REX22D-Tx electronic circuit protector

Description

E-T-A's compact and flexible REX system represents a comprehensive DC 24 V protection and distribution solution for mechanical engineering. It is a perfectly matched system, consisting of supply, overcurrent protection, power distribution and bus controller.

REX22D-T selectively protects all DC 24 V load circuits up to 20 A and limits the output current linearly during switch on or before tripping. The limitation cuts down the current rating in the event of a short circuit. This enables an effective and predictable protection even for switch mode power supplies with low power reserves.

Thus, the electronic characteristic curve additionally provides among other things the solution for protection of drive engineering, control technology for frequency converters, multiphase motors and sensitive relay contacts.

The only 12.5 mm wide devices, which can be modularly mounted side by side, are completely designed in push-in technology incl. pusher. Tool-free, time-saving and maintenance-free wiring are guaranteed.

All REX22D-T modules can be operated in the BASE and also in the COM mode. While the BASE mode provides an error message via the auxiliary contact in the supply module, the COM mode offers a variety of diagnosis, control and parameterisation options by means of different communication modules. All devices automatically recognise the respective operating mode.

Benefits

- Offers transparency and flexibility through adjustable current ratings via slide
- Reduces downtimes through calculable limited max. current
- Increases availability, as also loads with higher current consumption can be protected without unintended tripping
- Offers flexibility through automatic recognition of the operating mode.

Approvals

Compliance

Features

- Device combination incl. supply, overcurrent protection, power distribution and bus controller
- Remote control, parameterisation, diagnosis and monitoring via IO link, Modbus RTU or field bus system in the ***ControlPlex®*** CPC12 Controller
- BASE and COM mode in one module
- Fixed current ratings 12 A to 20 A
- Adjustable current ratings to 20 A
- No accessories required

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Preferred types – for more details on all product versions please see page 6

Preferred types are E-T-A products most frequently used by E-T-A customers. We manufacture E-T-A preferred types in particularly high volumes. Our preferred types are supplied at shorter lead times than other versions.

Preferred types

Preferred types	Short description	Preferred current ratings (A)		
REX22D-TA1	**1-channel**	12	16	20
REX22D-TA1-100-DC24V-		•	•	•
REX22D-TD1	**1-channel, adjustable 3 increments**	12/16/20		
REX22D-TD1-100-DC24V-		•		
REX22D-TD2	**2-channel, adjustable 3 increments**	2/3/3.6	2/4/6	6/8/10
REX22D-TD2-100-DC24V-		•	•	•
REX22D-TE2	**2-channel, adjustable**	1 - 3.6	1 - 10	
REX22D-TE2-100-DC24V-		•	•	

Technical data (T_U = +23 °C, U_B = DC 24 V)

REX12-Txx-xxx circuit protectors		
REX22D-TA1-10x-DC24V-xA	1-channel with fixed current ratings	
REX22D-TD1-10x-DC24V-xA/xA/xA	1-channel with adjustable current rating in 3 increments	
REX22D-TD2-10x-DC24V-xA/xA/xA	2-channel with adjustable current rating in 3 increments	
REX22D-TE2-10x-DC24V-xA-xA	2-channel with adjustable current ratings in 4 or 10 increments via momentary switch or communication	
The REX22D-Tx can either be operated at a passive supply module (EM12-T) in the BASE mode or at an active supply module (EM12D-T) in the COM mode. The operating mode is recognised automatically.		
Operating data		
Operating voltage U_B	DC 24 V (18 … 32 V) (No battery-buffered applications)	
Current rating I_N	Devices are available in different current ratings from 1 A to 20 A See order numbering code	
Quiescent current I_0 REX22D-Tx1 1-channel versions	In ON condition: typically 11 mA	
REX22D-Tx2 2-channel versions	In ON condition: typically 16 mA	
Reverse polarity protection	Yes, without load	
Visual operation status indication by means of multicoloured LED:	Green: Load circuit connected Green/orange blinking: Load current warning limit reached Orange: Overload or short circuit until disconnection Circuit protector was disconnected by the superordinate control unit, LED is permanently orange Red: After an overload/short circuit disconnection after low voltage disconnection of operating voltage in ON condition with autoreset OFF: Device was switched off via ON/OFF momentary switch or due to lacking operating voltage, triggered fail-safe element or faulty initialisation of the circuit protector.	
Load current measurement	1 A – 10 A types Measuring accuracy ±5 % ± 0.1 A 10 A – 20 A types Measuring accuracy ±5 % ± 0.3 A	
Load voltage measurement	Measuring accuracy ±3 % ± 0.1 V	
Load circuit		
Load output	Power-MOSFET-switching output (plus switching) no physical isolation	
Parameters	**Factory settings**	**Adjustable range (in COM mode)**
Switch-on behaviour	Last condition	Last condition

Technical data (T_U = +23 °C, U_B = DC 24 V)

Current ratings	Maximum current ratings	1 A – 3.6 A; 1 A – 10 A in 1 A increments
Load current warning limit (I_{WLimit}) Without COM mode In COM mode	 Typically 90 % I_N Typically 80 % I_N Typically 50 … 100 % I_N	
Warning limit hysteresis	Typically 5 %	
Overload disconnection (I_{OL})	Typically 1.2 x I_N (1.05 to 1.35 x I_N) Exception: I_N 3.6 A CL2 typically 1.05 x I_N	
Short circuit current (I_{KS})	With active current limitation Typically 2.5 x I_N , 1 A Typically 1.6 x I_N , 2 A – 5 A Typically 1.4 x I_N , 6 A – 20 A	
Trip times	Overload disconnection (I_{OL}) typically 3 s Short circuit disconnection (I_{KS}) Typically 0.01 to 1 s See time/current characteristics	
Fail-safe element, voltage drop and max. load current	See table 1	
Operating voltage monitoring for low voltage	OFF at typically OFF at typically Hysteresis typically with automatic OFF and ON operation	U_B < 16.0 V U_B > 19.0 V 2 V
ON delay with power ON	Channel 1: Channel 2:	typically 1,500 ms (depending on slot) typically 1,600 ms (depending on slot)
When switching on via ON/OFF momentary switch after low voltage	Channel 1: Channel 2: Channel 1: Channel 2:	typically 5 ms typically 100 ms typically 5 ms typically 5 ms
Disconnection of the load circuit	- Manually at the device with the ON/OFF momentary switch - Remote control via superordinate control unit - After an overload / short circuit disconnection with storage (no automatic reset) - Temporarily at low voltage - With no operating voltage	
Switch on of the load circuit - Momentary switch **ON**/OFF - Applying operating voltage:	The circuit protector can be switched on by the superordinate control unit or otherwise directly on the device. These two options are linked with AND. Switch on is only possible when **switched on from both positions**. If the circuit protector was switched off either by the control unit or by the momentary switch directly on the device, switch-on has to be effected also from the corresponding position. For switch on the device has to be supplied with operating voltage. The device re-starts with the last stored condition.	
Leakage current in load circuit in OFF condition	Typically 0.2 mA	
Capacitive loads	To 40,000 µF	
Free-wheeling circuit	External free-wheeling circuit at inductive load (rating according to load)	

Technical data (T_U = +23 °C, U_B = DC 24 V)

Parallel connection of several load outputs	Not permitted
FM/SM status output	**Error indicator/status indicator in the REX system in standard mode**
Electrical data	Regarding the EM12-T supply module a group signalling is realised via Si auxiliary contact.
FM status output REX22D-Tx-100-xx	**FM error indicator**
Normal condition	- Closed auxiliary contact in the EM12-T supply module - In ON condition, load output continuously switched - In OFF condition, load output switched off - No operating voltage U_B at the REX22
Fault condition	- Open auxiliary contact in the EM12-T supply module - Load output locked after an overcurrent/short circuit disconnection - After low voltage disconnection of operating voltage in ON condition with autoreset - No operating voltage U_B at the EM12-T supply module
SM status output REX22D-Tx-101-xx	**SM status indicator**
Normal condition	- Closed auxiliary contact in the EM12-T supply module - In ON condition, load output continuously switched - No operating voltage U_B at the REX22
Fault condition	- Open auxiliary contact in the EM12-T supply module - In OFF condition, load output switched off - Load output locked after an overcurrent/short circuit disconnection - After low voltage disconnection of operating voltage in ON condition with autoreset - No operating voltage U_B at the EM12-T supply module

Technical data (T_U = +23 °C, U_B = DC 24 V)

Terminals	**LOAD+**
Push-in terminal PT 2.5	0.14 mm² to 2.5 mm², flexible with wire end ferrule 0.14 mm² to 2.5 mm², flexible with wire end ferrule and plastic sleeve 0.14 mm² to 4 mm², flexible without wire end ferrule 0.14 mm² to 4 mm², rigid AWG24 – AWG14 str.
Wire stripping length	8 mm to 10 mm
General data	**REX22D-T…**
Housing material	Plastic material
Mounting method	Symmetrical rail to EN 60715-35x7.5
Ambient temperature (T_{amb})	-30...+60 °C (without condensation, cf. EN 60204-1)
Storage temperature	-40...+70 °C
Mounting temperature	+5...+60 °C
Damp heat	96 hrs / 95 % RH RH/40 °C to IEC 60068-2-78-Cab climate class 3K3 to EN 60721
Altitude	2,000m above sea level 3,000 m above sea level up to +55 °C 4,000 m above sea level up to +50 °C
Operation pressure	4 bar above atmospheric pressure
Vibration resistance	5 g, test to IEC 60068-2-6 test Fc
Degree of protection REX22D operating area	IEC 60529, DIN VDE 0470 IP30
EMC requirements (EMC Directive, CE logo) Connected to a EM module	Emitted interference EN 61000-6-3 Noise immunity: EN 61000-6-2
Insulation coordination (IEC 60934)	0.5 kV / pollution degree 2
Dielectric strength	Max. DC 32 V (load circuit)
Insulation resistance (OFF condition:)	N.a., only electronic disconnection
Conformity	CE Marking
Dimensions (h x w x d)	12.5 x 80 x 98.5 mm
Mass REX22D-Tx1-xxx 1-channel REX22D-Tx2-xxx 2-channel	Approx. 63 g Approx. 66 g

Approvals and standards

Approval authority	Standard	UL file no.	Rated voltage	Current rating range
UL	UL 2367, UL 1310 (NEC Class2)	E306740	DC 24 V	1 A ... 20 A 1 A ... 3.6 A
UL	UL 508 CSA C22.2 No. 14	E492388	DC 24 V	1 A ... 20 A

REX22-TE2 current rating request

Reading the present current rating is, independent of the operating mode (COM or BASE), possible for each channel directly at the REX22D-TE2. Enquiry mode is started by pushing the button between >= 2 seconds and < 5 seconds. After releasing the button, the LED briefly lights up RED to indicate start of request. Then the LED flashes ORANGE to indicate the adjusted current value. The adjusted current rating is indicated by the number of flashes. If the LED lights up 6 times, for example, the current rating is currently set to 6 amps. When the adjusted current rating is reached, signalling re-starts after another brief flash of the RED LED. The enquiry mode is left after the adjusted current rating was signalled 5 times or by pressing the button. Visual indication will now show again the current operating condition. The enquiry mode is possible in all operating conditions (ON, OFF, UNDERVOLTAGE and TRIPPED).

REX22-TE2 current rating adjustment

The REX22D-TE2 current rating adjustment is possible both in the BASE and the COM mode.

The adjustment in the BASE or COM mode (without active connection to the superordinate control unit) is started for each channel by pressing the button for >= 5 seconds. After releasing the button, the LED briefly lights up RED to indicate start of adjustment. Then the LED flashes GREEN to indicate the current rating to be adjusted. After reaching the max. adjustment value, signalling re-starts. An overflow from the maximum to the minimum adjustment value is indicated by a short flash of the RED LED. The current rating to be adjusted is adopted by pushing the button during the blinking period of 1 A up to the max. adjustment value. If for instance the button is pushed after the 6th illumination of the GREEN LED, 6 Ampere is adopted as current rating and visual indication again shows the current operating condition. If the button is not pressed, the adjustment mode is left after 5 times signalling the current rating range without a new current rating being adopted and the visual indication returns to current status indication.

The adjustment mode is possible in all operating conditions (ON, OFF, UNDERVOLTAGE and TRIPPED).

The adjustment in the COM mode is possible via the active connection to the superordinate control unit.

As soon as IO link communication is established, the current rating is taken over into the IO link master depending on the „Backup and restore“ setting.

Please see here for the video of mounting, operation and adjustment:
https://www.e-t-a.de/index.php?id=17311

Link for mounting (REX12):
https://www.youtube.com/watch?v=BcMUMtZdFuM

Link for operation and setting (REX12D-TE):
https://www.youtube.com/watch?v=Waqd5cQvev4

Communication interface

Overview of commands in COM mode:

Writing/reading of device configuration (parameters)
- Current rating (only for REX22D-TE2-10x-DC24V-xA-xA types)
- Load current warning limit

Reading of static product information
- Current rating
- Device types
- Serial number
- Hardware version
- Software version

Reading of dynamic device information / measuring values
- Load current
- Load voltage
- Error memory
- Trip counter
- Reason of last trip
- Device status / event

Control commands
- Switch on/off or reset load output
- Reset error memory
- Reset trip counter
- Set parameters to factory settings

Note

- Connection to a higher or not reliably disconnected voltage can cause hazardous conditions or damages.
- Only after expert installation must the device be supplied with power.
- After tripping of the circuit protector and before reset, the cause of the failure (short circuit or overload) must be remedied.
- The national standards (e.g. for Germany DIN VDE 0100) have to be observed during installation and selection of supply and return lines.
- The buttons are to be pressed without any tools.

Preferred types – for more details on all product versions please see page 6

Preferred types are E-T-A products most frequently used by E-T-A customers. We manufacture E-T-A preferred types in particularly high volumes. Our preferred types are supplied at shorter lead times than other versions.

Preferred types

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REX22D-TD1	**1-channel, adjustable 3 increments**	12/16/20		
REX22D-TD1-100-DC24V-		•		
REX22D-TD2	**2-channel, adjustable 3 increments**	2/3/3.6	2/4/6	6/8/10
REX22D-TD2-100-DC24V-		•	•	•
REX22D-TE2	**2-channel, adjustable**	1 - 3.6	1 - 10	
REX22D-TE2-100-DC24V-		•	•	

REX22-D - Order numbering code

Series
REX22D Electronic circuit protector with active current limitation and automatic standard or COM mode recognition

Mounting method
T Rail mounting

Design
A 1 load output terminal per channel, firm current ratings xA
D 1 load output terminal per channel, adjustable current ratings xx…xxA, by means of 3-position switch
E 1 load output terminal per channel, adjustable current ratings xx…xxA, by means of 1A increments

Number of channels
1 1 channel
2 2 channels

Version
1 Without physical isolation

Signal input
0 Without signal input

Signal output
0 Status output FM/error indicator
1 Status output Sm/status indicator

Operating voltage
DC 24 V DC 24 V rated voltage

Current ratings
12 A (only 1 channel)
16 A (only 1 channel)
20 A (only 1 channel)
10 A/12 A/15 A (only 1 channel)
10 A/16 A/20 A (only 1 channel)
12 A/16 A/20 A (only 1 channel)
2 A/3 A/3.6 A (only 2 channels, standard Class2)
2 A/3 A/4 A (only 2 channels)
2 A/4 A/6 A (only 2 channels)
3 A/5 A/7 A (only 2 channels)
6 A/8 A/10 A (only 2 channels)
2/3/4 A - 6/8/10 A (only 2 channels)
1 A-3.6 A (only 2 channels, standard Class2)
1 A-10 A (only 2 channels)

Approval
CL2 Class2 (only 1 A–3.6 A; 2 A/3 A/3.6 A versions)

Option:
A Condition as delivered OFF [*1]

REX22D-T	**A**	**1 - 1**	**0**	**0 - DC24V - 16A**		(Example 1 channel)
REX22D-T	**D**	**2 - 1**	**0**	**0 - DC24V - 2A/4A/6A**		(Example 2 channels)
REX22D-T	**E**	**2 - 1**	**0**	**0 - DC24V - 1A-10A**		(Example various current ratings)

Please note:
- Selection of current rating of the circuit protector ≤ Current rating of power supply.
- Condition as delivered is the maximum adjustable current rating.
- Condition as delivered is ON condition
- [*1] Only REX22D-TA1-101-DC24V20A-A versions;
  REX22D-TD1-101-DC24V-12A/16A/20A-A;
  REX22D-TD2-101-DC24V-2A/4A/6A-A;
  REX22D-TD2-101-DC24V-6A/8A/10A-A

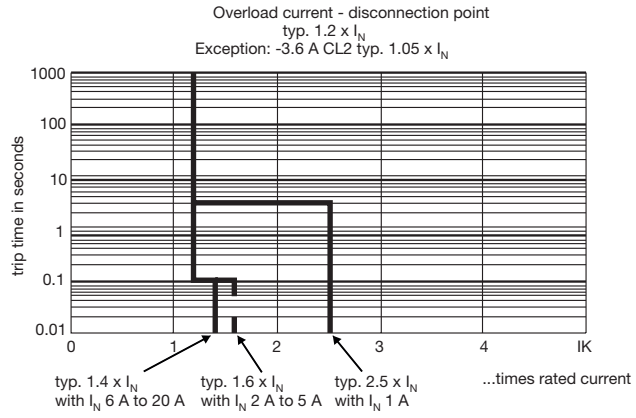
Table 2: Fail-safe element, voltage drop and max. load current

REX22D-Txx with current ratings	Fail-safe element	Voltage drop between +LINE and +LOAD	Max. load current at 100 % ON duty (Derating)		
		Typically per 1 A (at +23 °C)	T_{amb} = +40 °C	T_{amb} = +50 °C	T_{amb} = +60 °C
2A/3A/3.6A-CL2 1A-3.6A-CL2	4 A	45mV	3.6 A	3.6 A	3.2 A
1A/2A/4A 2A/3A/4A	6.3 A	27mV	4 A	4 A	3.6 A
2A/4A/6A 3A/5A/7A	10 A	17mV	7 A	6.5 A	5 A
6A/8A/10A 1A-10A	15 A	11mV	10 A	10 A	8 A
10A/12A/15A 12 A 16 A	25 A	6mV	16 A	16 A	14 A
10A/16A/20A 12A/16A/20A 20 A	30 A	5.3mV	20 A	20 A	16 A

Table 3: Power loss (T_U = +23 °C, U_B = DC 24 V, I_L = 100 %)

Version	Typical power loss P_V in W
REX22D-TA1-10x-DC24V-12A	1.13
REX22D-TA1-10x-DC24V-16A	1.80
REX22D-TA1-10x-DC24V-20A	2.38
REX22D-TD1-10x-DC24V-10A/12A/15A	0.86 / 1.13 / 1.61
REX22D-TD1-10x-DC24V-10A/16A/20A	0.79 / 1.62 / 2.38
REX22D-TD1-10x-DC24V-12A/16A/20A	1.03 / 1.62 / 2.38
REX22D-TD2-10x-DC24V-2A/3A/3.6A-CL2	0.74 / 1.19 / 1.55
REX22D-TD2-10x-DC24V-1A/2A/4A	0.44 / 0.60 / 1.25
REX22D-TD2-10x-DC24V-2A/3A/4A	0.60 / 0.87 / 1.25
REX22D-TD2-10x-DC24V-2A/4A/6A	0.52 / 0.93 / 1.61
REX22D-TD2-10x-DC24V-3A/5A/7A	0.69 / 1.23 / 2.05
REX22D-TD2-10x-DC24V-2/3/4A - 6/8/10A	0.85/ 1.24/ 1.76
REX22D-TD2-10x-DC24V-6A/8A/10A	1.18 / 1.79 / 2.58
REX22D-TE2-10x-DC24V-1A-3.6A-CL2	1.55
REX22D-TE2-10x-DC24V-1A-10A	2.58

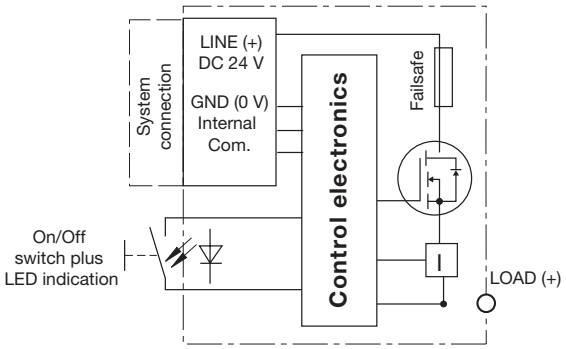
Typical time/current characteristic (T_{amb} = +23 °C, U_B = DC – 24 V)



Short circuit current –
Disconnectionor short circuit current limitation

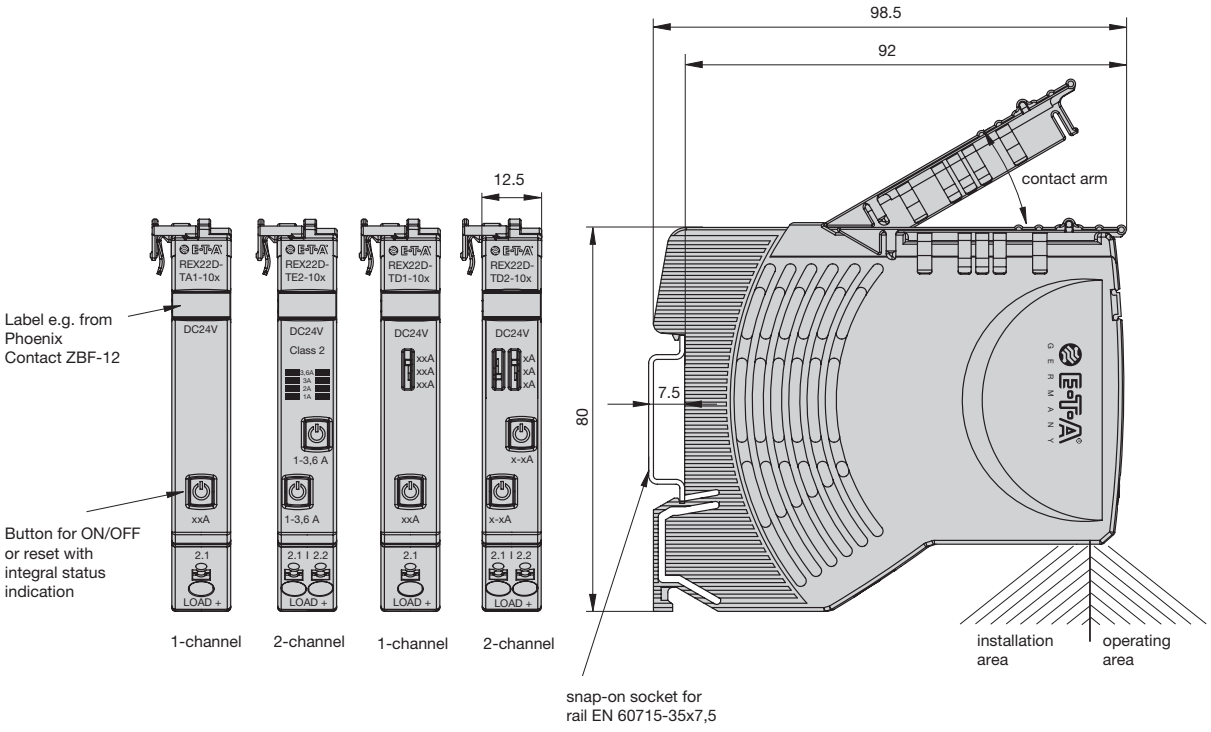
Without the current limitation there would be a much higher overcurrent in the event of an overload or short circuit.

REX22D-Txx-xxx schematic diagram

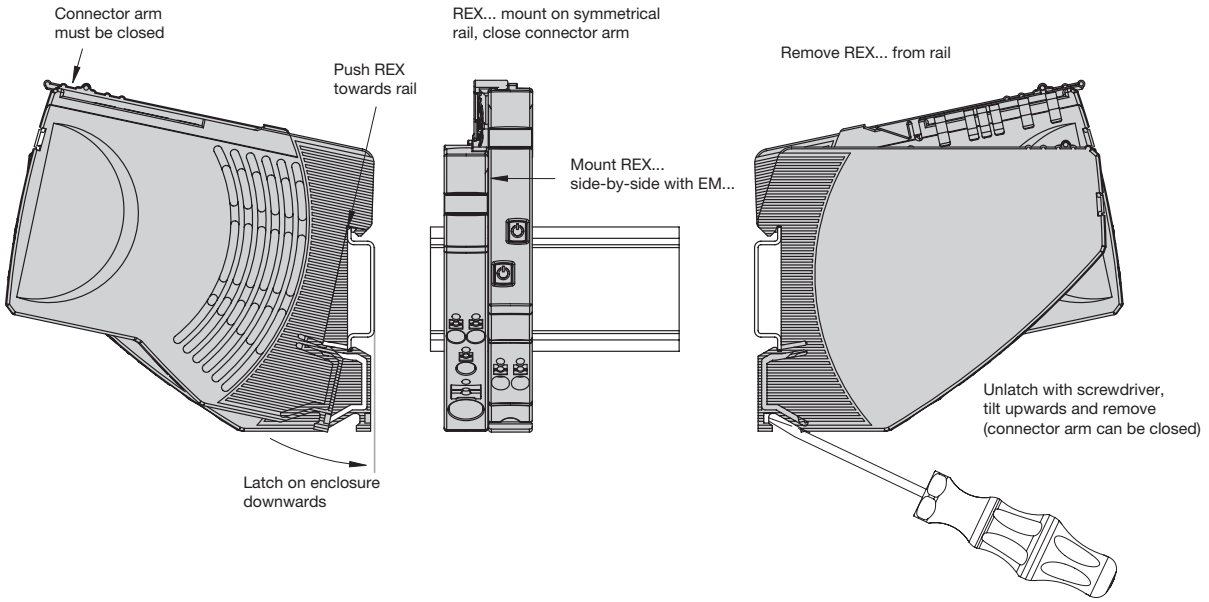


Optional manual current rating setting on the device.
In the case of 2-channel devices, it is shown twice.

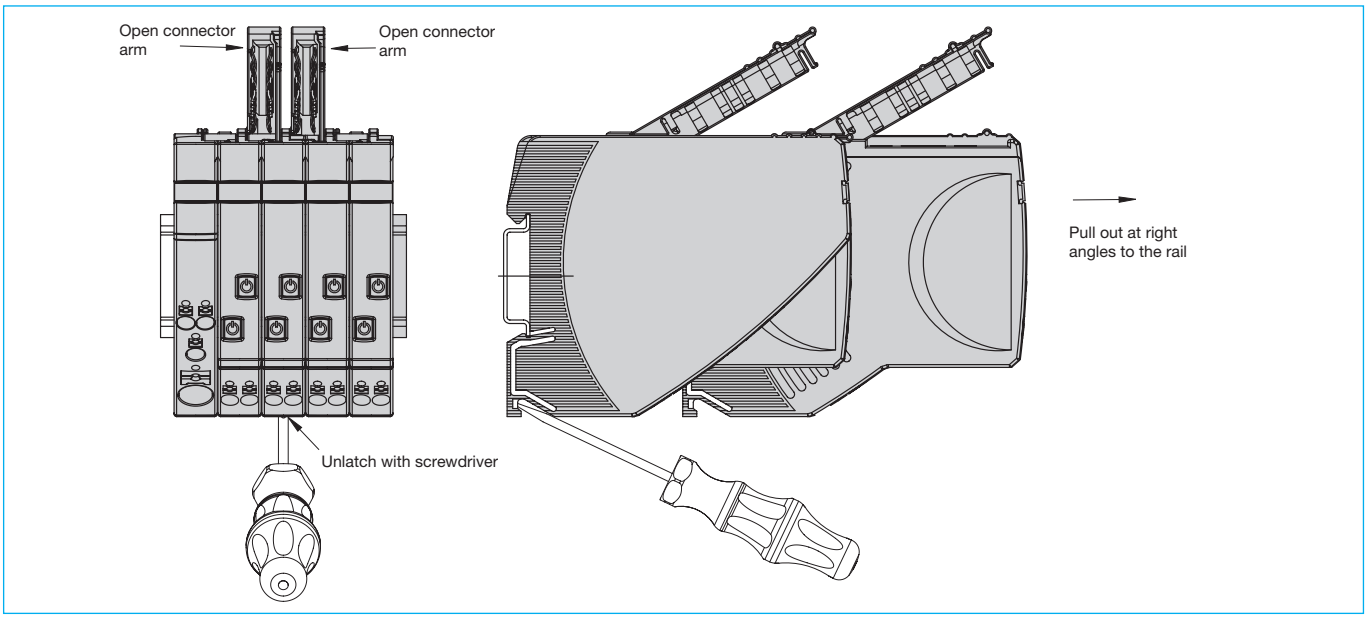
Dimensions with connection diagram: REX22D-TA1-xxx/REX22D-TE2-xxx/REX22D-TD1-xxx/REX22D-TD2-xxx



Application example: REX... mounting on or removing from symmetrical rail



Application example: REX... Replacement or disassembly



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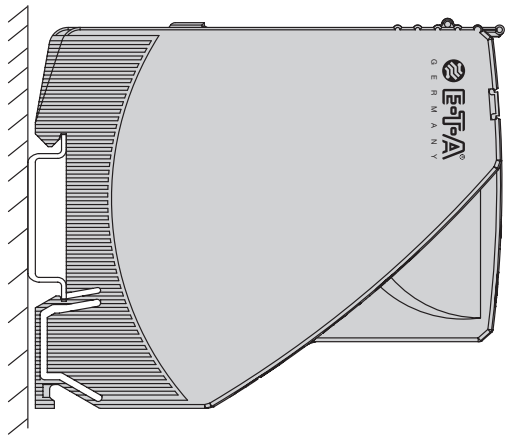
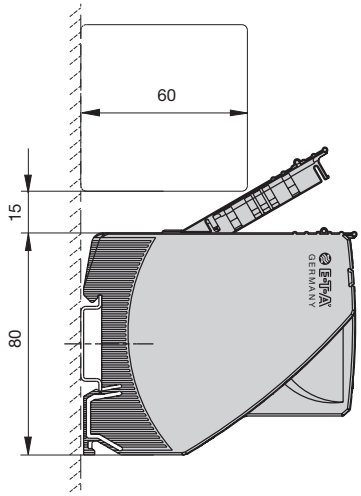
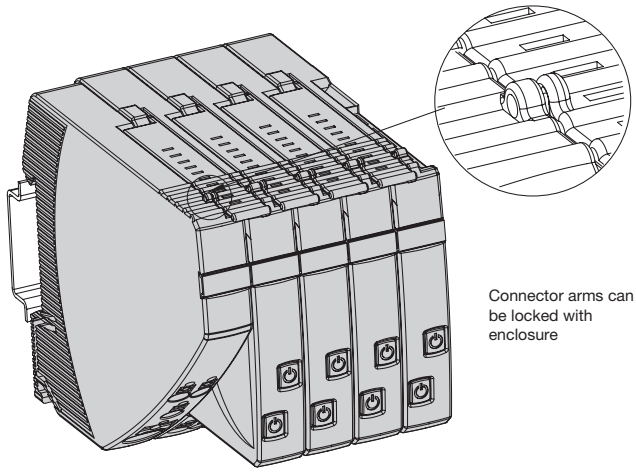
Mounting position REX... preferred mounting position horizontal



Application example: REX22D-T ... distance between cable duct and connector arm

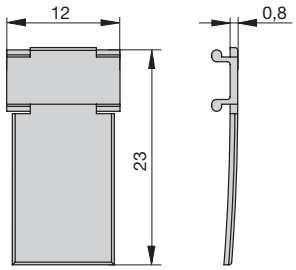


Application example: REX... Locked connector arms



Accessories

Label with cover: Y31369501
(Packaging unit: 10 pcs.)



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