

Description

The compact and flexible all-in-one solution REX consists of several perfectly matched components. It comprises the EM12D-T / EM12-T supply module for the plus and minus potential via a single or double channel REX12D-T electronic circuit protector which can be mounted side by side in any number and the PM12-T potential extension module for plus and minus multiplication.

The requirements regarding modern machinery and equipment are constantly growing. System transparency, remote maintenance and remote access are getting more and more important in international competition. Early notification in the event of any disturbances and a fast response to current problems will increase system availability, save costs and improve the overall stability of the production process.

E-T-A provides the ideal solution for machine and panel builders with the intelligent protection system comprising the REX12D circuit protector and the EM12D interface module. The system combines the well-proven quality of DC24V overcurrent protection with the communication options of the IO link system. It allows complete transparency of the DC24V power supply and provides all necessary information for a reliable production process in this plant sector.

The new generation of REX12D electronic overcurrent protection consists of the intelligent EM12-TIO supply module and the single or double channel REX12D-Telectronic circuit protector which allows modular side-by-side mounting. The modules with a width of only 12.5 mm feature push-in technology including press release buttons and allow time-saving and maintenance-free wiring without tools.

And what is more: no additional accessories are required when connecting the individual components electrically and mechanically. This helps save time and money!

Features

- Control, diagnosis and monitoring via IO link
- Combination of supply modules, overcurrent protection and power distribution
- Double channel selective load protection by means of electronic trip curve
- No accessories required for connecting the components
- Width per channel only 6.25 mm (2-channel)
- Fixed current ratings: 1 A, 2 A, 3 A, 4 A, 6 A, 8 A and 10 A
- Integral fail-safe element, adjusted to current rating
- Switching capacitive loads up to 20,000 µF
- Manual ON/OFF/reset momentary switch
- Connection via push-in terminals including press release buttons

Approval logos and markings



Benefits

- Increases machine availability through high transparency and remote diagnosis
- Saves cost – no further accessories required
- Saves 50 % time through innovative and flexible mounting and connection technology
- Saves space – with a width of only 12.5 mm per channel
- Provides flexibility through ease of mounting, disassembly and modular design

Data sheet

The current data sheet is available on our website: www.e-t-a.de/d751

Technical data ($T_{amb} = +23\text{ }^{\circ}\text{C}$, $U_B = \text{DC } 24\text{ V}$)

REX12D-TAx-xxx circuit protectors

REX12D-TA1-100-DC24V-xA	1-channel
REX12D-TA2-100-DC24V-xA/xA	2-channel
Operating voltage U_B	DC 24 V (18...30 V)
Closed current I_0	
REX12D-TA1 1-channel	in ON condition: typically 7 mA
REX12D-TA2 2-channel	in ON condition: typically 10 mA
Reverse polarity protection	yes
Power failure buffering time	up to 10 ms
Current ratings I_N	fixed ratings:
REX12D-TA1	8 A, 10 A
REX12D-TA2	1 A/1 A, 2 A/2 A, 3 A/3 A, 4 A/4 A, 6 A/6 A
Visual status indication of operating condition by multicoloured LED:	green: - load circuit connected green/orange blinking: - load current warning limit reached 50 % – 100 % orange: - overload or short circuit until disconnection - circuit protector was switched off by the superordinate control unit LED is permanently orange red: - after disconnection due to overload or short circuit - after undervoltage release of operating voltage in ON condition with autoreset OFF: Device was switched off via ON/OFF momentary switch, or due to lacking operating voltage or faulty initialisation of the circuit protector

Load circuit

Load output	power MOSFET switching output (plus switching)
Load current – warning limit (I_{WLimit}) hysteresis	typically 0.5 – 1.0 x I_N (parameterisable) typically 5 %
Overload current disconnection (I_{OL}) with trip times (t_{OL})	typically $I_{OL}: I_N \times 1.05$ $t_{OL}: 3\text{ s}$ typically $I_{OL}: I_N \times 1.35$ $t_{OL}: 0.5, 5\text{ s}$ typically $I_{OL}: I_N \times 2.00$ $t_{OL}: 0.1\text{ s}$ typically $I_{OL}: I_N \times 2.50$ $t_{OL}: 0.012\text{ s}$
short circuit trip time (t_{SC})	typically at short circuit (I_{SC}) $t_{SC}: 0.002\text{ s}$ 1) depending on the power source Note: Selection of current rating of the circuit protector $\leq$ rating of power supply
Influence of ambient temperature on overload disconnection and load current – warning limit	see temperature factor table
Continuous Current IC	typically $0.8 \times I_N$ (Fail Safe Element is protected by REX12)
Fail-safe element (integral blade fuse adjusted to related current rating I_N)	$I_N: 1\text{ A}/1\text{ A}$ fail-safe $I_N: 1\text{ A} / 1\text{ A}$ $I_N: 2\text{ A}/2\text{ A}$ fail-safe $I_N: 2\text{ A} / 2\text{ A}$ $I_N: 3\text{ A}/3\text{ A}$ fail-safe $I_N: 3.15\text{ A} / 3.15\text{ A}$ $I_N: 3\text{ A}/3\text{ A}-\text{CL2}$ fail-safe $I_N: 4\text{ A} / 4\text{ A}$ $I_N: 4\text{ A}/4\text{ A}$ fail-safe $I_N: 4\text{ A} / 4\text{ A}$ $I_N: 4\text{ A}/4\text{ A}-\text{CL2}$ fail-safe $I_N: 4\text{ A} / 4\text{ A}$ $I_N: 6\text{ A}/6\text{ A}$ fail-safe $I_N: 6.3\text{ A} / 6.3\text{ A}$ $I_N: 8\text{ A}$ fail-safe $I_N: 8\text{ A}$ $I_N: 10\text{ A}$ fail-safe $I_N: 10\text{ A}$

Technical data ($T_{amb} = +23\text{ }^{\circ}\text{C}$, $U_B = \text{DC } 24\text{ V}$)

Voltage drop in load circuit at I_N and at I_N 70 % LINE+ and LOAD+	
$I_N: 1\text{ A}$	typically 180 mV $I_N: 70\%$ typically 125 mV
$I_N: 2\text{ A}$	typically 110 mV $I_N: 70\%$ typically 80 mV
$I_N: 3\text{ A}$	typically 120 mV $I_N: 70\%$ typically 85 mV
$I_N: 3\text{ A}-\text{CL2}$	typically 130 mV $I_N: 70\%$ typically 90 mV
$I_N: 4\text{ A}$	typically 115 mV $I_N: 70\%$ typically 80 mV
$I_N: 4\text{ A}-\text{CL2}$	typically 180 mV $I_N: 70\%$ typically 120 mV
$I_N: 6\text{ A}$	typically 170 mV $I_N: 70\%$ typically 110 mV
$I_N: 8\text{ A}$	typically 160 mV $I_N: 70\%$ typically 105 mV
$I_N: 10\text{ A}$	typically 180 mV $I_N: 70\%$ typically 120 mV
Operating voltage monitoring	OFF at typically $U_B < 16.0\text{ V}$ ON at typically $U_B > 19\text{ V}$ hysteresis typically 2 V with regard to low voltage with automatic ON and OFF switching
Switch-on delay - with power ON	channel 1: typically 100 ms channel 2: typically 200 ms
- when switching on via ON/OFF momentary switch or	channel 1: typically 5 ms channel 2: typically 100 ms
- after undervoltage	channel 1: typically 5 ms channel 2: typically 5 ms
Disconnection of load circuit	- manually on the device with the ON/OFF momentary switch - remote control via the superordinate control unit - after an overload / short circuit disconnection with storage (no automatic reset) - temporarily at undervoltage - at no operating voltage
Switch on of load circuit - momentary switch ON/OFF	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 if 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.
- Apply operating voltage	For switch-on the device has to be supplied with operating voltage. The device re-starts with the last stored condition.
Reset function	A blocked load output (blocked by overload / short circuit) can be reset by the ON/OFF momentary switch or by the superordinate control unit.
Leakage current in load circuit in OFF condition	typically $< 1\text{ mA}$
Capacitive loads	up to 20,000 μF : depending on: cable attenuation, power supply used, load current and current rating
Free-wheeling diode	external free-wheeling circuit at inductive load (rating according to load)
Parallel connection of several load outputs	not allowed
Terminals	LOAD+
Push-in terminal PT 2.5	0.14 mm ² ... 2.5 mm ² , flexible AWG24 – AWG14 rigid
Stripping length	8 mm ... 10 mm
Dimensions (w x h d)	12.5 x 98.5 x 80 mm
Mass	
REX12D-TA1-xxx 1-channel approx.	58 g
REX12D-TA2-xxx 2-channel approx.	62 g

Technical data (T_{amb} = +23 °C, U_B = DC 24 V)

General data	REX / EM / PM
Housing material	moulded
Mounting	symmetrical rail to EN 60715-35x7.5
Ambient temperature	-25 °C...+60 °C (without condensation, cf. EN 60204-1)
Storage temperature	-40 °C ... +70 °C
Mounting temperature	+5° ... +60 °C
Humidity	96 hrs / 95 % RH/40 °C to IEC 60068-2-78-Cab climate class 3K3 to EN 60721
Corrosion only PM and EM accessories	96hrs. in 5% salt mist to IEC 60068-2-11 test Ka
Vibration	3g test to IEC 60068-2-6, test Fc
Degree of protection operating area REX12	IEC 60529, DIN VDE 0470 IP30
terminal area EM, PM:	IP20
EMC requirements (EMC directive, CE logo)	noise emission EN 61000-6-3 susceptibility: EN 61000-6-2
Insulation co-ordination (IEC 60934)	0.5 kV / pollution degree 2
Dielectric strength	max. DC 30 V (load circuit)
Insulation resistance (OFF condition)	n/a, only electronic disconnection
Modules to be mounted side-by-side	
REX12D-TA1-xxx 1-channel	
REX12D-TA2-xxx 2-channel	max.16 channels
Conformity	CE marking

Approvals and standards

Approval authority	Standard	UL file no.	Voltage rating	Current rating range
UL	UL 2367	E306740	DC 24 V	1 A...10 A
UL	UL 1310 NEC Class2	E306740	DC 24 V	1 A, 2 A, 3 A, 4 A
UL	cULus508listed	E492388	DC 24 V	1 A...10 A

PM and EM – accessories approvals see technical data of accessories

Notes

- The intelligent EM12D-TIO supply module is only meant for use with extra-low voltage (DC 24 V).
 - Connection to a higher or not reliably disconnected voltage can cause hazardous conditions or damages.
 - Only the intended circuit protectors must be used.
 - The technical data of the circuit protectors used have to be observed.
 - The entire power distribution system must only be installed by qualified personnel.
 - 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 for installation and selection of feed and return cables.
 - For convenient adjustment and configuration by means of projecting software a master data file (GSDML file) will be made available for downloading on the E-T-A homepage.
- Please observe separate user manual of the EM12D-TIO.

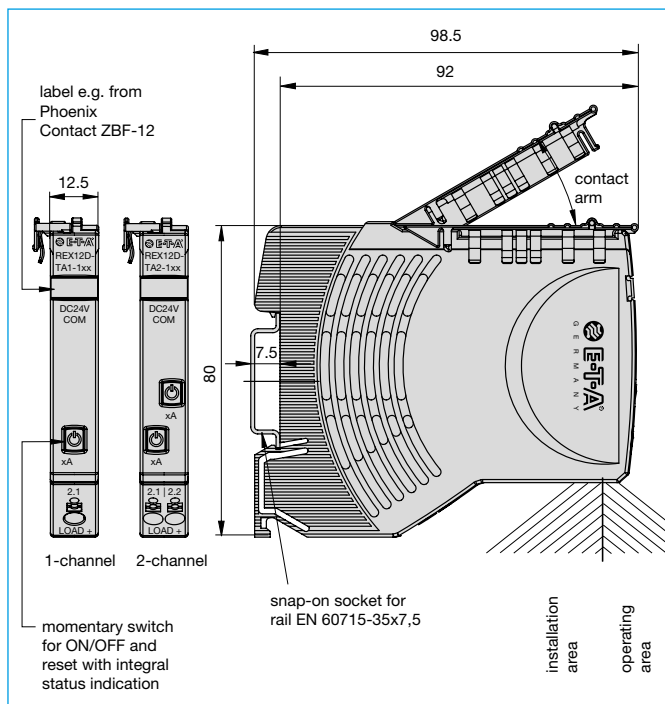
Ordering number code

Type	REX12D intelligent electronic circuit protector with PT connection technology									
Mounting method	T rail mounting									
Design	A 1 load output terminal per channel, fixed current ratings xA or xA/xA									
Number of channels	2									
Version	1 without physical isolation									
Signal input	0 without signal input									
Signal output	0 without signal output									
Operating voltage	DC 24 V voltage rating DC 24 V									
Current rating range	8 A (only 1 channel) 10 A (only 1 channel) 1 A / 1 A (only 2 channels, Class2) 2 A / 2 A (only 2 channels, Class2) 3 A/3 A (only 2 channels) 4 A/4 A (only 2 channels) 6 A/6 A (only 2 channels)									
Approval	CL2 Class2 (only for 3A and 4A versions)									
REX12D-T	A	1 - 1	0	0 -	DC24V -	10A	example 1 channel			
REX12D-T	A	2 - 1	0	0 -	DC24V -	4A/4A-CL2	example 2 channels			

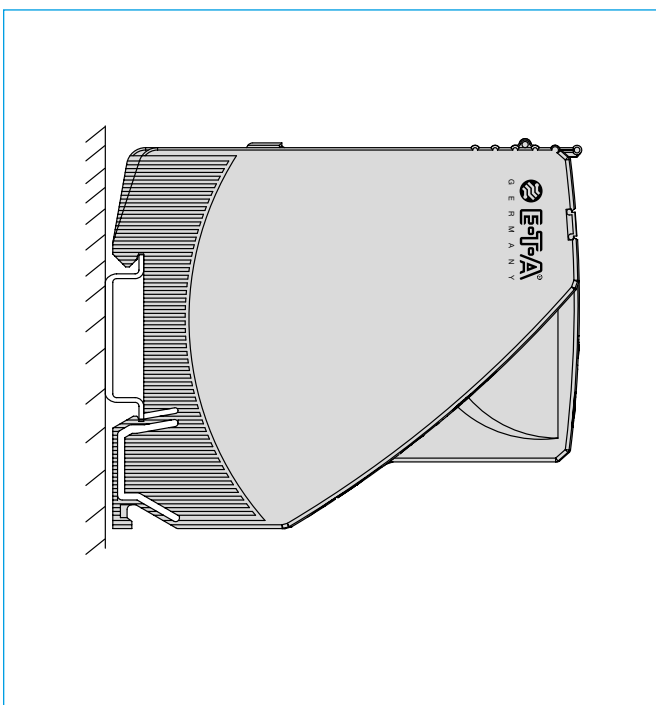
Overview of ordering number codes

Supply module	EM12D-TIO-000-DC24V-40A
Circuit protectors: 1-channel	REX12D-TA1-100-DC24V-8A REX12D-TA1-100-DC24V-10A
Protection modules: 2-channel	REX12D-TA2-100-DC24V-1A/1A (Class2) REX12D-TA2-100-DC24V-2A/2A (Class2) REX12D-TA2-100-DC24V-3A/3A REX12D-TA2-100-DC24V-3A/3A-CL2 (Class2) REX12D-TA2-100-DC24V-4A/4A REX12D-TA2-100-DC24V-4A/4A-CL2 (Class2) REX12D-TA2-100-DC24V-6A/6A
Accessories	
Supply modules	EM12-T00-100-LINE-40A EM12-T00-200-LINE-40A EM12-T00-000-GND-40A EM12-T00-300-GND-40A
Potential modules	PM12-T01-00-LOAD-20A PM12-T02-00-LOAD-20A PM12-T03-00-GND-20A

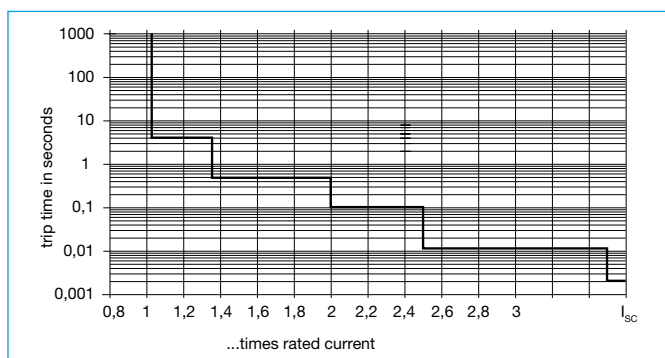
Dimensions with connection diagram: REX12D-TAx-xxx circuit protectors



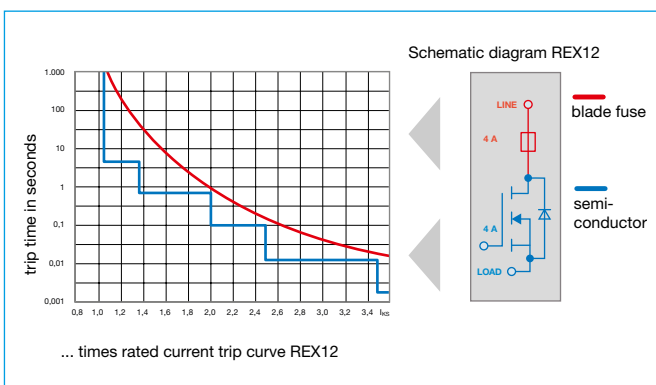
Mounting position: REX... preferred mounting position horizontal



Typical time/current characteristic $(T_{amb} = +23^{\circ}\text{C}, U_B = \text{DC } 24 \text{ V})$



Basic trip curve and schematic diagram REX12



Temperature factor / continuous duty

The time/current characteristic depends on the ambient temperature. In order to determine the max. load current, please multiply the current rating with the temperature factor and consider the factor for side-by-side mounting.

Temperature factor table:

ambient temperature [°C]	0	10	23	40	50	60
temperature factor	1	1	1	0.95	0.90	0.85

Note: When mounted side-by-side, the devices can carry max. 80 % of their rated load or a different rating has to be selected (see technical information: www.e-t-a.de/ti_e).

Note:

With high temperatures, the load current warning threshold “warn limit typically $0.5 \dots 1 \times I_N$ ” will be reduced in accordance with the temperature factor.

Description – EM12D-T supply module

The EM12D-T supply module receives the DC 24 V supply voltage, e.g. from a switched mode power supply, and distributes it to the installed intelligent circuit protectors via the integral connector arm of the REX12D-T. The communication interface of the EM12D-T, which is designed as an IO link device, allows a great number of diagnosis and control commands to a superordinate IO link master of the control level.

Technical data ($T_{amb} = +23\text{ °C}$, $U_B = \text{DC } 24\text{ V}$)

Operating voltage U_B	DC 24 V (18...30 V)
Operating current I_B	max. 40 A
Reverse polarity protection	yes
Quiescent current I_0	typically 20 mA
Insulation co-ordination	0.5 kV / pollution degree 2
Power failure buffering time	up 10ms
Terminals	LINE+
Push-in terminal PT 10	0.5 mm ² ... 10 mm ² , flexible AWG24 – AWG8 rigid
stripping length	18 mm
Terminals	0 V
Push-in terminal PT 2.5	0.14 mm ² ... 2.5 mm ² , flexible AWG24 – AWG14 rigid
stripping length	8 mm ... 10 mm
Dimensions (w x h x d)	12.5 x 98 x 80 mm
Mass	approx. 56 g
Modules to be mounted side-by-side	
REX12D-TA1 1-channel	
REX12D-TA2 2-channel	max.16 channels
Visual status indication of operating condition via multicoloured LED:	green: Faultless operation communication to IO link master available
	green blinking: independent operation no communication to IO link master
	red: critical fault detected communication to IO link master not available
	orange: non-critical fault detected communication to IO link master available
	orange blinking: uncritical fault detected communication to IO link master not available
	red blinking: bootloader mode active no communication to IO link master
IO link connection	X81 COM interface to IO link master
	terminal 1 IO link L+DC +24V
	connector 2: IO link C/Q
	connector 3: IO link L-
When wiring and connecting to the point-to-point communication IO link, the installation and wiring regulations of the PROFIBUS-DP User Organisation (PNO) have to be observed.	
Push-in terminals PT xx	
connector, 3-pole (plugged on)	0.25 – 0.5 mm ²
stripping length	6 mm

Communication interface

Overview of commands:

Writing/reading of configuration (parameters)

- Current limit value (50 %...100 %)

Reading of static product information

- Current ratings
- Product type
- Serial number
- Hardware version
- Software version

Reading of dynamic product information / measuring values

- Error memory
- Trip counter
- Reason of last trip
- Status / event of device
- Supply voltage: ACTUAL / MIN / MAX / MEDIUM VALUE
- Load voltage ACTUAL / MIN / MAX / MEDIUM VALUE
- Load current

Control commands

- switch on/off or reset load output
- reset error memory
- reset trip counter
- set parameters to factory setting

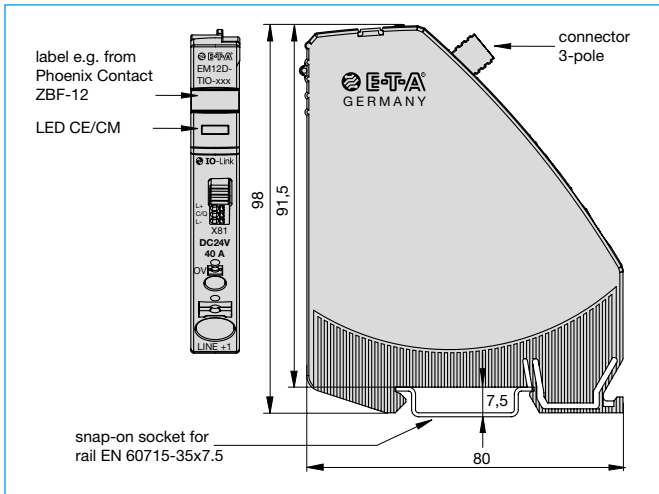
Overview of ordering number codes

Supply module	EM12D-TIO-000-DC24V-40A
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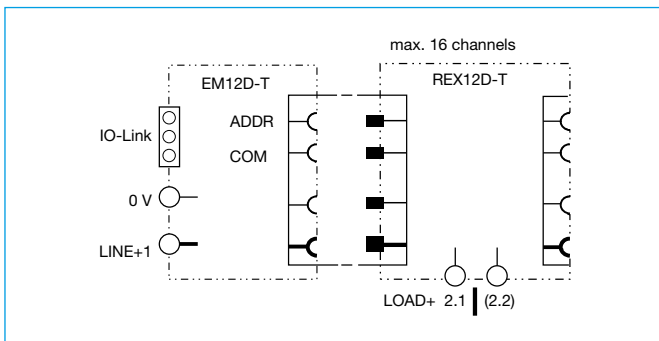
Ordering number code – EM12D

Type	
EM12D	supply module for REX12D, with PT connection technology
Mounting method	
T	rail mounting
Version: Communication, interface	
IO	IO link
Additional functionality	
0	without
Signal input	
0	without signal input
Signal output	
	without signal output
Operating voltage	
DC 24 V	voltage rating DC 24 V
Current rating range	
40 A	
EM12D - T 01 - 0 0 0 - DC 24 V - 40 A	ordering example

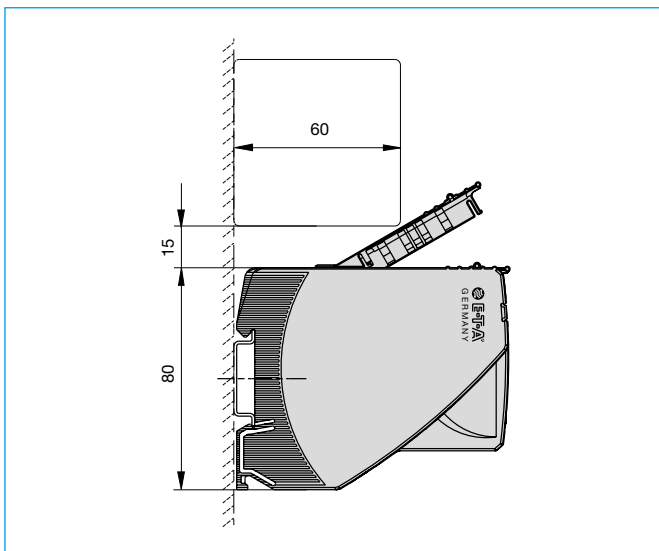
Dimensions EM12D-TIO-xxx supply module



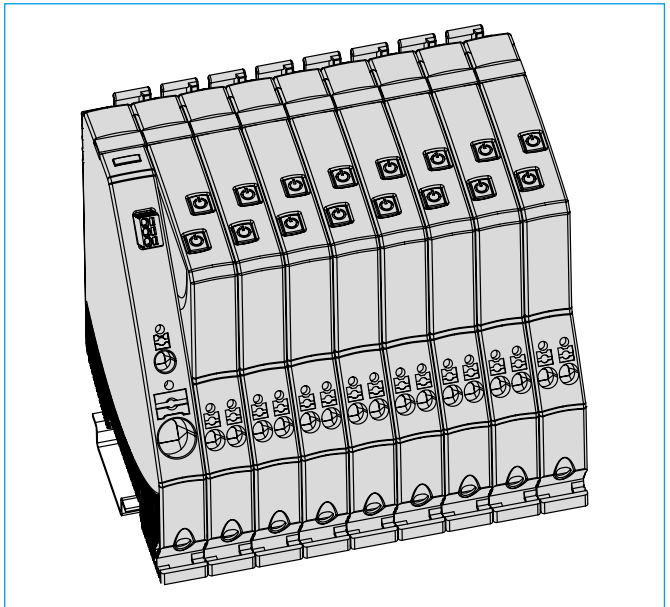
Schematic diagram EM12D-TIO-xxx with REX12D-xxx



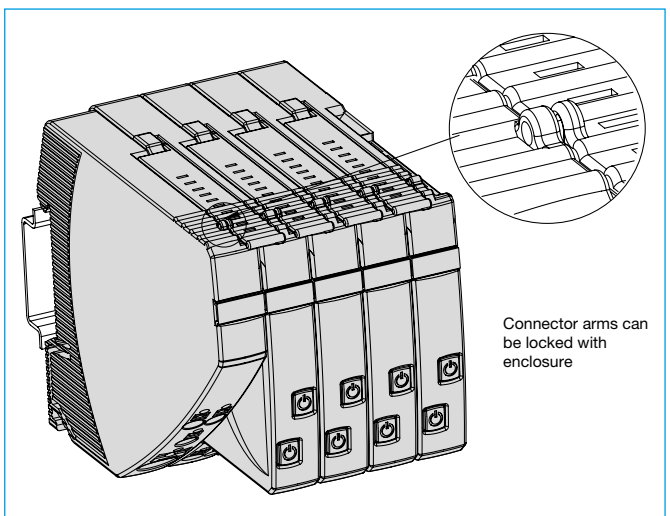
Application example: REX12(D)-T... distance between cable duct and connector arm



Application example: EM12D-TIO-xxx with REX12D-xxx



Application example: REX Locked connector arms

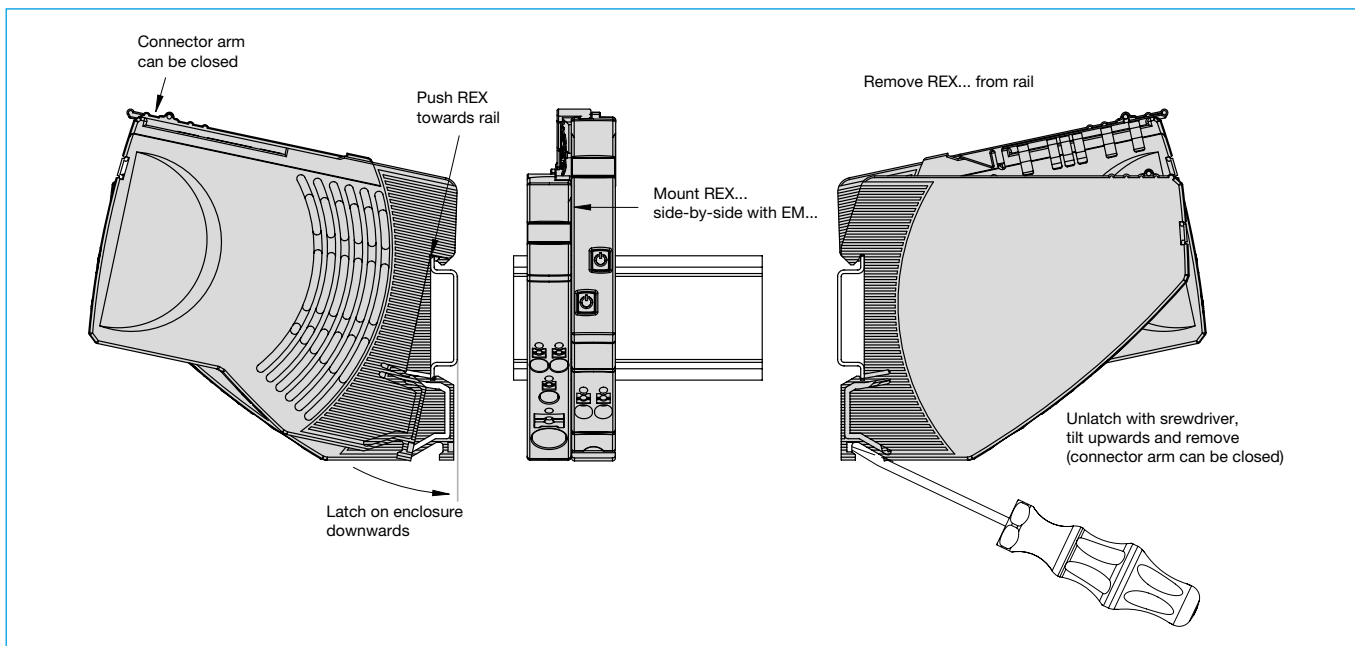


CAUTION

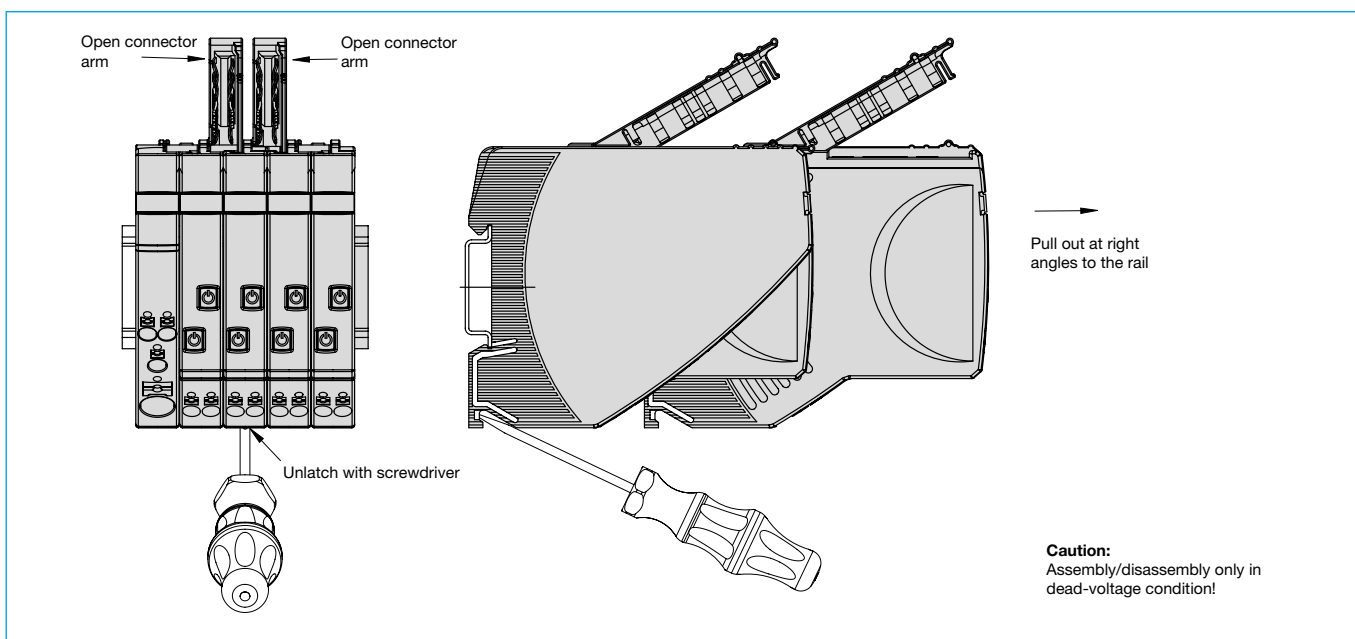


Electrostatically sensitive sub-assemblies can be destroyed by voltages far below the human perception threshold. These voltages already occur if you touch a component or electrical terminals of a sub-assembly without being electrostatically discharged. The damage of a sub-assembly caused by an overvoltage is often not immediately recognised, but will be noticed only after a longer operating time.

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



Application example: REX Replacement or disassembly



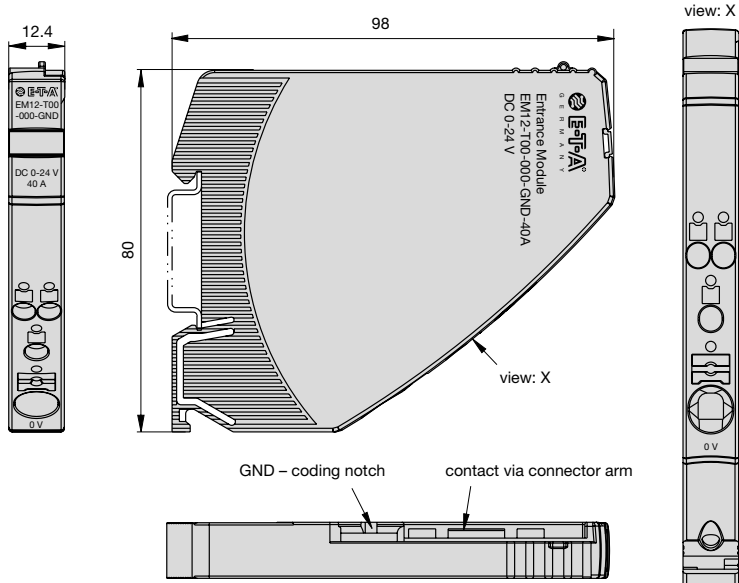
Instructions for installation

Mounting or actuation of the REX connector arm must only be effected at dead-voltage. For start-up the REX connector arm must be closed.

All information and data given on our products are accurate and reliable to the best of our knowledge, but E-T-A does not accept any responsibility for the use in applications which are not in accordance with the present specification. E-T-A reserves the right to change specifications at any time in the interest of improved design, performance and cost effectiveness. Dimensions are subject to change without notice. Please enquire for the latest dimensional drawing with tolerances if required. All dimensions, data, pictures and descriptions are for information only and are not binding. Amendments, errors and omissions excepted. Ordering codes of the products may differ from their marking.

Accessories

EM12-T00-000-GND-40A supply module left – 0V – GND

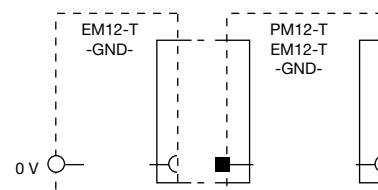


Technical data

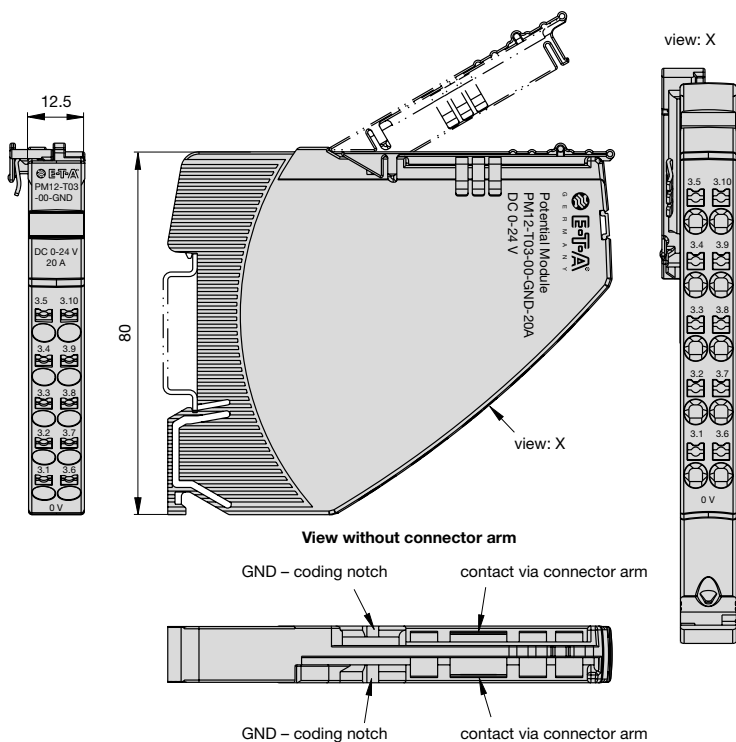
Please observe general data of REX / EM / PM	
Operating voltage U_B	0 V – DC 24 V (0 ... 30 V)
Operating current I_B	max. load 40 A
Line terminal	0 V – GND
Push-in terminal PT 10	0.5 mm ² ... 10 mm ² , flexible AWG24 – AWG8 rigid
Stripping length	18 mm
Dimensions (w x h x d)	12.5 x 98 x 80 mm
Mass	approx. 40 g
Approvals	UL 1059, File # E335289

Schematic diagram

EM12-T00-000-GND-40A



PM12-T03-00-GND-20A potential module – GND (10-way)

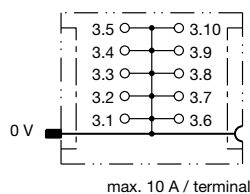


Technical data

Please observe general data of REX / EM / PM	
Operating voltage U_B	0 V – DC 24 V (0 ... 30 V)
Operating current I_B	max. load 20 A
Line terminal	0 V – GND
Push-in terminal PT 2.5	0.14 mm ² ... 2.5 mm ² , flexible AWG24 – AWG14 rigid
Stripping length	8 mm ... 10 mm
Dimensions (w x h x d)	12.5 x 98 x 80 mm
Mass	approx. 52 g
Approvals	UL 1059, File # E335289

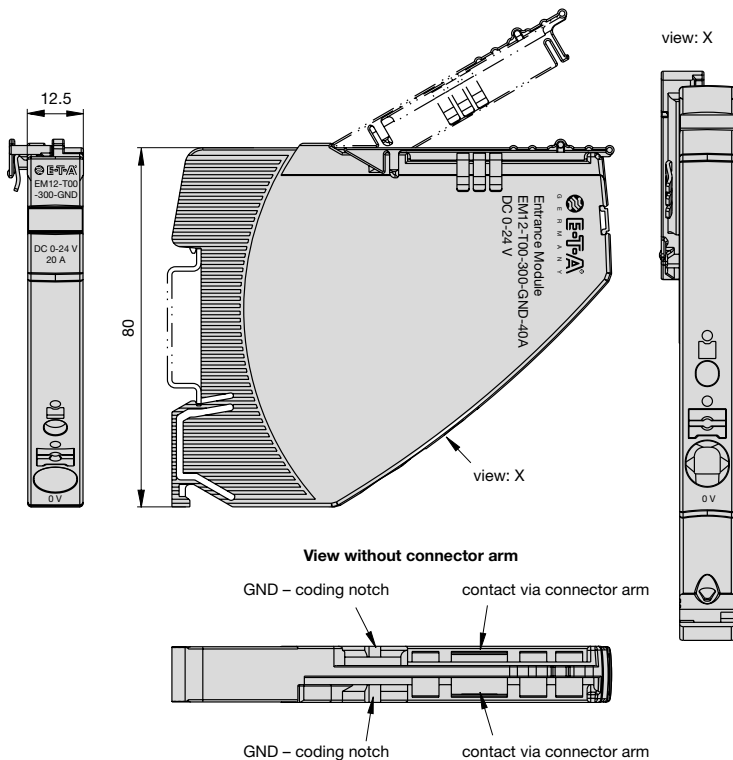
Schematic diagram

PM12-T03-00-GND-20A



Accessories

EM12-T00-300-GND-40A supply module centre/right – 0V – GND

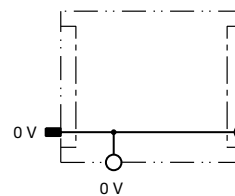


Technical data

Please observe general data of REX / EM / PM	
Operating voltage U_B	0 V – DC 24 V (0 ... 30 V)
Operating current I_B	max. load 40 A
Line terminal	0 V – GND
Push-in terminal PT 10	0.5 mm ² ... 10 mm ² , flexible AWG24 – AWG8 rigid
Stripping length	18 mm
Dimensions (w x h x d)	12.5 x 98 x 80 mm
Mass	approx. 45 g
Approvals	UL 1059, File # E335289

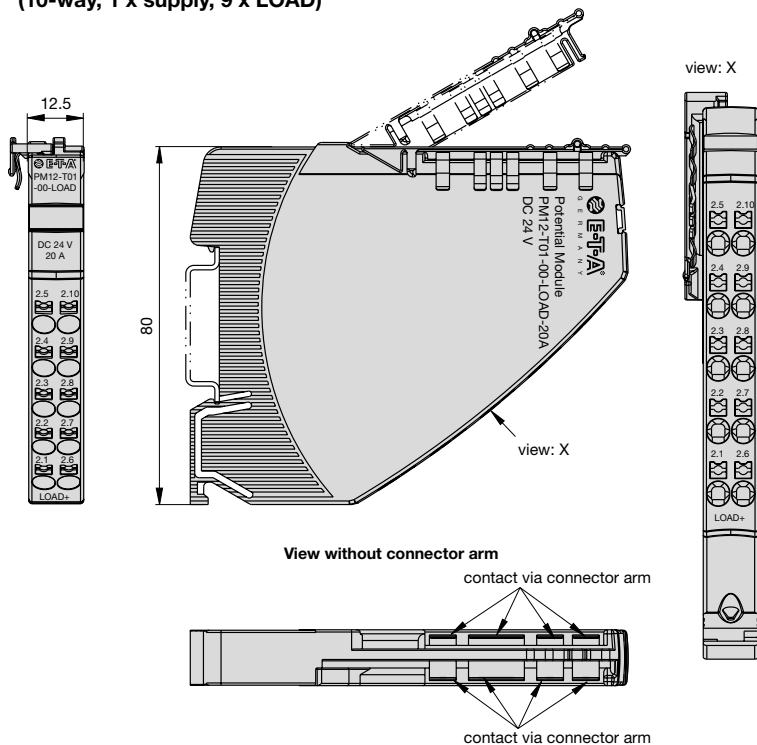
Schematic diagram

EM12-T00-300-GND-40A



Accessories

PM12-T01-00-LOAD-20A potential module – LOAD (10-way, 1 x supply, 9 x LOAD)

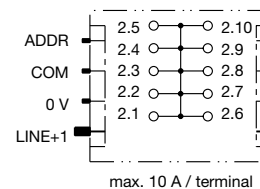


Technical data

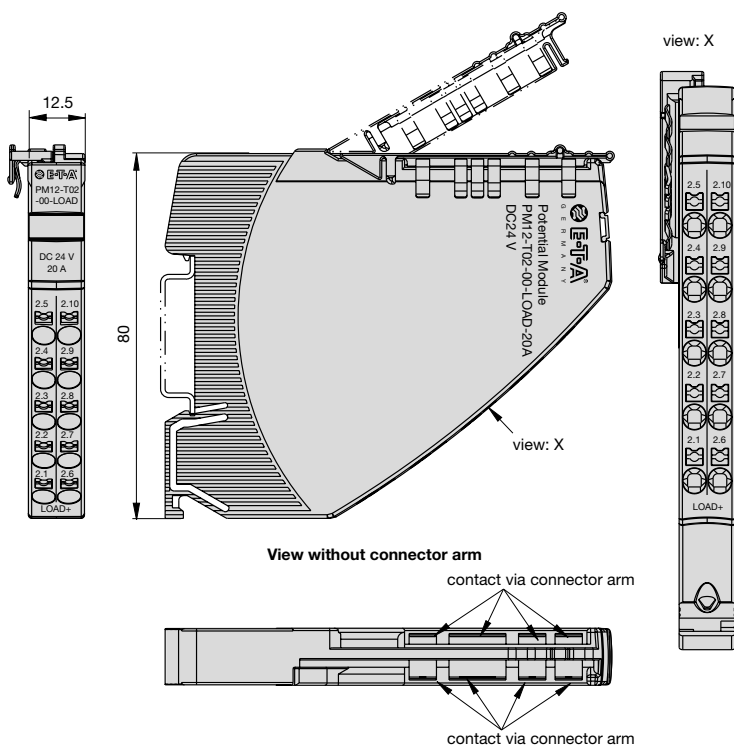
Please observe general data of REX / EM / PM	
Operating voltage U_B	DC 24 V (18...30 V)
Operating current I_B	max. load 20 A
Insulation co-ordination	0.8 kV / pollution degree 2
Terminals	LOAD+
Push-in terminal PT 2.5	0.14 mm ² ... 2.5 mm ² , flexible AWG24 – AWG14 rigid 8 mm ... 10 mm
Stripping length	12.5 x 98 x 80 mm
Mass	approx. 52 g
Approvals	UL 1059, File # E335289

Schematic diagram

PM12-T01-00-LOAD-20A



PM12-T02-00-LOAD-20A potential module – LOAD (2 x 5-way, 1 x supply and 4 x LOAD each)

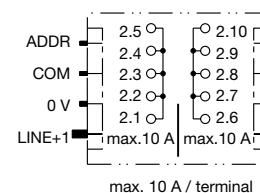


Technical data

Please observe general data of REX / EM / PM	
Operating voltage U_B	DC 24 V (18...30 V)
Operating current I_B	max. load 20 A
Insulation co-ordination	0.8 kV / pollution degree 2
Terminals	LOAD+
Push-in terminal PT 2.5	0.14 mm ² ... 2.5 mm ² , flexible AWG24 – AWG14 rigid 8 mm ... 10 mm
Stripping length	12.5 x 98 x 80 mm
Mass	approx. 52 g
Approvals	UL 1059, File # E335289

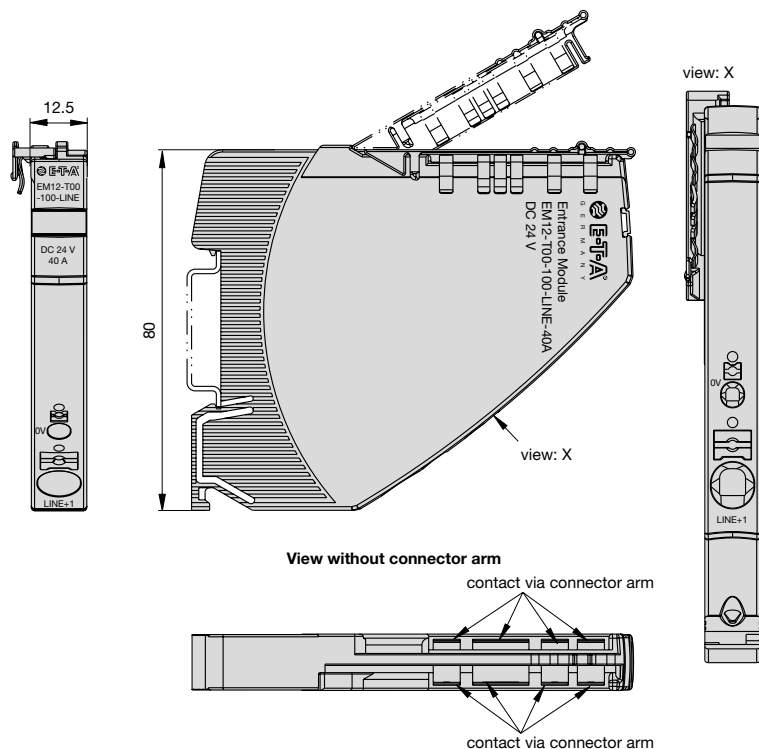
Schematic diagram

PM12-T02-00-LOAD-20A



Accessories

EM12-T00-100-LINE-40A supply module centre/right – LINE, LINE connected

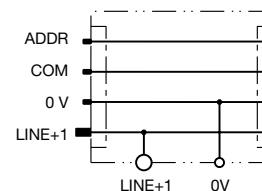


Technical data

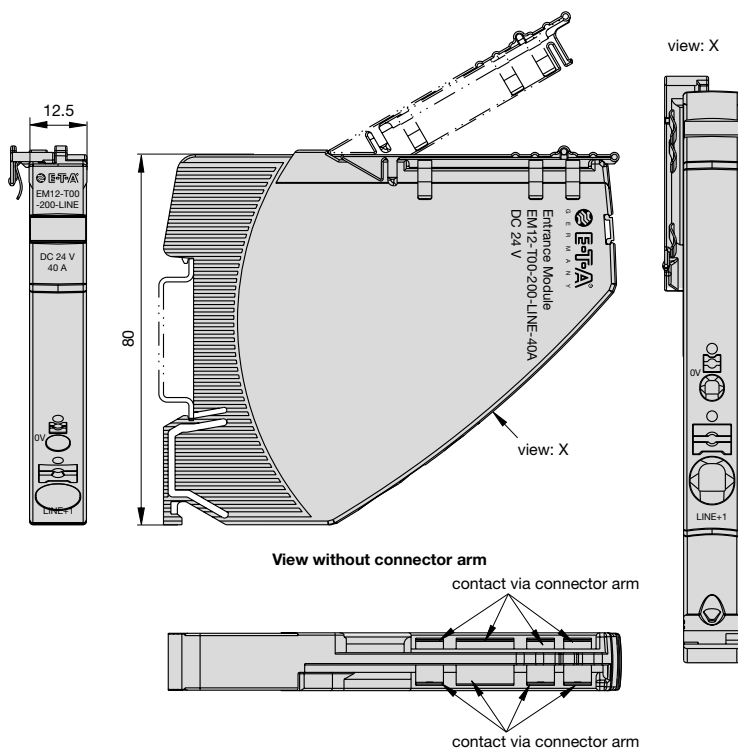
Please observe general data of REX / EM / PM	
Operating voltage U_B	DC 24 V (18...30 V)
Operating current I_B	max. load 40 A
Insulation co-ordination	0.8 kV / pollution degree 2
Terminals	LINE+1
Push-in terminal PT 10	0.5 mm ² ... 10 mm ² , flexible AWG24 – AWG8 rigid
Stripping length	18 mm
Terminals	0 V
Push-in terminal PT 2.5	0.14mm ² ... 2.5mm ² , flexible AWG24 – AWG14 rigid
Stripping length	8 mm ... 10 mm
Dimensions (w x h x d)	12.5 x 98 x 80 mm
Mass	approx. 52 g
Approvals	UL 1059, File # E335289

Schematic diagram

EM12-T00-100-LINE-40A



EM12-T00-200-LINE-40A supply module centre/LINE, LINE separated

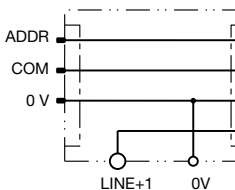


Technical data

Please observe general data of REX / EM / PM	
Operating voltage U_B	DC 24 V (18...30 V)
Operating current I_B	max. load 40 A
Insulation co-ordination	0.8 kV / pollution degree 2
Terminals	LINE+1
Push-in terminal PT 10	0.5 mm ² ... 10 mm ² , flexible AWG24 – AWG8 rigid
Stripping length	18 mm
Terminals	0 V
Push-in terminal PT 2.5	0.14mm ² ... 2.5mm ² , flexible AWG24 – AWG14 rigid
Stripping length	8 mm ... 10 mm
Dimensions (w x h x d)	12.5 x 98 x 80 mm
Mass	approx. 52 g
Approvals	UL 2367, File # E306740; cULus508listed, File # E492388; pending

Schematic diagram

EM12-T00-200-LINE-40A



Application example: EM12-T ... with REX12-TAx... and PM12-...

