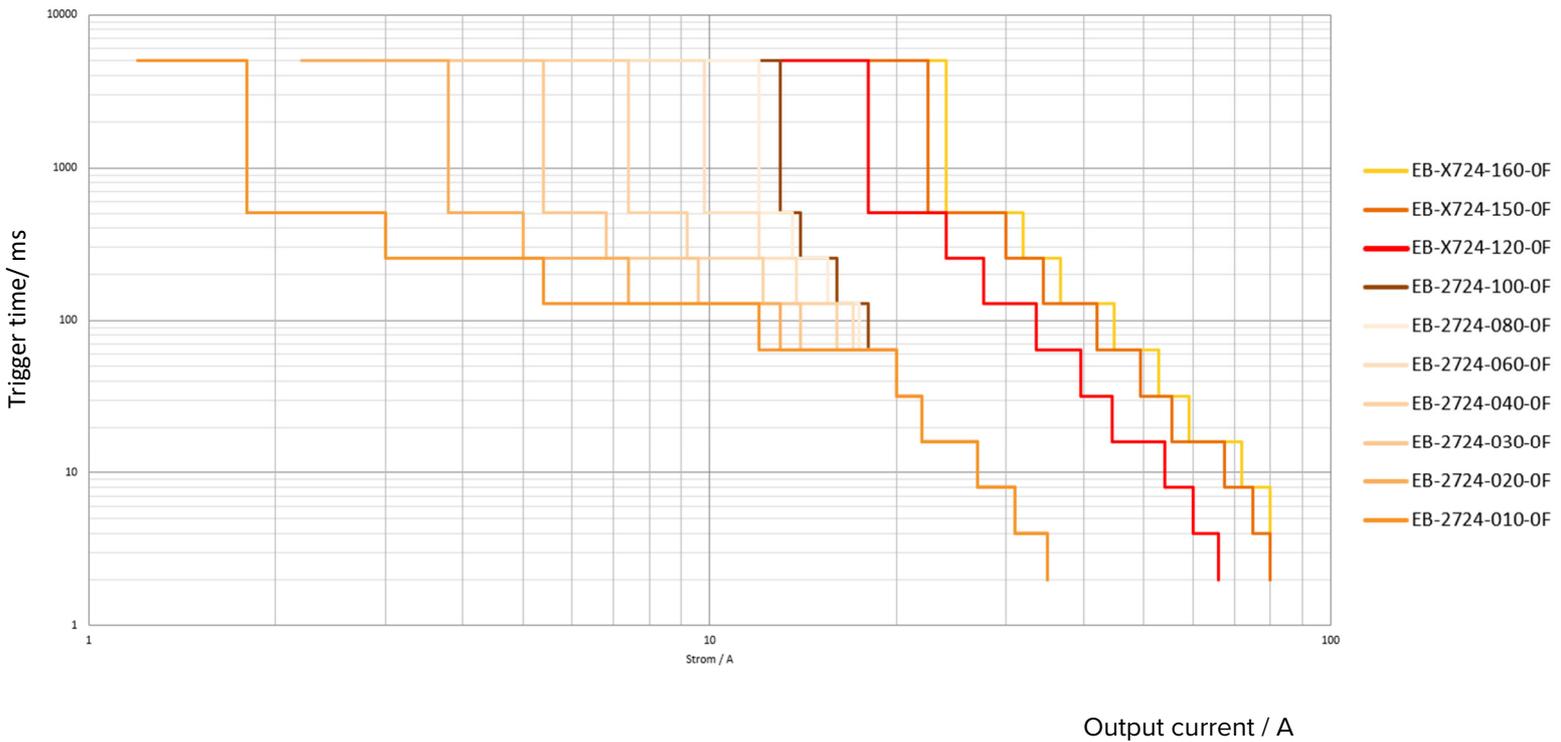


Figure 14: trip characteristic EB-x7-xxx-xF

### 5.5.2 EB-07 / EB-17

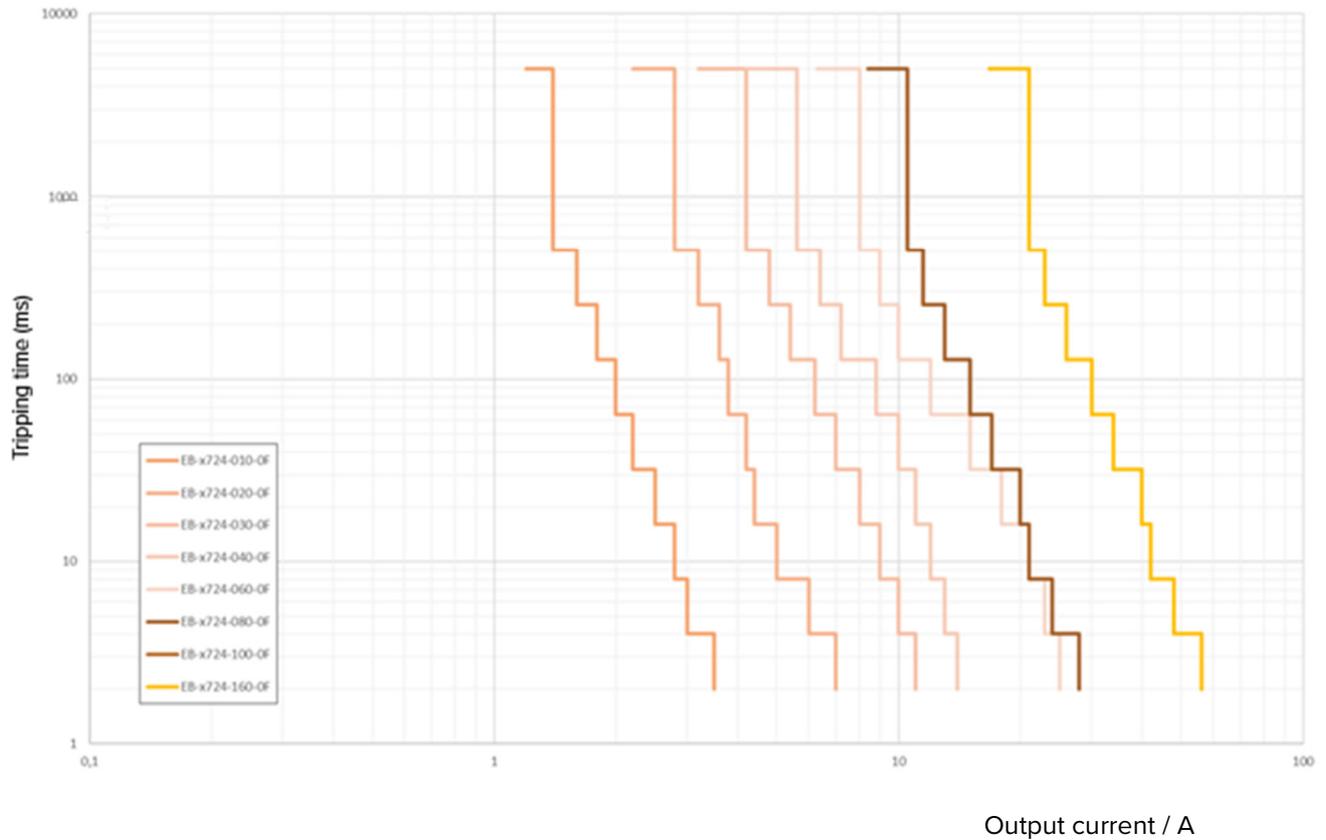


Figure 15: trip characteristic EB-07, EB-17

### 5.5.3 EB-28

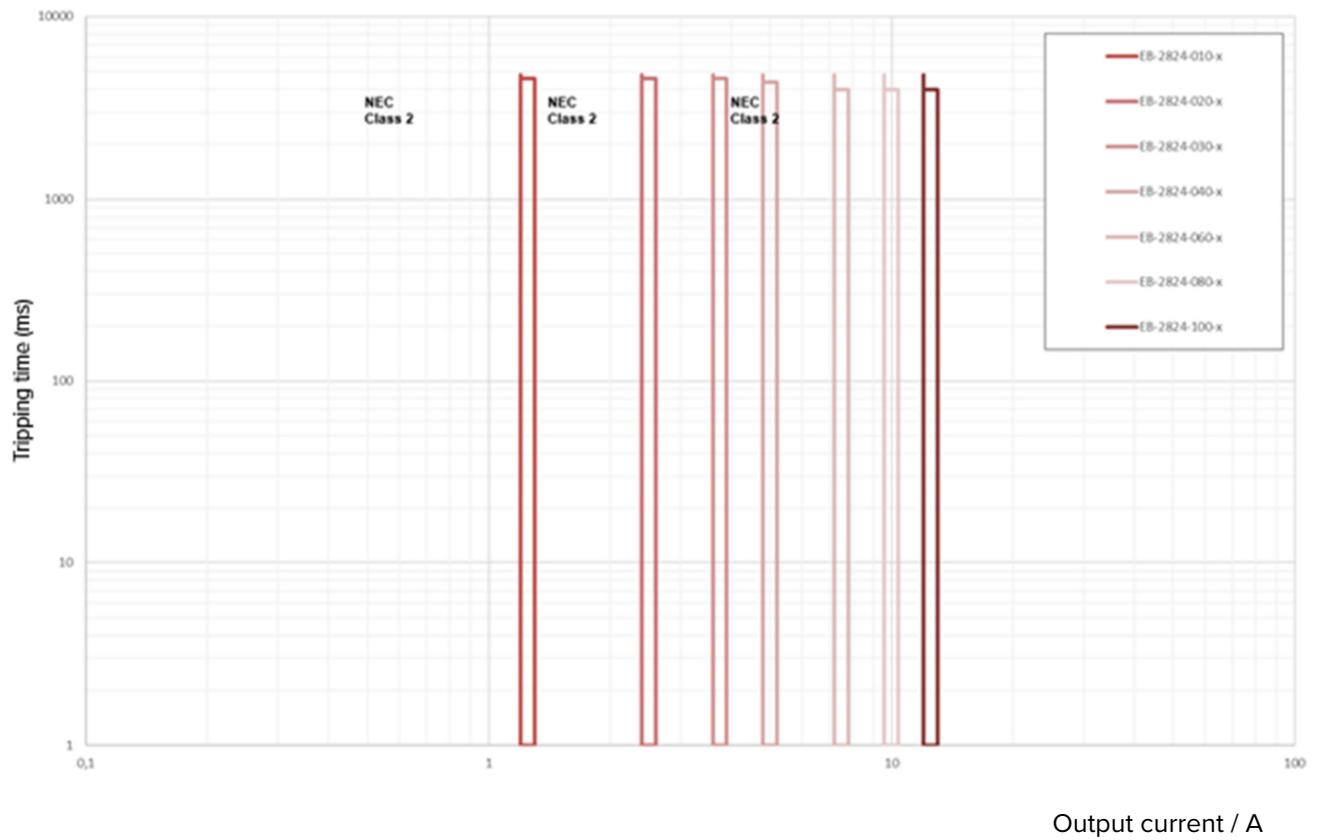


Figure 16: trip characteristic EB-28

### 5.5.4 EB-08, EB-18, EB-38

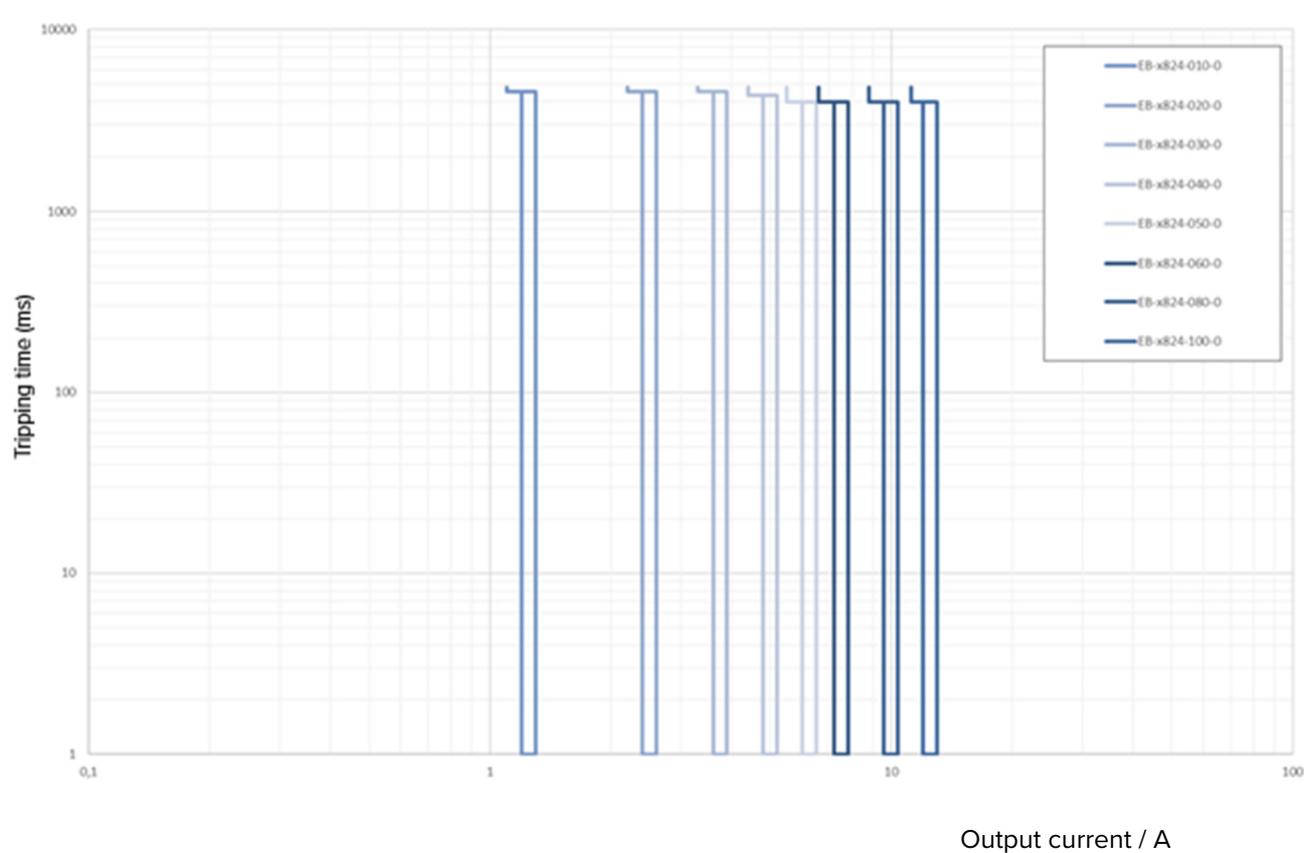


Figure 17: Tripping characteristic EB-08, EB-18, EB-38

## 5.6 MTBF

	EB-0724 EB-1724	EB-2724 EB-3724	EB-0748 EB-1748	EB-1824	EB-2824	EB-0824 EB-3824
Mean Time Between Failures	> 500,000 h at 40°C, rated load					

## 5.7 EMC, Safety

	EB-0724 EB-1724	EB-2724 EB-3724	EB-0748 EB-1748	EB-1824	EB-2824	EB-0824 EB-3824
Standard for safety	EN 60950-1, EN 50178, EN/IEC 60204-1					
CE	In accordance with 2014/30/EU (EMC Directive)					
Protection class	III					
Safety class	IP 20					
EMC immunity	EN 61204-3					
EMC interference emission	EN 61204-3					

## 5.8 Ambient conditions

	EB-0724 EB-1724	EB-3724	EB-0748 EB-1748	EB-1824	EB-0824 EB-3824	EB-2824 EB-2724
Ambient temperature up to 6A rated current	-25°C ... +70°C					
Ambient temperature up to 8A rated current	-25°C ... +60°C					
Ambient temperature up to 10A rated current	-25°C ... +55°C					-25°C ... +60°C
Storage temperature	-25°C ... +85°C					
Degree of soiling	II					
Air humidity	5 ... 96%, No condensation					
Climate class (EN 60721)	3K3					

## 5.9 Dimensions, Weight

	EB-0724 EB-1724	EB-2724 EB-3724	EB-0748 EB-1748	EB-2824	EB-1824	EB-0824 EB-3824
Dimensions	see illustration below					
Weight	39g			40g	42g	

