

Description

Wiring of load and signal lines in a space-saving manner will become ever more important for designers of electrical plants and systems, because all control cabinets and control boxes will have to be more and more compact due to the growing decentralisation of the entire automation technology. A significant cost reduction for the complete power distribution including wiring in the control cabinet will also play an important role.

The module 18plus holds a complete mounting and power distribution system for DIN rail mounting which has, together with the busbars, a fully-featured 80 A power distribution of the DC 24 V control voltage without additionally required terminals and connection lines. It allows a cost-effective realisation of e.g. an 11-way protection system, because you only have plug in the 11 required circuit breakers or protectors type 2210-S, ESS30 or ESX10 into the ready slots of the connection modules. Each connection module can be operated with max. 20A load current.

The signalling circuits of the individual devices for the group signalling by means of an integral auxiliary make contact are already pre-wired in this system. Line entry of the DC 24 V supply for LINE+, 0 Volt and functional earth FE is by means of plug-in type busbars.

All electrical connections are made by means of push-in terminals with the following properties:

- All conductors can be plugged in easily and without tools
- Reliable contact making
- Firm connection of the conductors due to high pull-out forces
- Ease of operation with any tool
- Contact reliability in the event of shock and vibration
- Gas-tight connection
- Maintenance-free

All pushers were designed in four different colours (red, blue, orange, grey) so as to easily distinguish the different voltage potentials and functions of the device.

Red =	conductor: supply 24V/LINE+	or protected load output/LOAD+
Blue =	return conductor: supply 0 Volt	or load/0 Volt
Orange =	functional earth supply FE	or load/FE
Grey =	signalling circuits: supply 24V/terminal 13	or signal output terminal 14, LED load terminal 17

Module 18plus can be used in combination with the following plug-in type overcurrent protection devices:

- **Thermal-magnetic circuit breaker 2210-S**
- **Electronic circuit breakers ESS20-003, ESS30-S003**
- **Electronic circuit protectors ESX10-103, ESX10-S103**

Module 18plus consists of three different basic modules:

- **supply module 18plus-EM-...**
terminal 1 (LINE +), terminal 3 (0 V), terminal 4 (FE)
terminal 13 (aux. contact input)
- **connection module 18plus-AM-...**
terminal 2.1/2.2 (LINE +), terminal 3.1/3.2 (0 V), terminal 4.1/4.2 (FE)
- **signalling module type 18plus-SM-...**
terminal 14 (aux. contact output)
terminal 17 (GND for integral signal load 10mA with LED indication)

The connection module 18plus-AM has been designed to accommodate single pole circuit breakers and other overcurrent protection devices. Those will be plugged into the connection modules 18plus-AM. The single-way AM modules can be mounted side by side, enabling bigger distribution systems with up to 30 slots. Each AM module is fitted with 4 mm² push-in terminals for double connection of DC 24 V loads via L+, 0V and FE, the max. load current is 20 A per slot.



By mounting the individual connection modules 18plus-AM side-by-side, all internal wiring connections are established for the group signalling. The make contacts of the plugged in electro-mechanical or electronic circuit breakers are connected in series on this occasion. In addition, a 10 mA load is included in the signalling module 18plus-SM holding a green LED indication. This also enables the connection of PLC or ET200 inputs with a high internal resistance value.

Module 18plus fitted with 2210-S:

The integral auxiliary contact (make contact) of the thermal-magnetic circuit breakers 2210-S can be used for the group signalling. All required terminals (make contacts opening in the event of a failure) in the Module 18plus are connected in series for this purpose. Group signalling is realised via terminal 13 integrated in the supply module, the signal output is located in the signal module 18plus-SM, terminal 14. An additional signal load of 10 mA can be realised via the 0 V terminal of the control at terminal 17.

Module 18plus fitted with ESS20-003 or ESS30-S003:

The 0V reference potential of the connection module 18plus-AM for the ESS20 or the ESS30-S is already directly connected to the 0V potential of the supply terminal 18plus-EM and is then looped through to the next AM element over the blade terminals on the side. This means: The side-by-side mounting (plug together) of the individual AM modules simultaneously establishes all internal wirings for the 0 V potential and for the group fault indication (series connection of make contacts).

The ESS20-003 or ESS30-S003 have an integral auxiliary contact (change over contact). The contact SC-S0 is used for the group fault indication. For this purpose the contacts for this signalling are already connected in series in the 18plus modules. These are connected via two terminals – 13 (supply in 18plus-EM) and 14 (output in 18plus-SM).

Module 18plus fitted with ESS10-103/ESX10-S103:

The 0 V reference potential of the connection module 18plus-AM for the ESX10-103 or the ESX10-S103 is already directly connected to the 0 V potential of the supply terminal 18plus-EM and is then looped through to the next AM element over the blade terminals on the side. This means: The side-by-side mounting (plug together) of the individual AM modules simultaneously establishes all internal wirings for the 0 V potential and for the group fault indication (series connection of make contacts).

The ESX10-103 or ESX10-S103 have an integral auxiliary contact (change over contact). The contact SC-S0 is used for the group fault indication. For this purpose the contacts for this signalling are already connected in series in the 18plus modules. These are connected via two terminals – 13 (supply in 18plus-EM) and 14 (output in 18plus-SM).

Technical Data

Plug-in type circuit breakers	2210-S; ESS20-003, ESS30-S003; ESX10-103; ESX10-S103;
Rated voltage	DC 24 V (optionally up to DC 80 V) IEC 60947-7-1/-2 300 V (UL1059)
Rated insulation voltage	AC 250 V
Main circuit, rated current I_N	
supply module	80 A (IEC 60947-7-1/-2) 65 A (UL1059)
connection module	20 A (IEC 60947-7-1/-2) 16 A (UL1059)
Signal circuits, rated current I_N	
min. current (terminals 13 – 14)	min. 10 mA at DC 10 V
max. current	max. 1 A at DC 24 V
integral current load (terminals 13 – 17)	typically 12 mA at DC 24 V
Busbar for power distribution	
insulated busbar	I_{max} 80 A
Ambient temperature	-30 °C ... +60 °C
Installation temperature	+5 °C ... +60 °C
Storage temperature	-40 °C ... +70 °C
Mounting position	as desired
Creepage resistance	PTI 600
Mounting	symmetrical rail EN 50022-35x7.5 symmetrical rail EN 50022-35x15/1.5
supply module EM terminals (1; 3; 4)	push-in terminal PT 16 0.5 – 16 mm ² ; rigid (without) wire end ferrule* 20 – 6; AWG 0.5 – 16 mm ² ; flexible (without) wire end ferrule* 20 – 6; AWG 0.5 – 16 mm ² ; flexible with wire end ferrule* without plastic sleeve 0.5 – 16 mm ² ; flexible with wire end ferrule* with plastic sleeve
terminals (13; 15; 16)	push-in terminal PT 4 0.2 – 6 mm ² ; rigid (without) wire end ferrule* 24 – 10; AWG 0.2 – 4 mm ² ; flexible (without) wire end ferrule* 24 – 12; AWG 0.25 – 4 mm ² ; flexible with wire end ferrule* without plastic sleeve 0.25 – 4 mm ² ; flexible with wire end ferrule* with plastic sleeve
connection module AM terminals (2.1; 2.2; 3.1; 3.2; 4.1; 4.2)	push-in terminal PT 4 0.2 – 6 mm ² ; rigid (without) wire end ferrule* 24 – 10; AWG 0.2 – 4 mm ² ; flexible (without) wire end ferrule* 24 – 12; AWG 0.25 – 4 mm ² ; flexible with wire end ferrule* without plastic sleeve 0.25 – 4 mm ² ; flexible with wire end ferrule* with plastic sleeve
signalling module SM terminals (14; 15; 16)	push-in terminal PT 4 0.2 – 6 mm ² ; rigid (without) wire end ferrule* 24 – 10; AWG 0.2 – 4 mm ² ; flexible (without) wire end ferrule* 24 – 12; AWG 0.25 – 4 mm ² ; flexible with wire end ferrule* without plastic sleeve 0.25 – 4 mm ² ; flexible with wire end ferrule* with plastic sleeve

Technical Data

Wire stripping length	
Push-in terminal PT 16	18 mm
Push-in terminal PT 4	11 mm
Insulation co-ordination (IEC 60664-1)	
Main circuit	rated voltage 4 kV Pollution degree 3
Auxiliary circuit	rated voltage 0.8 kV pollution degree 3
Dielectric strength	
Main circuit to main circuit	1500 V
Main circuit to auxiliary circuit	1500 V
Auxiliary circuit to auxiliary circuit	1500 V
Insulation resistance	> 100 MΩ (DC 500 V)
Typical internal resistance values	
Main circuit (EM1 – AM2.1/2.2);	without device 5 mΩ
Auxiliary circuit (1 x EM, 4 x AM, 1 x SM); (13 – 14 / make contact)	without device 60 mΩ; (+5 mΩ for each added AM)
Typical mounting values (circuit breaker)	
Typical push-in force	approx. 130 N
Typical pull-out force	approx. 150 N
Number of push-on operations	
devices	50
busbar	20
Mass	
Module 18plus EM	approx. 70 g
Module 18plus AM	approx. 60 g
Module 18plus SM	approx. 45 g
Vibration (sinusoidal)	
test to IEC 60068-2-6, test Fc	5 g (57-500Hz), ± 0,38 mm (10-57 Hz)
Shock	
test to IEC 60068-2-27, test Ea	25 g (11 ms)
Humidity	
test to IEC 60068-2-78, test Cab	240 hrs. in 95% RH
Corrosion	
Test to DIN IEC 60068-2-11, test Ka	96 hours in 5% salt mist

*) Application note: We recommend a square crimp shape when using wire end ferrules.

Approvals

Approval authority	Standard	Rated voltage	Current ratings
UL	UL1059	300 V	65 A / 16 A pending

Standards

Approval authority
CE logo according to IEC 60947-7-1

Features and Benefits

- Complete mounting and power distribution system for rail mounting
- Together with the busbars it holds a fully-fledged 80A potential distribution of the DC24V control voltage without additionally required connection terminals or connecting cables
- All electrical connections are implemented via screwless push-in terminals. All pushers were designed in four different colours (red, blue, orange, grey) so as to easily distinguish the different voltage potentials and functions of the device.

Supply terminals PLUS connecting terminals PLUS signalling terminals
PLUS integral wiring harness PLUS flexible circuit breaker population ...
... mutually complete their effects

- Modular compact system for rail mounting as a complete package, containing
- Load wiring with integral terminals without additional potential distribution
- Plug-in type overcurrent protection for all requirements in the DC 24 V area
- Integral power distribution up to 80 A
- Integral group signal wiring, make contacts
- Future bus connection for **ControlPlex®** applications
- Push-in terminals for reliable wiring, even with shock and vibration

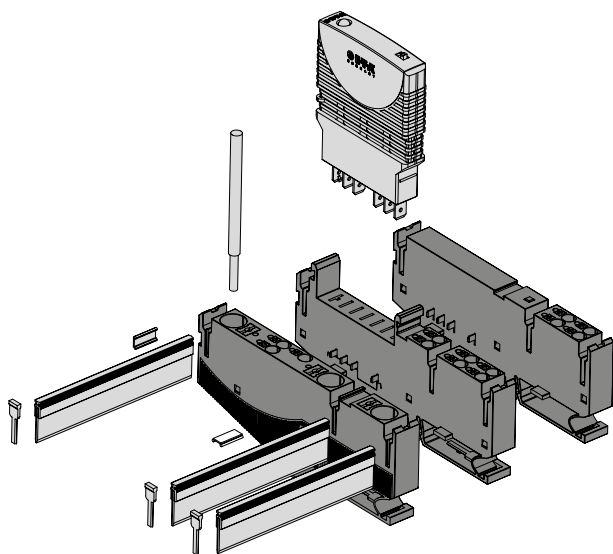
User benefits

- Saves component costs for wiring and for additional parts because the cable harness and the potential distribution are already included
- Reduces costs through ease of electrical planning, of mounting in system and plant service, of procurement etc.
- Perfectly matches centralised and decentralised power distribution concepts
- Saves expenses in logistics through use of only few, standardised components
- High application flexibility through population with different circuit breaker models

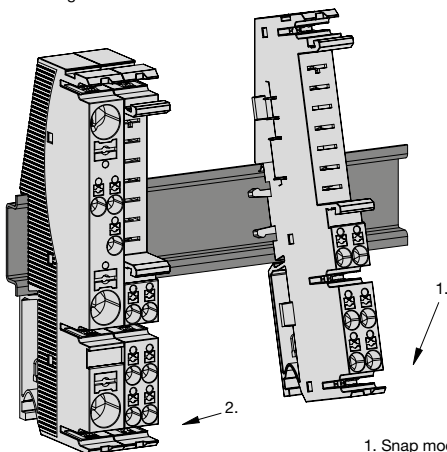
Available versions

18plus-EM02-00-PT01-01	18plus supply module, compact version with group signalling make contact
18plus-AM02-00-PT01-01	18plus connection module for circuit breaker types 2210-S, ESS20-003, ESS30-S003, ESX10-103/ESX10-S103, compact version with group signalling make contact
18plus-SM02-01-PT01-01	18plus signalling module for compact version with group signalling make contact, with integral signal load 10mA

Mounting

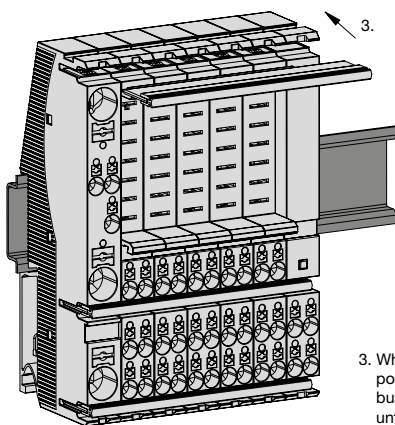


Mounting the modules:



1. Snap module onto rail
2. Push modules on the rail until they catch on audibly

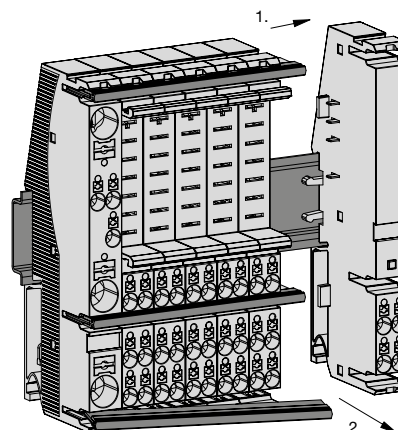
Mounting the busbars:



3. When all modules are positioned correctly, insert busbars in correct position until stop

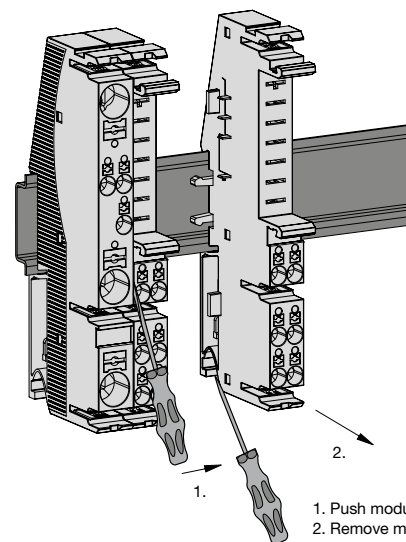
Disassembly

Removing the busbars:



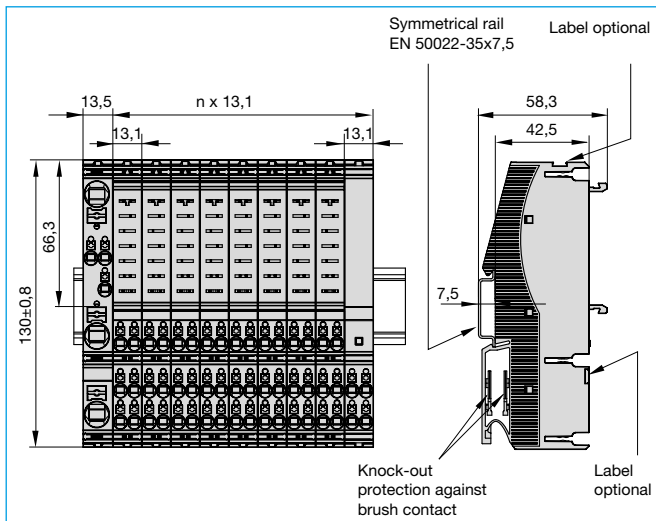
1. Push away signalling module to remove busbar
2. Pull busbar out of the groove

Removing the modules:

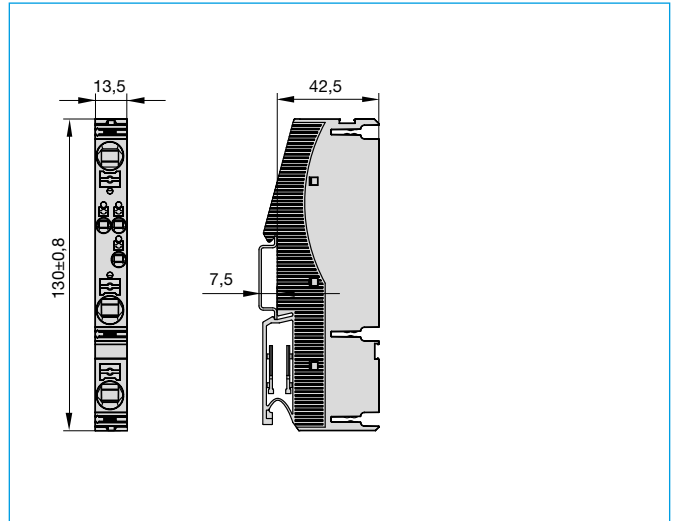


1. Push modules apart
2. Remove module from rail: put screwdriver with a 4 mm blade to foot

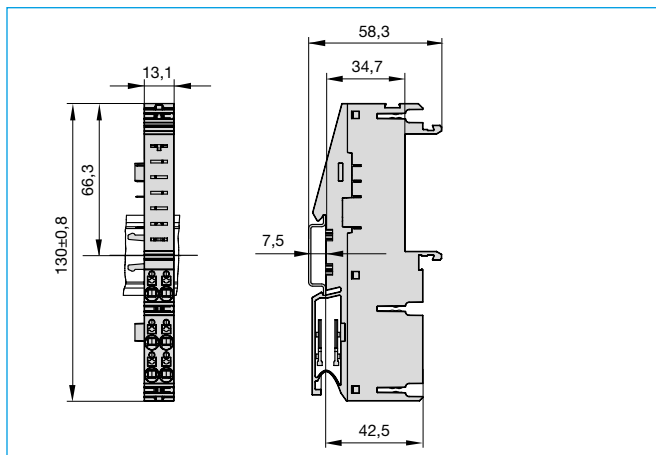
Dimensions of socket system



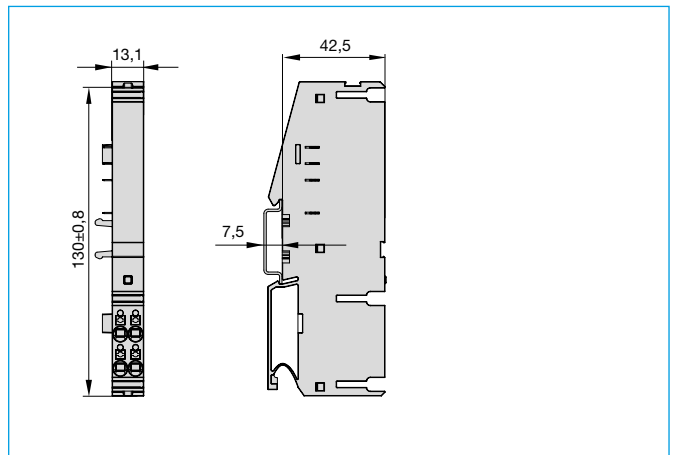
Dimensions EM



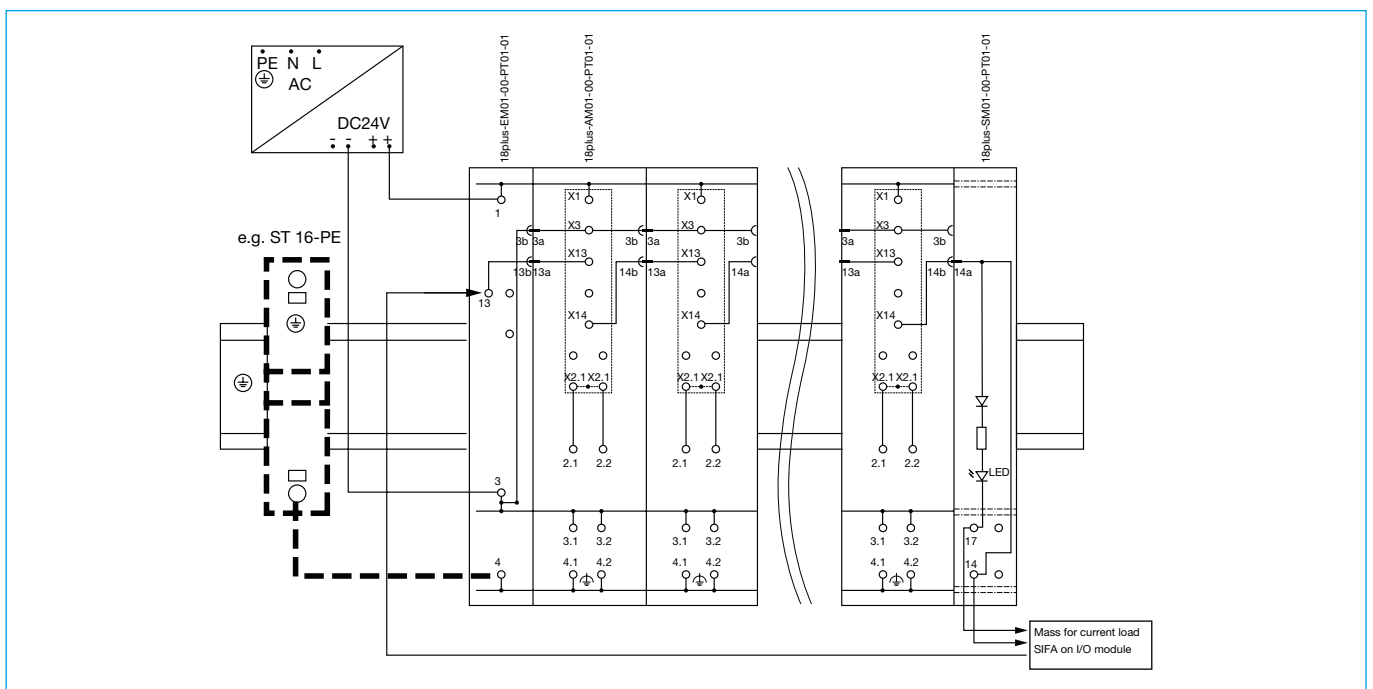
Dimensions AM



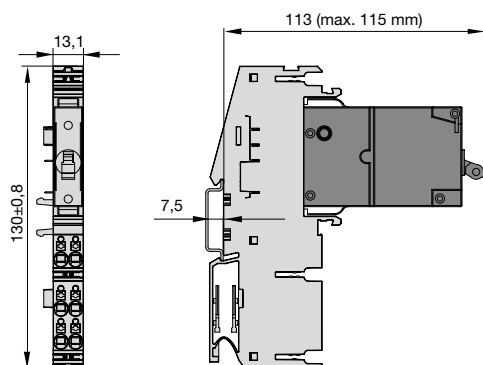
Dimensions SM



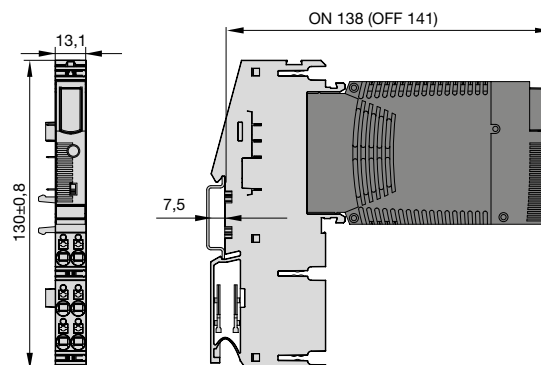
Wiring diagram, without circuit breakers



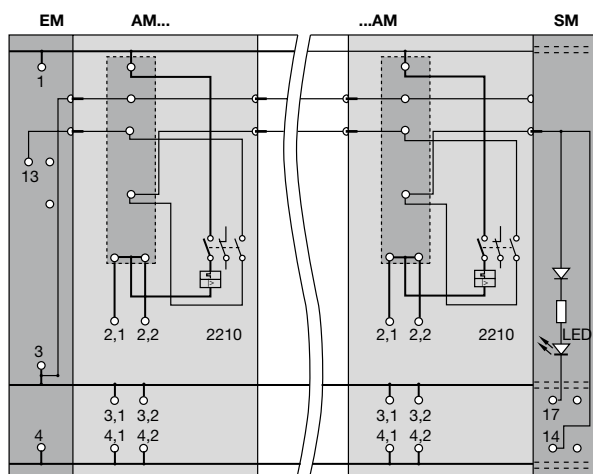
Dimensions, with 2210-S



Dimensions, with ESS20-003

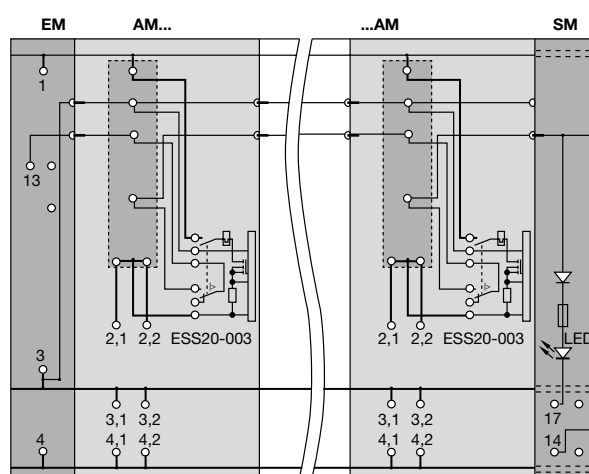


Schematic diagram, with 2210-S



EM		SM	
1	line	14	signalling
3	0 Volt	17	load 24 V / 10 mA
4	FE		
13	signalling		
AM			
2.1, 2.2	load		
3.1, 3.2	0 Volt		
4.1, 4.2	FE		

Schematic diagram, with ESS20-003



EM		SM	
1	line	14	signalling
3	0 Volt	17	load 24 V / 10 mA
4	FE		
13	signalling		
AM			
2.1, 2.2	load		
3.1, 3.2	0 Volt		
4.1, 4.2	FE		

Pin assignment, with 2210-S

2210-S.. module 18plus compact

1	1	
11 (n.a.)	3	
23	13	
24	14	
12 (n.a.)		
2	2.1, 2.2	

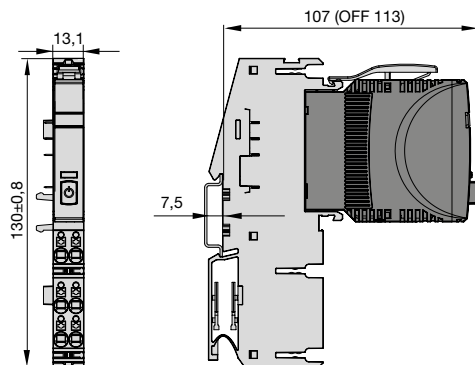
Pin assignment, with ESS20-003

ESS20.. module 18plus compact

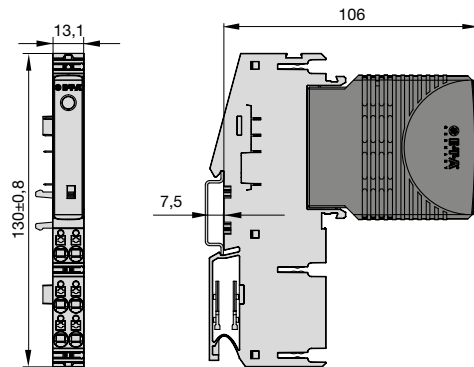
LINE (+)	1	
GND	3	
SC	13	
SO	14	
SI (n.a.)		
LOAD (+)	2.1, 2.2	

Dimensions, with ESS30-S003

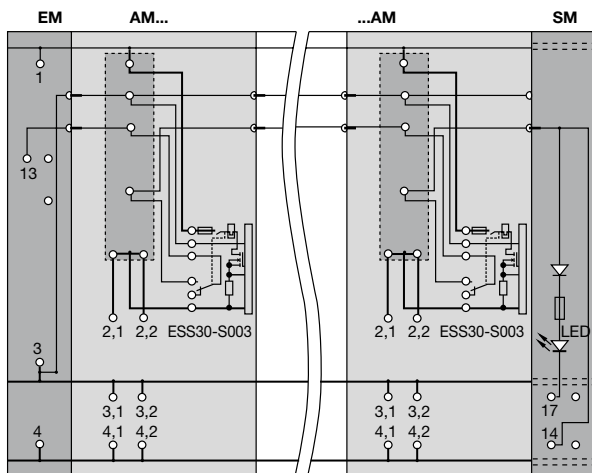
With optional retaining clip:



Dimensions, with ESX10-103 / ESX10-S103

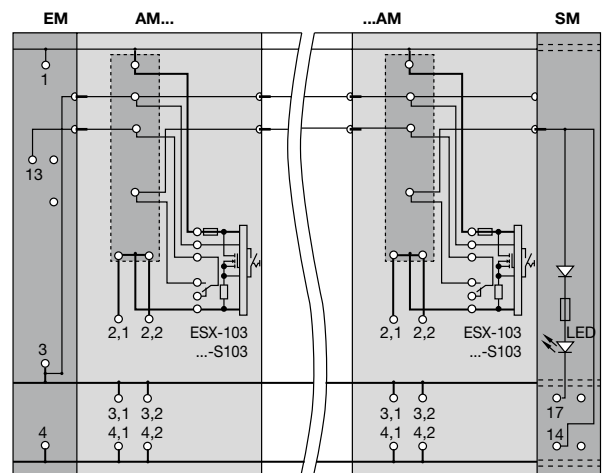


Schematic diagram, with ESS30-003



EM		SM	
1	line	14	signalling
3	0 Volt	17	load 24 V / 10 mA
4	FE		
13	signalling		
AM			
2.1, 2.2	load		
3.1, 3.2	0 Volt		
4.1, 4.2	FE		

Schematic diagram, Type ESX10-103 / ESX10-S103



EM		SM	
1	line	14	signalling
3	0 Volt	17	load 24 V / 10 mA
4	FE		
13	signalling		
AM			
2.1, 2.2	load		
3.1, 3.2	0 Volt		
4.1, 4.2	FE		

Pin assignment, with ESS30-S003

ESS30-S003	module 18plus compact
LINE (+)	1
GND	3
SC	13
SO	14
SI (n.a.)	
LOAD (+)	2.1, 2.2



Pin assignment, with ESX10-103 / ESX10-S103

ESX10-103 ESX10-S103	module 18plus compact
LINE (+)	1
GND	3
SC	13
SO	14
SI (n.a.)	
LOAD (+)	2.1, 2.2

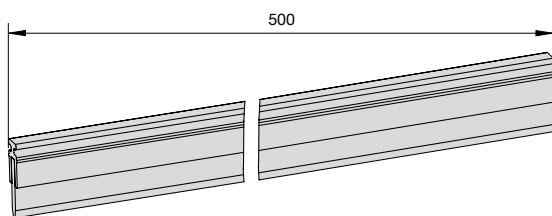


Accessories

- X 222 611 02** busbar for LINE, 0 V, FE, grey insulation, 500 mm
- SB-S11-P1-01-1-1A** jumper
- Y 307 754 01** retaining clip for ESS20 / ESX10 / SB-S11-P1-01-1-1A
- Y 311 978 01** retaining clip for ESS30-S (under preparation)

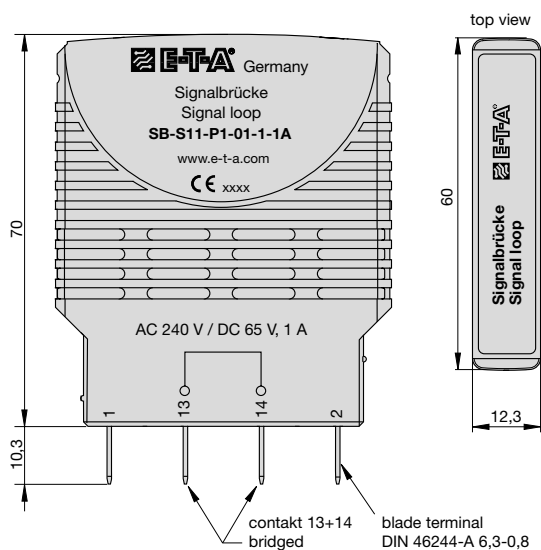
Busbar

- X 222 611 02** busbar for LINE, 0 V, FE, grey insulation, 500 mm

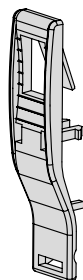


Jumper

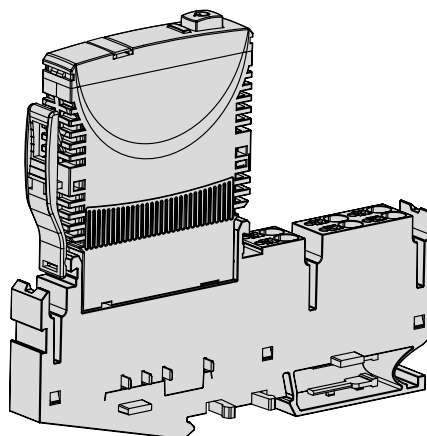
- SB-S11-P1-01-1-1A**



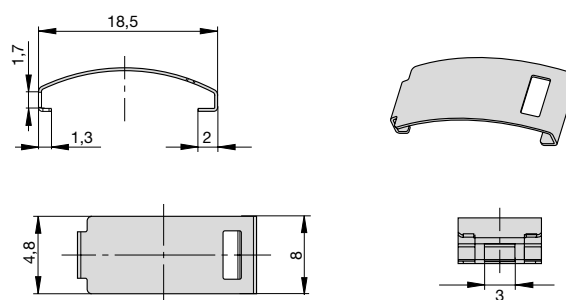
- Retaining clip Y 311 978 01** (under preparation)
Retaining clip for ESS30-S



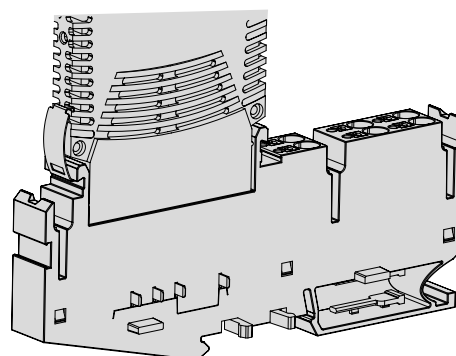
- Installation example with ESS30-S with optional retaining clip**



- Retaining clip Y 307 754 01**
Retaining clip for ESS20 / ESX10 / SB-S11-P1-01-1-1A



- Mounting example for the retaining clip with ESS20**



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