Electrical installation solutions for buildings – Technical details

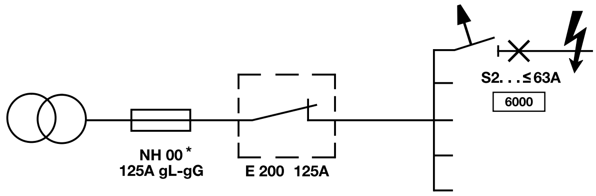
Command and signaling

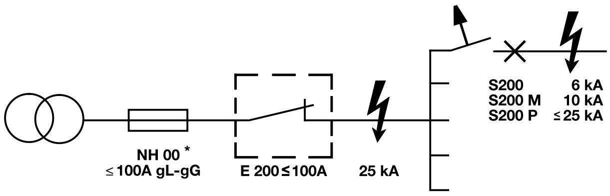
Index

Command and signaling technical details

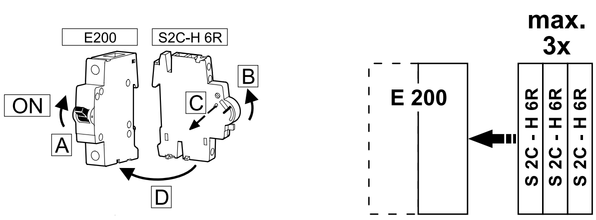
E 200 switches

E200 Short-circuit withstand capacity

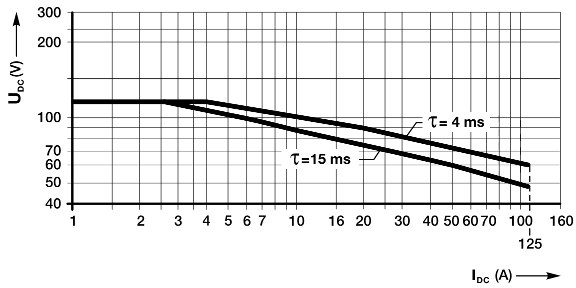




Assembling of S2C-H 6R and E 200

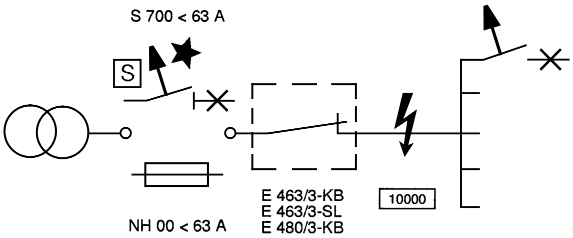


E 200 DC switching capacity



Command and signaling technical details
E 463 switches

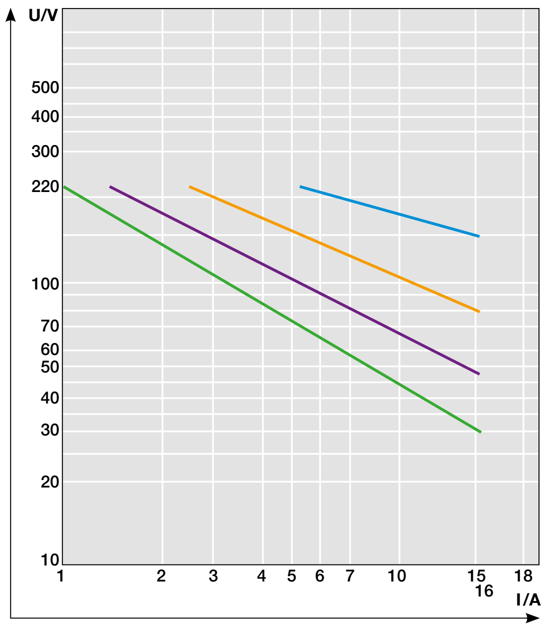
E463 / E480 Short-circuit withstand capacity



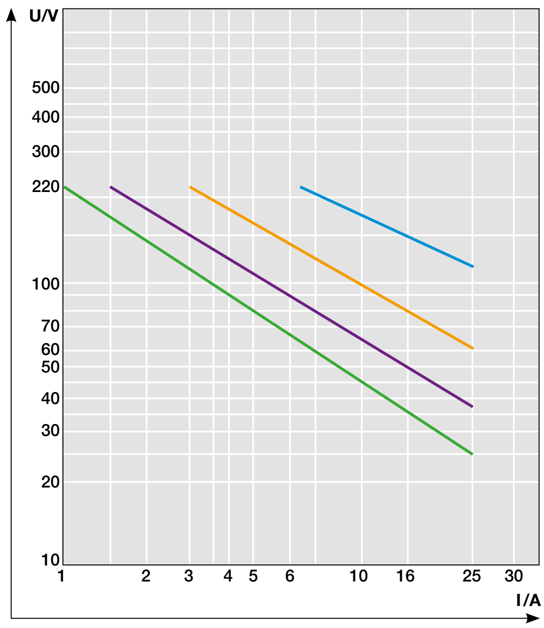
Command and signaling technical details

E 210 switches

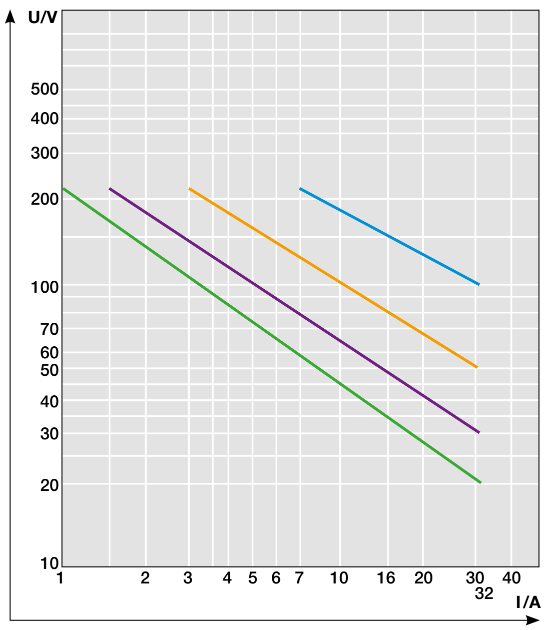
DC switching capacity E211 16A



DC switching capacity E211 25A



DC switching capacity E211 32A



Ohmic load
- Normally-open contact
- Normally-closed contact

Load with time constant
t = 15ms (inductive load)
- Normally-open contact
- Normally-closed contact

Command and signaling technical details

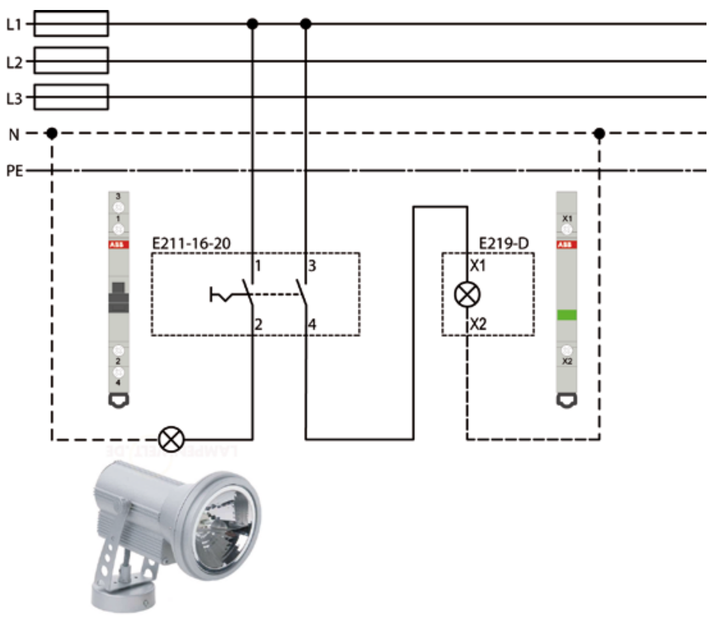
Technical data – Pushbuttons and indicator lights

Overview of general meanings of the colours of operator control parts (excerpt from VDE 0199 or DIN EN 60073).

Colour	Meaning	Explanation	Application examples
RED	Emergency	Action in hazardous situations or emergency	EMERGENCY STOP, STOP or OFF with EMERGENCY STOP pushbutton Initiating an emergency function
YELLOW	Abnormal	Action if an abnormal condition is present	Intervention required to suppress the abnormal condition, manual intervention to restart an interrupted automatic cycle
GREEN	Safety	Action in safe conditions or to prepare a normal condition	Activation
BLUE	Regulation	Status requiring action	Reset function
WHITE GREY BLACK	Non-specific	Functions start	Available for any functions except, except for emergency stop, e.g. ON/OFF; Stop/Start

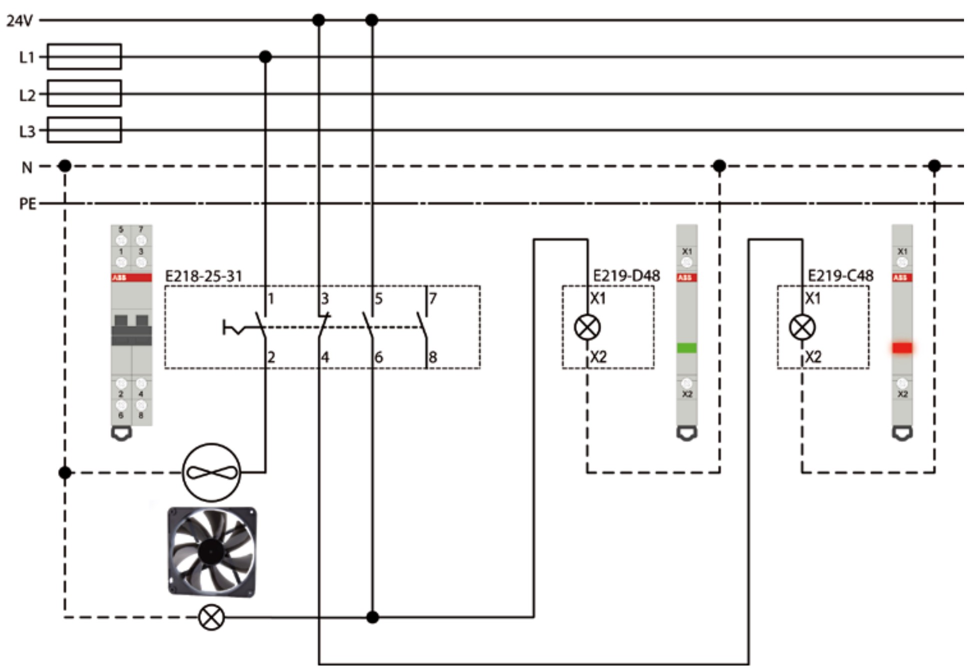
Command and signaling technical details

Sample applications – On-off switches and control switches



Additional garden lighting
On-off switches E211-16-20 (2NO contacts) and indicator lights E219-D

- On-off control for additional garden light
- The green indicator light in the cetral distribution board shows whether the garden light is ON or OFF

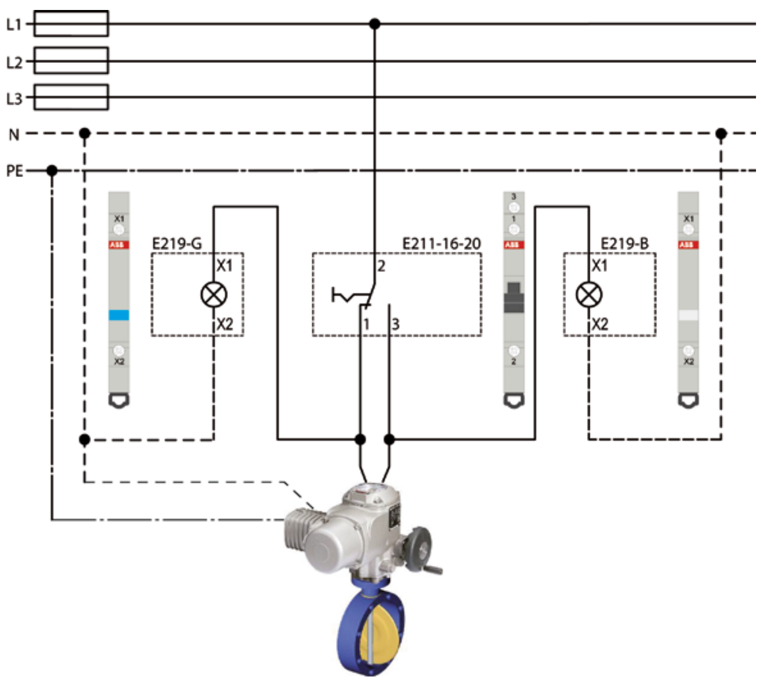


Room ventilator with status display
Control switches E218-25-31 (3NO + 1NC contacts) and E219-D48; E219-C48

- On-off function control of a ventilator
- Integrated signal lamp 24 V for status detection is directly embedded at the ventilator
- The green and red indicator lights 12-48 V show the current operating position in the central distribution board

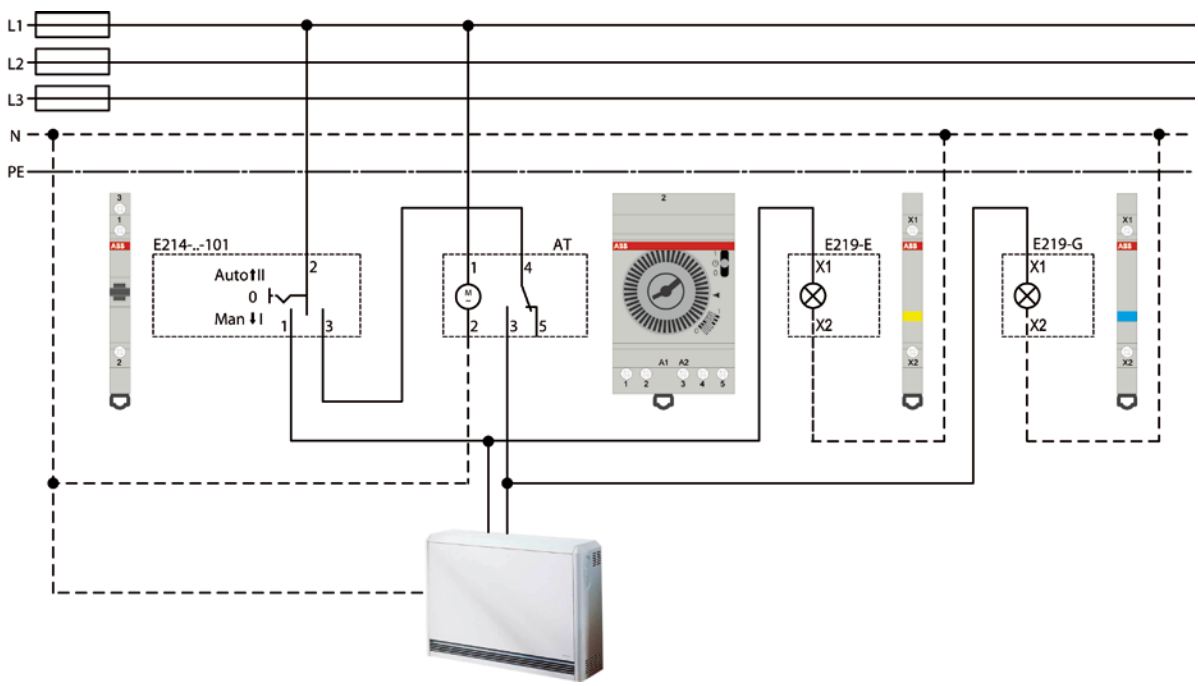
Command and signaling technical details

Sample applications – Change over switches and group switches



Flap gate control
Change over switches E213-16-001 with position I-II (1CO contact) and E219-G; E219-B

- Contol of a manual flap gate position with central visualization
- The blue indicator light shows that the flap gate is open
- The white indicator light shines in closed state

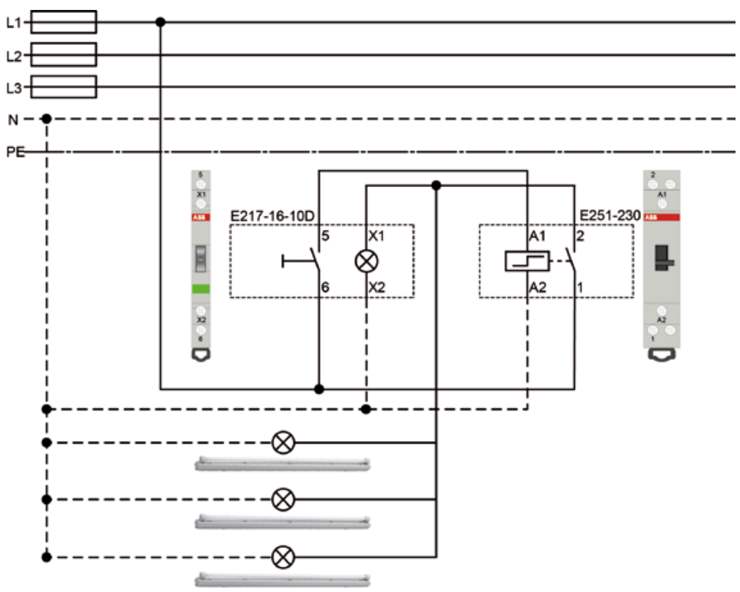


Electrical room heater
Group switches E214-16-101 with position I-0-II (1CO contact) and E219-E; E219-G

- Changeover switching of manual control to time switch mode, e. g. for an additional heater
- The yellow indicator light shows that the control mode occurs manually
- The heater is set on automatic control when the blue E219-G shines

Command and signaling technical details

Sample applications – Push buttons

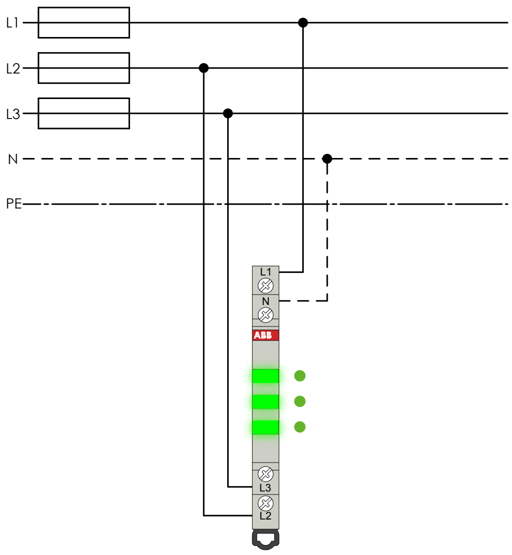


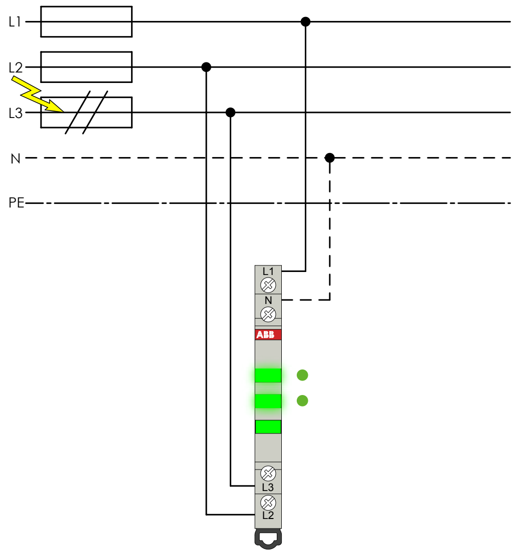
Room lighting (fluorescent-tubes)
Pushbuttons mit 1NO contact (impulse) with geen LED

- Lighting system with latching relay (impulse switching relais)
- The green LED which is integrated in the pushbutton shines when the lighting group has the status ON

Command and signaling technical details

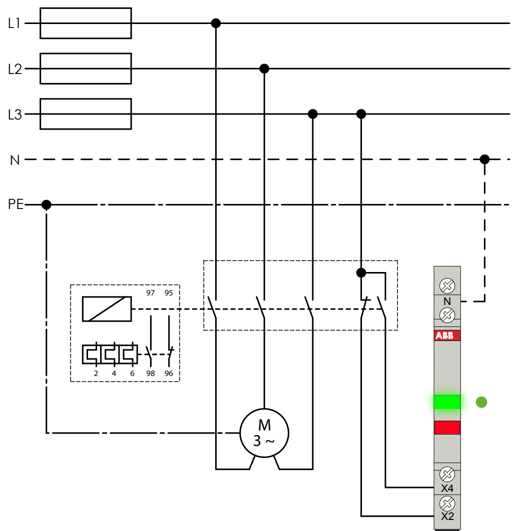
Sample applications – Multiple indicator lights



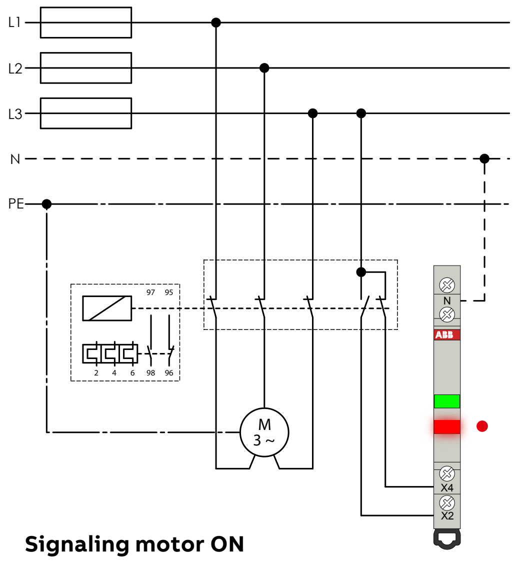


Network and phase control
Multiple indicator lights E219-3D (3x green LEDs)

- All LEDs shine → Net is working
- If one phase breaks down, the green LED turns off
  → Attention! Phase break down in the network



Signaling motor OFF



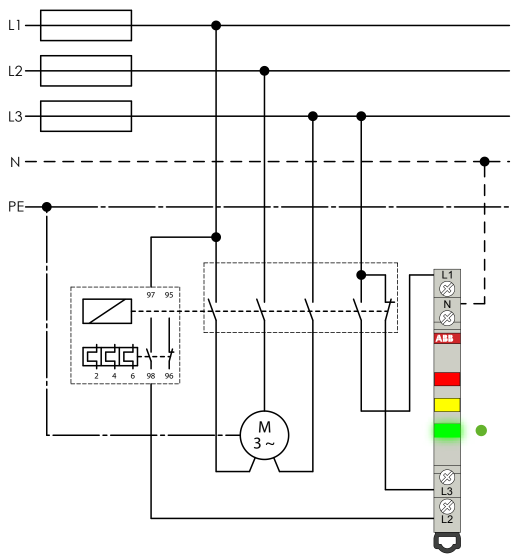
Signaling motor ON

Motor status display
Multiple indicator lights E219-2CD (1x green, 1x red LED)

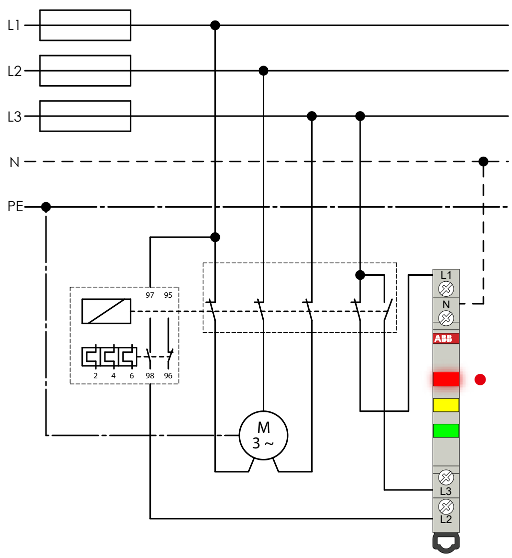
- ABB three-phase contactor (remote controlled with 2 auxiliary contacts (1NO + 1NC))
- The current operating mode of the motor drive is visualized over auxiliary contacts.

Command and signaling technical details

Sample applications – Multiple indicator lights



Signaling motor OFF



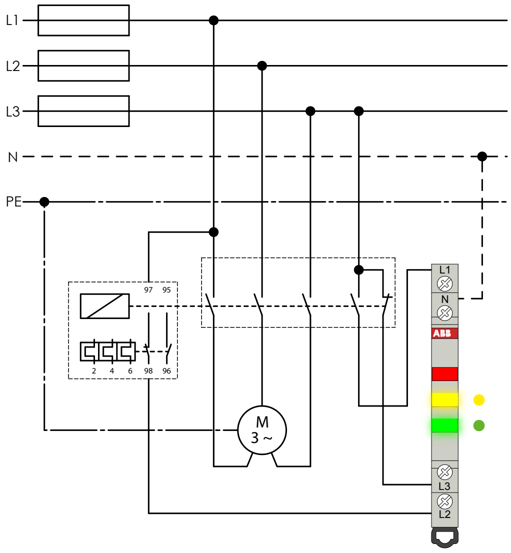
Signaling motor ON

Motor status display
Multiple indicator lights E219-3CDE (1x green, 1x yellow, 1x red LED)

- ABB polyphase contact gate (remote control) with 2 auxiliary contacts (1NO + 1NC)
- The current operating mode of the motor drive is visualized over contactor auxiliary contacts
- The error indication occurs over the signalling contact of the motor protection relay

Command and signaling technical details

Sample applications – Multiple indicator lights



**Signaling motor interference
on basis of thermal overload**

**Motor status display (off and interuption)
Multiple indicator lights E219-3CDE (1x green, 1x yellow, 1x red LED)**

- A thermal activation is signalized by the use of motor protection relay contacts
- Motor off = green LED on; closed motor protection relay contact = yellow LED shows interference

Command and signaling technical details

Installation contactors

Technical data main circuit

Main circuit – Utilization characteristics according to IEC/EN

Contactor type		ESB16..N	ESB20..N/ EN20..N	ESB25..N/ EN25..N	ESB40..N/ EN40..N	ESB63..N	ESB100..N
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 61095					
Rated operational voltage U_e		220 V DC 250 V AC	220 V DC 250 V AC	220 V DC 400 V AC	220 V DC 400 V AC	220 V DC 400 V AC	220 V DC 400 V AC
Rated frequency		DC, 50/60 Hz	DC, 50/60 Hz	DC, 50/60 Hz	DC, 50/60 Hz	DC, 50/60 Hz	DC, 50/60 Hz
AC-1/AC-7a utilization category for air temperature near the contactor ≤ 55 °C							
Rated operational current I_e AC-1/AC-7a	NO	16 A	20 A	25 A	40 A	63 A	100 A
	NC	16 A	20 A	25 A	30 A	30 A	-
Rated operational power AC-1	230 V 1 phase	3.7 kW	4.6 kW	5.8 kW	9.2 kW	14.5 kW	23 kW
	400 V 3 phases	–	–	17.3 kW	27.7 kW	43.6 kW	69.3 kW
AC-3/AC-7b utilization category for air temperature close to contactor ≤ 55 °C							
Rated operational current I_e AC-3/AC-7b	230 V 1 phase	6 A	9 A	9 A	22 A	30 A	–
	400 V 3 phases	–	–	9 A	22 A	30 A	–
Rated operational power AC-3	230 V 1 phase	0.9 kW	1.3 kW	1.3 kW	3.7 kW	5 kW	–
	400 V 3 phases	–	–	4 kW	11 kW	15 kW	–
Rated making capacity AC-3 acc. to IEC 60947-4-1		10 x I_e /AC-3	10 x I_e /AC-3	10 x I_e /AC-3	10 x I_e /AC-3	10 x I_e /AC-3	–
Rated breaking capacity AC-3 acc. to IEC 60947-4-1		8 x I_e /AC-3	8 x I_e /AC-3	8 x I_e /AC-3	8 x I_e /AC-3	8 x I_e /AC-3	–
Short-circuit protective devices - gG type fuses, type 1 coordinated		20 A	20 A	35 A	63 A	80 A	125 A
Rated short-time withstand current I_{cw} at 40 °C ambient temp. in free air, from a cold state	10 s	48 A	72 A	72 A	176 A	240 A	–
Minimum switching capacity		17 V/200 mA	17 V/200 mA	17 V/200 mA	17 V/200 mA	17 V/200 mA	17 V/200 mA
Power loss per pole		0.9 W	1.4 W	2 W	3 W	4.5 W	6 W
Maximum electrical switching frequency	AC-1/AC-7a	300 cycles/h	300 cycles/h	300 cycles/h	300 cycles/h	300 cycles/h	150 cycles/h
	AC-3/AC-7b	600 cycles/h	600 cycles/h	600 cycles/h	600 cycles/h	600 cycles/h	–
Electrical durability	AC-1/AC-7a	150,000 cycles	150,000 cycles	130,000 cycles	150,000 cycles	100,000 cycles	70,000 cycles
	AC-3/AC-7b	150,000 cycles	150,000 cycles	500,000 cycles	150,000 cycles	240,000 cycles	–
Mechanical durability		1,000,000 cycles					

Command and signaling technical details

Installation contactors

Technical data main circuit and control circuit

Main circuit – Utilization characteristics according to UL/CSA

Contactor type		ESB16..N	ESB20..N/ EN20..N	ESB25..N/ EN25..N	ESB40..N/ EN40..N	ESB63..N	ESB100..N
Standards		UL 60947-1, UL 60947-4-1					
General use rating	240 V	16 A	20 A	–	–	–	–
	480 V	–	–	25 A	40 A	63 A	100 A
Motor rating							
Full load current	220 ... 240 V 1 phase	6.9 A	8 A	–	–	–	–
	220 ... 240 V 3 phases	–	–	9.6 A	22 A	28 A	–
	440 ... 480 V 3 phases	–	–	7.6 A	21 A	21 A	–
Horse power rating	220 ... 240 V 1 phase	0.8 hp	1 hp	–	–	–	–
	220 ... 240 V 3 phases	–	–	3 hp	7.5 hp	10 hp	–
	440 ... 480 V 3 phases	–	–	5 hp	15 hp	15 hp	–
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded							
	Fuse rating	20 A	20 A	25 A	40 A	75 A	125 A
	Fuse type 480 V	K5	K5	K5	K5	K5	K5
Max. electrical switching frequency							
	for general use	300 cycles/h	300 cycles/h	300 cycles/h	300 cycles/h	300 cycles/h	150 cycles/h
	for motor use	600 cycles/h	600 cycles/h	600 cycles/h	600 cycles/h	600 cycles/h	–

General technical data

Contactor type		ESB16..N	ESB20..N/ EN20..N	ESB25..N/ EN25..N	ESB40..N/ EN40..N	ESB63..N	ESB100..N
Rated insulation voltage U_i acc. to IEC 60947-4-1 and VDE 0110 (Gr. C)		400 V	400 V	500 V	500 V	500 V	500 V
Rated impulse withstand voltage U_{imp}		6 kV	ESB: 6 kV EN: 6 kV	ESB: 6 kV EN: 4 kV/6 kV with protection cover		6 kV	6 kV
Ambient air temperature range [1]	operation	-25 ... +55 °C	-25 ... +55 °C	-25 ... +55 °C	-25 ... +55 °C	-25 ... +55 °C	-25 ... +55 °C
	storage	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C	-40 ... +80 °C
Maximum operating altitude permissible		2000 m	2000 m	2000 m	2000 m	2000 m	2000 m
Vibration (sinusoidal) according to IEC/EN 60068-2-6 (Fc)		1 g/3-150 Hz	1 g/3-150 Hz	1 g/3-150 Hz	1 g/3-150 Hz	1 g/3-150 Hz	
Shock (half-sine) according to IEC/EN 60947-1 Annex. Q		Category E	Category E	Category E	Category E	Category E	Category E
Shock (half-sine) according to IEC/EN 60068-2-27 (Ea)		15g/11ms	15g/11ms	15g/11ms	15g/11ms	15g/11ms	15g/11ms

1) If several contactors are mounted adjacently and the duty time is longer than one hour, every second contactor needs a distance piece, Type ESB-DIS (1/2 module). This is not necessary at an ambient temperature ≤ 40 °C or on Type ESB16..N, ESB/EN20..N and ESB100..N

Magnet system characteristics

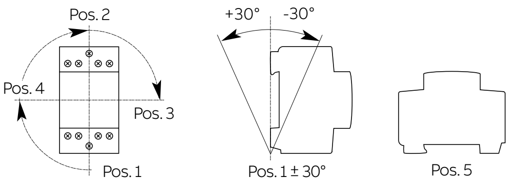
Contactor type			ESB16..N	ESB20..N/ EN20..N	ESB25..N/ EN25..N	ESB40..N/ EN40..N	ESB63..N	ESB100..N
Coil operating limits acc. to IEC/EN60947-4-1			0.85 ... 1.1 x U_c (at θ ≤ 55 °C)					
Rated frequency			DC, 50/60/400 Hz					
Frequency range			DC, 40 ... 450 Hz					
Coil consumption	pull-in	50 Hz	2.5 VA	2.5 VA	4 VA	4.5 VA	60 VA	90 VA
		60 Hz	2.5 VA	2.5 VA	4 VA	4.5 VA	60 VA	90 VA
		DC	2.5 W	2.5 W	4 W	5 W	70 W	100 W
	holding	50 Hz	2.5 VA	2.5 VA	4 VA	4.5 VA	4.5 VA	7.5 VA
		60 Hz	2.5 VA	2.5 VA	4 VA	4.5 VA	4.5 VA	7.5 VA
		DC	2.5 W	2.5 W	4 W	5 W	5 W	8.5 W

Command and signaling technical details

Installation contactors

Technical data main circuit and control circuit

Mounting characteristics and conditions for use

Contactor type	ESB16..N	ESB20..N/ EN20..N	ESB25..N/ EN25..N	ESB40..N/ EN40..N	ESB63..N	ESB100..N
Mounting position	Position 1 to 5 					
Mounting on DIN rail	TH35-15 (35 x 15 mm Mounting Rail) acc. to IEC 60715 TH35-7.5 (35 x 7.5 mm Mounting Rail) acc. to IEC 60715					

Main circuit - Connecting characteristics

Contactor type	ESB16..N	ESB20..N/ EN20..N	ESB25..N/ EN25..N	ESB40..N/ EN40..N	ESB63..N	ESB100..N
Connecting capacity						
Rigid	1x 1 ... 10 mm^2 2x 1 ... 4 mm^2	1x 1 ... 10 mm^2 2x 1 ... 4 mm^2	1x 1.5 ... 10 mm^2 2x 1.5 ... 4 mm^2	1x 1.5 ... 25 mm^2 2x 1.5 ... 10 mm^2	1x 1.5 ... 25 mm^2 2x 1.5 ... 10 mm^2	1x 10 ... 50 mm^2
Flexible with ferrule	1x 1 ... 6 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 6 mm^2 2x 1 ... 2.5 mm^2	1 x 1.5 ... 10 mm^2 2x 1.5 ... 2.5 mm^2	1x 1.5 ... 16 mm^2 2x 1.5 ... 10 mm^2	1x 1.5 ... 16 mm^2 2x 1.5 ... 10 mm^2	1x 10 ... 35 mm^2
Flexible with insulated ferrule	1x 1 ... 6 mm^2 2x 1 ...1.5 mm^2	1x 1 ... 6 mm^2 2x 1 ...1.5 mm^2	1 x 1 .5 ... 10 mm^2 2x 1 .5 mm^2	1x 1.5 ... 16 mm^2 2x 1.5 ... 10 mm^2	1x 1.5 ... 16 mm^2 2x 1.5 ... 10 mm^2	1x 10 ... 35 mm^2
Flexible	1x 1 ... 6 mm^2 2x 1... 4 mm^2	1x 1 ... 6 mm^2 2x 1... 4 mm^2	1 x 1.5 ... 10 mm^2 2x 1.5 ... 4 mm^2	1x 1.5 ... 16 mm^2 2x 1.5 ... 10 mm^2	1x 1.5 ... 16 mm^2 2x 1.5 ... 10 mm^2	1x 10 ... 35 mm^2
Stranded acc. to UL/CSA	14-8 AWG	14-8 AWG	16-8 AWG	16-4 AWG	16-4 AWG	8-0 AWG
Degree of protection	IP20	IP20	IP20	IP20	IP20	IP20
Wire stripping length	10 mm	10 mm	10 mm	13 mm	13 mm	15 mm
Tightening torque	1.2 N·m/ 11 lb.in	1.2 N·m/ 11 lb.in	1 N·m/ 9 lb.in	2.5 N·m/ 20 lb.in	2.5 N·m/ 20 lb.in	3 N·m/ 27 lb.in
Recommended screw driver	Pozidriv 1	Pozidriv 1	Pozidriv 1	Pozidriv 2	Pozidriv 2	Pozidriv 2

Control circuit - Connecting characteristics

Contactor type	ESB16..N	ESB20..N/ EN20..N	ESB25..N/ EN25..N	ESB40..N/ EN40..N	ESB63..N	ESB100..N
Connecting capacity						
Rigid	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2
Flexible with ferrule	1x 0.75 ... 2.5 mm^2 2x 0.75 ... 1 mm^2	1x 0.75 ... 2.5 mm^2 2x 0.75 ... 1 mm^2	1x 0.75 ... 2.5 mm^2 2x 0.75 ... 1 mm^2	1x 0.75 ... 2.5 mm^2 2x 0.75 ... 1 mm^2	1x 0.75 ... 2.5 mm^2 2x 0.75 ... 1 mm^2	1x 0.75 ... 2.5mm^2 2x 0.75 ... 1 mm^2
Flexible with insulated ferrule	1x 1 ... 2.5 mm^2 2x 0.75 ... 1 mm^2	1x 1 ... 2.5 mm^2 2x 0.75 ... 1 mm^2	1x 1 ... 2.5 mm^2 2x 0.75 ... 1 mm^2	1x 1 ... 2.5 mm^2 2x 0.75 ... 1 mm^2	1x 1 ... 2.5 mm^2 2x 0.75 ... 1 mm^2	1x 1 ... 2.5 mm^2 2x 0.75 ... 1 mm^2
Flexible	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2	1x 1 ... 4 mm^2 2x 1 ... 2.5 mm^2
Stranded acc. to UL/CSA	16-10 AWG	16-10 AWG	16-10 AWG	16-10 AWG	16-10 AWG	16-10 AWG
Degree of protection	IP20	IP20	IP20	IP20	IP20	IP20
Wire stripping length	7 mm	7 mm	7 mm	7 mm	7 mm	7 mm
Tightening torque	0.9 N·m/8 lb.in	0.9 N·m/8 lb.in	0.9 N·m/8 lb.in	0.9 N·m/8 lb.in	0.9 N·m/8 lb.in	0.9 N·m/8 lb.in
Recommended screw driver	Pozidriv 1	Pozidriv 1	Pozidriv 1	Pozidriv 1	Pozidriv 1	Pozidriv 1

Command and signaling technical details

Installation contactors

Technical data auxiliary circuit

Auxiliary circuit - Utilization characteristics according to IEC/EN

For ambient temperature T_u = 40 °C if not stated otherwise.

Contactor type			EH04-xxN
Standards			IEC/EN 60947-1, IEC/EN 60947-5-1
Rated operational voltage U_e			500 V AC
			250 V DC
Rated frequency			DC, 50/60 Hz
Rated operational current I_e AC-15	24 V	NO/NC	6 A/6 A
	120 V	NO/NC	6 A/6 A
	240 V	NO/NC	4 A/4 A
	415 V	NO/NC	3 A/3 A
	500 V	NO/NC	2 A/2 A
Rated operational current I_e DC-13	125 V	NO/NC	0.55 A/0.55 A
	250 V	NO/NC	0.27 A/0.27 A
Minimum switching capacity			17 V/5 mA
Short-circuit protective devices			10 A, gG type fuse
Mechanical durability			1,000,000 cycles
Electrical durability	AC-15	240 V/4 A	100,000 cycles
	DC-13	125 V/0.55 A	100,000 cycles
Maximum electrical switching frequency	AC-15		360 cycles/h
	DC-13		360 cycles/h

General technical data

Contactor type			EH04-xxN
Duty time			100%
Rated impulse withstand voltage U_{imp} acc. to IEC/EN 60947-1			4 kV
Rated insulation voltage U_i acc. to IEC/EN 60947-1			500 V
Pollution category acc. to IEC/EN 60664			2
Overvoltage category acc. to IEC/EN 60664			Up to III
Maximum operating altitude permissible			2000 m
Ambient air temperature range	Operation	Open	-25 °C ... +55 °C
	Storage		-40 °C ... +80 °C
Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc)			5 g/3-150 Hz
Shock (half-sine) acc. to IEC/EN 60947-1 Annex. Q			Category E
Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea)			15 g/11 ms

Auxiliary circuit - Utilization characteristics according to UL/CSA

Contactor type		EH04-xxN
Standards		UL 60947-1, UL 60947-4-1
Max. operational voltage		600 V AC
Pilot duty		A600
Thermal continuous test current		10 A
General use rating	600 V AC per pole	5 A

Command and signaling technical details

Installation contactors

Technical data auxiliary circuit

Mounting characteristics and conditions for use

Contactor type	EH04-xxN		
Mounting position	Position 1	0°	Yes
	Position 2	180°	Yes
	Position 3	270°	Yes
	Position 4	90°	Yes
	Position 5	standing	Yes
	Position 6	upside down	Not allowed
Mounting on DIN rail	TH35-15 (35 x 15 mm Mounting Rail) acc. to IEC 60715 TH35-7.5 (35 x 7.5 mm Mounting Rail) acc. to IEC 60715		

Auxiliary circuit - Connecting characteristics

Contactor type	EH04-xxN
Connecting capacity	
Rigid	1x 1 mm² ...4 mm² 2x 1 mm² ... 1.5 mm²
Flexible with ferrule	1x 1 mm² ... 1.5 mm²
Flexible with insulated ferrule	-
Flexible	1x 1 mm² ... 1x 2.5 mm²
Stranded acc. to UL/CSA	AWG 18.... AWG 12
Degree of protection	IP20
Wire stripping length (upper/lower)	17 mm (≤ 1.5mm² 7 mm) / 9 mm (≤ 1.5mm² 7 mm)
Tightening torque	0.9 N·m/ 8 lb.in
Recommended screw driver	Pozidriv 1

Command and signaling technical details

Installation contactors

DC switching table installation contactors

Type	Rated operational voltage	Contact	DC-1/A 1-pole	DC-3/A 1-pole
ESB16-..N	24 V DC	NO	16	12
	48 V DC		12	6
	60 V DC		12	4
	110 V DC		4	1.2
	220 V DC		0.4	0.2
	24 V DC	NC	11	5
	48 V DC		6	2
	60 V DC		4	1.5
	110 V DC		1.2	0.4
	220 V DC		0.2	0.1
ESB20-..N	24 V DC	NO	20	15
EN20-..N	48 V DC		15	7
	60 V DC		15	5
	110 V DC		5	1.5
	220 V DC		0.5	0.2
	24 V DC	NC	14	6
	48 V DC		7	3
	60 V DC		4.5	2
	110 V DC		1.5	0.6
	220 V DC		0.2	0.1

Type	Rated operational voltage	Contact	DC-1/A 3 poles in series	DC-3/A 3 poles in series
ESB25-..N	24 V DC	NO	24	24
EN25-..N	48 V DC		24	24
	60 V DC		24	24
	110 V DC		24	16
	220 V DC		13	4
	24 V DC	NC	24	19
	48 V DC		22	9.4
	60 V DC		17.5	7.5
	110 V DC		9.5	4.1
	220 V DC		3.8	1.6
ESB40-..N	24 V DC	NO	40	40
EN40-..N	48 V DC		40	40
	60 V DC		40	34
	110 V DC		30	18
	220 V DC		15	4.5
ESB63-..N	24 V DC	NO	63	63
	48 V DC		63	47
	60 V DC		60	38
	110 V DC		33	21
	220 V DC		17	5
ESB100-..N	24 V DC	NO	100	100
	48 V DC		100	70
	60 V DC		80	45
	110 V DC		50	25
	220 V DC		35	7

Command and signaling technical details

Installation contactors

Lamp load table

Please note that switching lamps is a capacitor load application where high inrush current peaks could occur. These are influenced by the length and cross section of the wire as well as the type of power supply unit and specifications of the lamp brand. For example, long cables can increase the possible number of lamps per pole. The table shows the allowed max. current for one pole and considers already the startup current peaks.
The following selection table shows the current values and the maximum switchable capacitor load for compensated lamps. These two limits have to be considered in the selection of contactors.

		ESB16..N	ESB20..N EN20..N	ESB25..N EN25..N	ESB40..N EN40..N	ESB63..N	ESB100..N
Permitted compensating capacity per phase Cmax [μF]		45	75	100	350	500	650
Lamp types		Maximum load of the current paths during switching of electric lamps I_e [A]					
Incandescent and halogen lamps (230 V)		4	6	7	20	30	45
Mixing lamps without ballast		4	6	7	20	30	45
Fluorescent lamps with conventional ballast	single lamp uncompensated	14	18	22	36	56	90
	single lamp parallel compensated	2	3	3.5	10	15	22
	series compensation, duo circuit	14	18	22	36	56	90
Fluorescent lamps with electronic ballast or CFL		4	6	7	20	30	45
LED lamps		4	6	7	20	30	45
High pressure mercury-vapor lamps	single lamp without compensation	7	9	11	18	28	45
	single lamp with parallel compensation	2	3	3.5	10	15	22
Halogen metal-vapor lamps	single lamp without compensation	7	9	11	18	28	45
	single lamp with parallel compensation	2	3	3.5	10	15	22
High pressure sodium-vapor lamps	single lamp without compensation	7	9	11	18	28	45
	single lamp with parallel compensation	2	3	3.5	10	15	22
Low pressure sodium-vapor lamps	single lamp without compensation	7	9	11	18	28	45
	single lamp with parallel compensation	2	3	3.5	10	15	22

Example for lamp load calculation
Due to many varieties of lamps and ballasts we advice to take the current load as base for reference. The lamp table considers already the inrush peaks and other lamp parameters. Please see the following examples for a reliable project lamp calculation.

Fluorescent lamp with conventional ballast, uncompensated
the lamp operating current I = 1.5 A, voltage U = 230 V
1 pole of ESB25..N can be loaded with max. 22 A,
see lamp table => 22 A/1.5 A = 14.66 => 14 lamps
1 pole of ESB20..N can be loaded with max. 18 A,
see lamp table => 18 A/1.5 A = 12 lamps

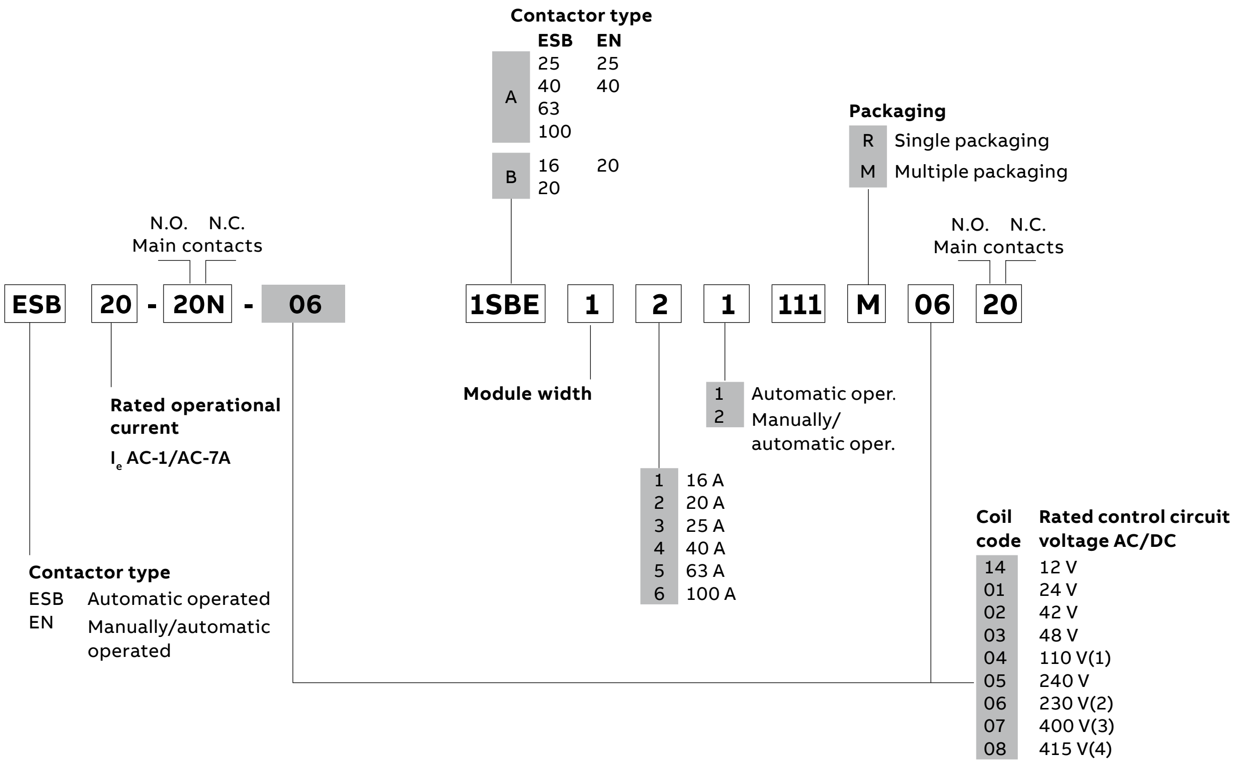
Please use the referring value in the table stated above and divide it with the current stated on the lamp. This will lead to the number of lamps which can be switched.

Example with picture: ESB25..N used for LED lamps:
7 A (= 7000 mA) / 85 mA = 82.23 => 82 lamps

Command and signaling technical details

Installation contactors

Voltage code table



(1) 110 V - 120 V for ESB25..N/EN25..N

(2) only coil 6 available with 230 V - 240 V for ESB25..N/EN25..N

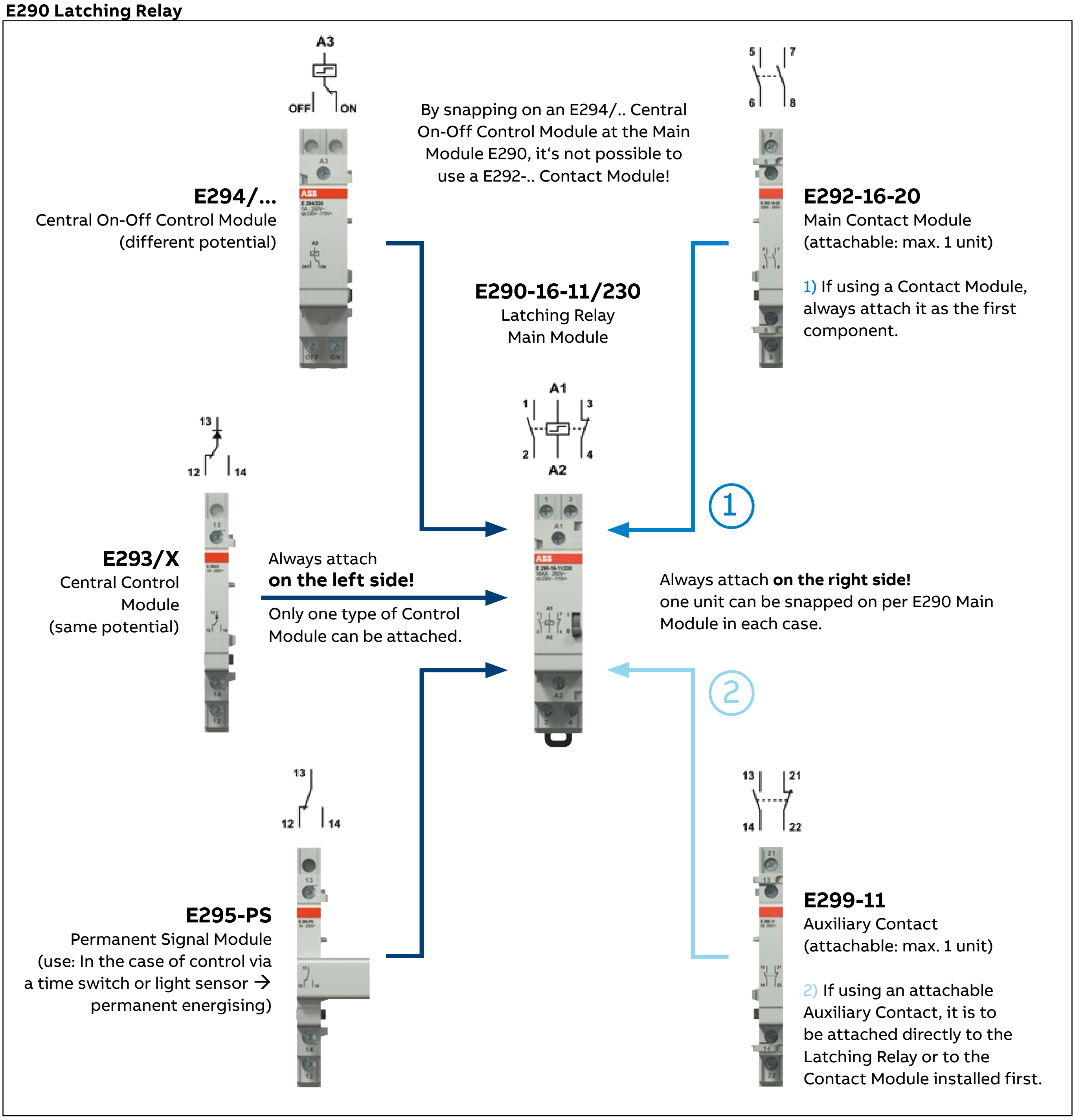
(3) only coil 7 available with 400 V - 415 V for ESB25..N

(4) Coil 8 available for ESB40-40N and ESB63-40N only.

Command and signaling technical details

E290 latching relays

E290 Latching Relay



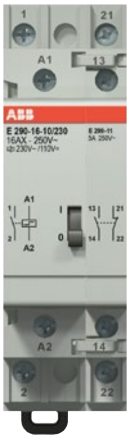
Safety information

If more than one Latching relay installed next to each other, it is recommended to use a intermediate piece (distance). This guarantees optimal heat dissipation by the main modules. The intermediate pieces (9 or 18mm wide) can be found in the order information as types ZLS725 or ZLS726 (the use depends on the application).

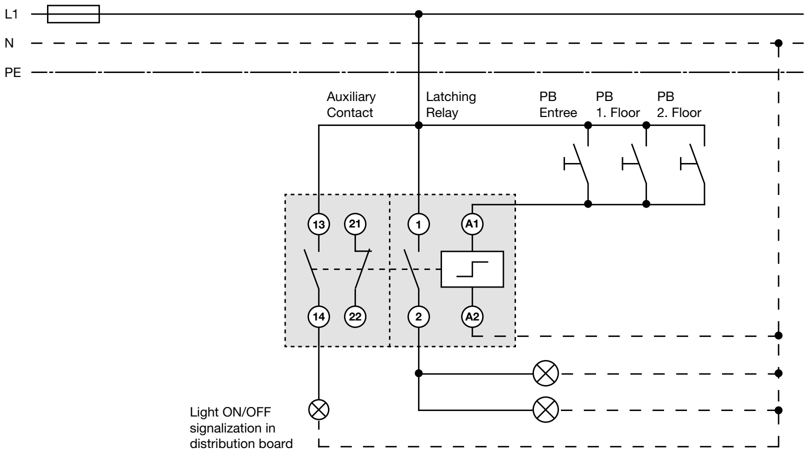
Command and signaling technical details

E290 latching relays

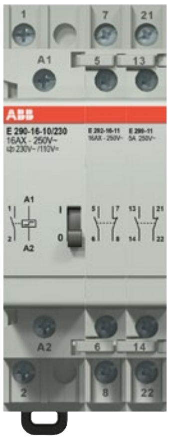
E290-16-10 + E299-11 — Latching Relay with Auxiliary Contact



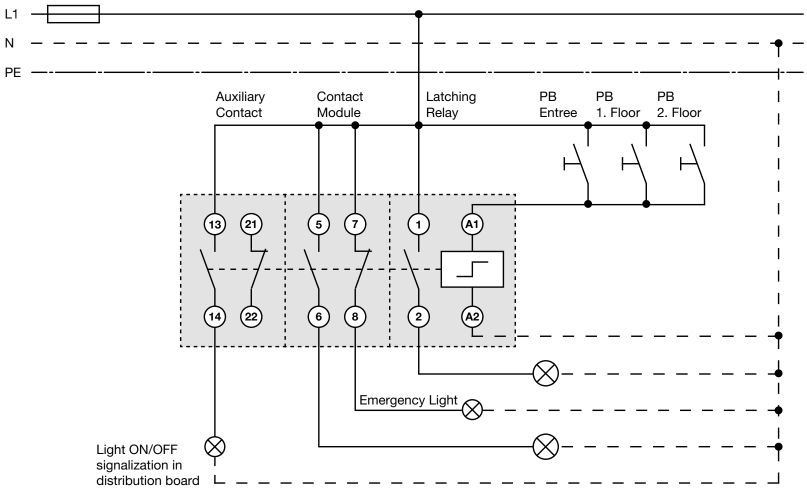
Application at a normal light control via different push buttons (PB);
The snapped-on auxiliary contact (E299-11) displays the current switching state of the light control (ON/OFF).



E290-16-10 + E292-16-11 + E299-11 — Latching Relay with Auxiliary Contact

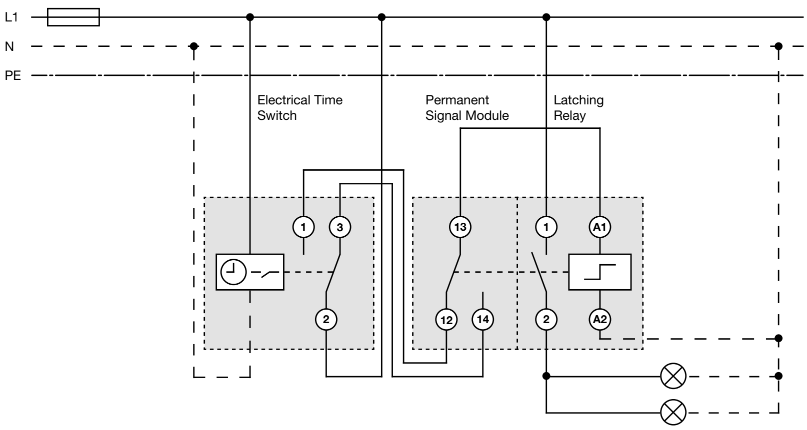


Latching Relay E290 with attached contact module E292-16-11 (additional main contact tracks) plus an auxiliary contact to externally display the switching state of the main contacts (ON/OFF).



E290-16-10 + 295-PS — Latching Relay with permanent signal module

This combination permits control of the E290 coil via a permanent signal (e.g. directly controlled by a timer or a twilight switch).
When using this accessory, manual switching at the main unit is not possible.

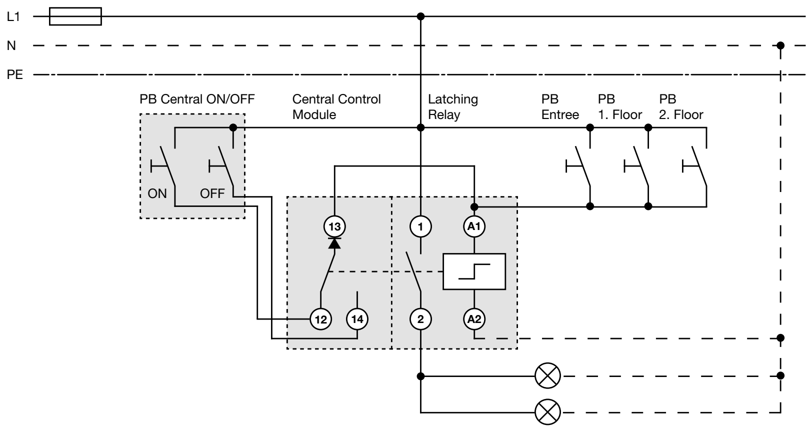


Command and signaling technical details

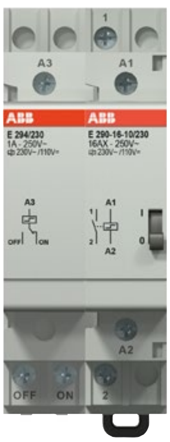
E290 latching relays

E290-16-10 + E293/X — Latching Relay with Central Control Module

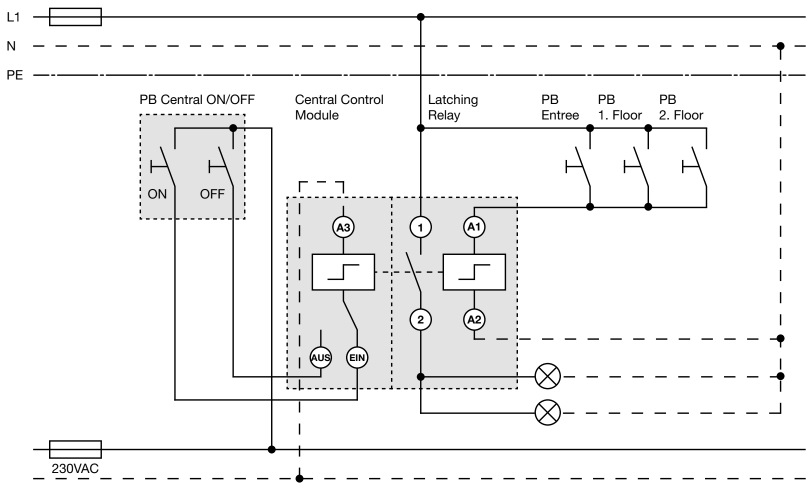
The function of a Central ON/OFF control is implemented by using the accessory E293/X. The E293/X Central ON/OFF module uses the same coil voltage potential as the main unit E290. The light control can be either on site via the local buttons, or by the Central ON/OFF button.



E290-16-10 + E294/230 — Latching Relay with Central Control Module

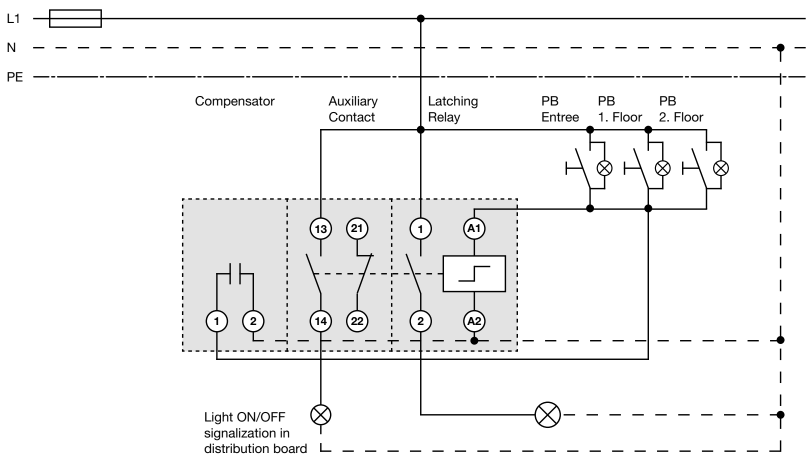


This is a second possibility to implement a Central ON/OFF control. When a E294/... accessory is snapped on, this Central ON/OFF device uses a different voltage source for coil control.The light control can be performed locally on site via the regular button. The Central ON/OFF button permits a general switching state change from a central location.



E296CP + E290-16-10 + E299-11 — Latching Relay with Auxiliary Contact plus Compensator

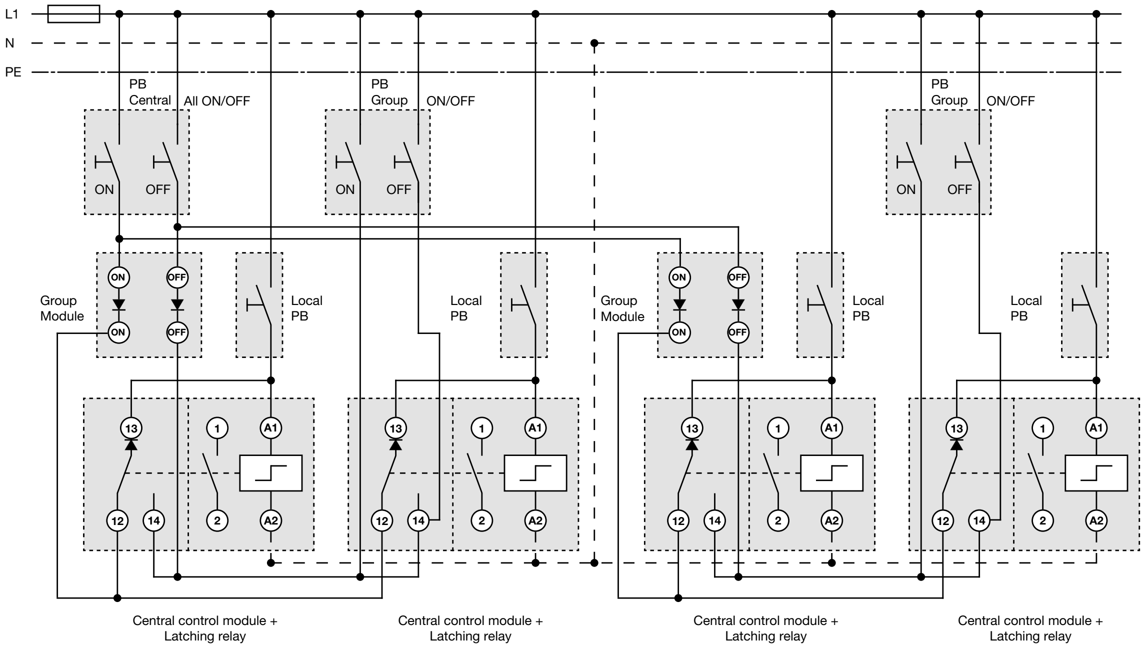
The compensator E296-CP is used every time a certain number of lit local buttons is exceeded.



Command and signaling technical details

E290 latching relays

E290-16-10 + E293/X + E295GM — Latching Relay with Central Control Module and Group Module



An example of a central ON/OFF control E290 with E293/X combined with Group Modules E295-GM; The Group Modules are integrated into the control to be structured into different light area groups. The on-site local buttons permit individual control of each Latching Relay. The Integration of the Group Modules into this control permits a distribution into two groups. Pushing the button „Group ON/OFF“ permits individual switching of each group. The general button „Central ALL ON/OFF“ can put the switching state of all E290 devices into the desired position (ON/OFF).

Command and signaling technical details

E290 latching relays

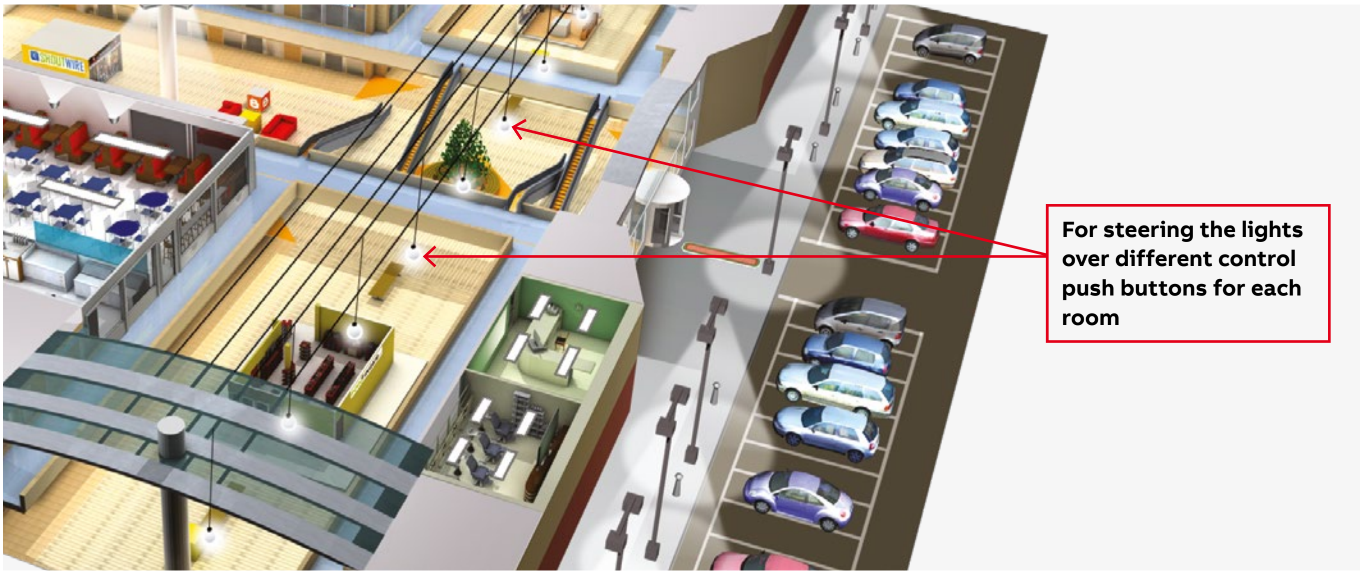
In an office building, supermarket or other large building complex, latching relays can be used to achieve a flexible, modern and reliable lighting control system for the whole site.

Application for an E290 Latching Relay:
Each time the impulse button is operated, an electrical pulse is applied to the latching relay that results in a change to the switching state. This state is held mechanically until the next pulse is received.

Switching sequence:
OFF – ON – OFF – ON

The main application for a latching relay is to simply switch various independent lighting areas on and off. Switching from „on“ to „off“ is carried out by means of a short impulse.
As the device coil of the latching relay is only excited by a pulse for a short time during switching, no additional holding energy is required. The contact position (on/off) is held by means of a mechanical interlock until the next pulse command is sent. In the event of a power failure, the current switch position will always be held. This technology considerably helps to reduce the temperature rise and current consumption of devices operated by magnetic coils, thus saving on unnecessary energy costs.

Example of use within a commercial building



Command and signaling technical details

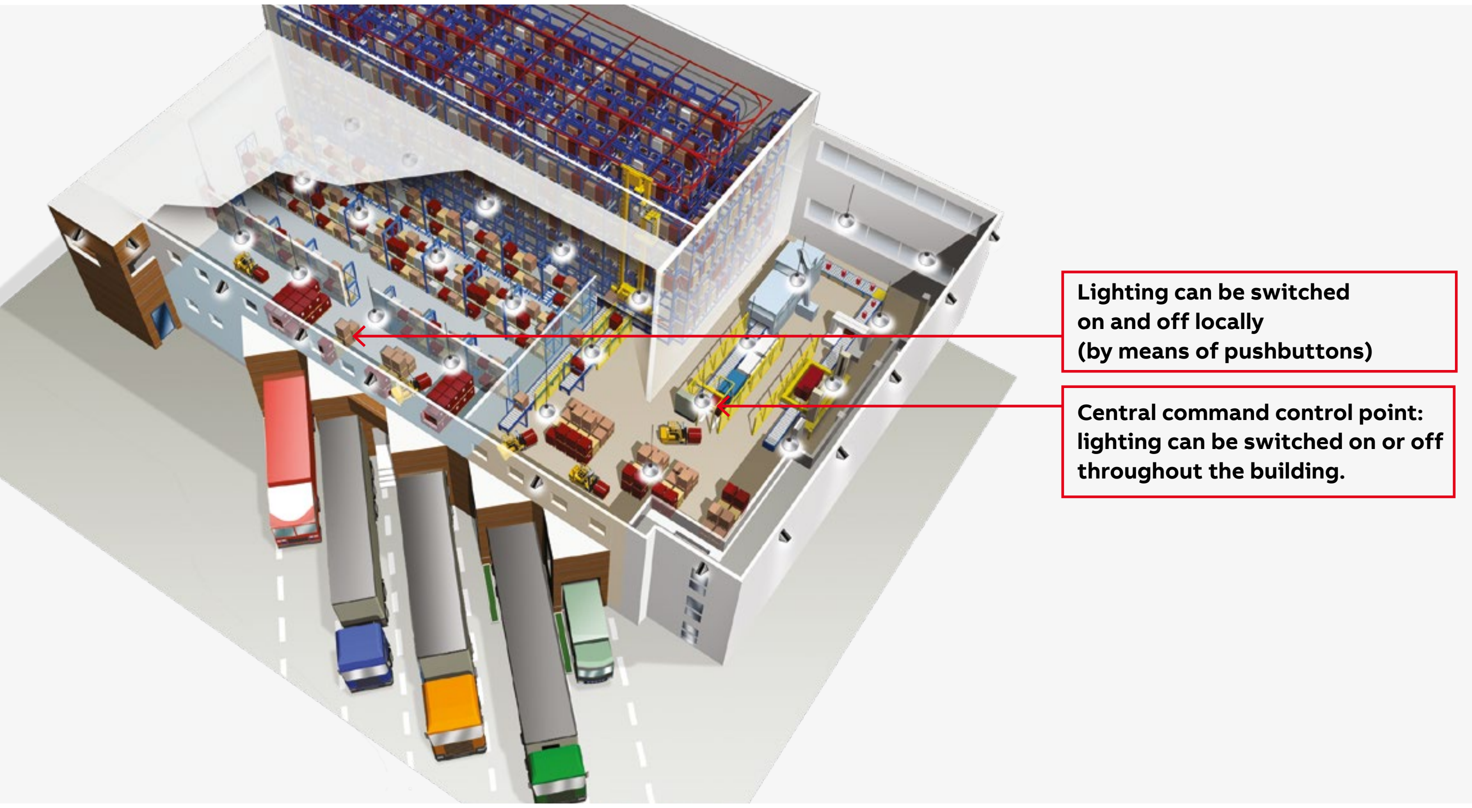
E290 latching relays

Application for an E290 Latching Relay in conjunction with an E293/X or E294 Central On-Off Control Module:
The interior lighting controlled by means of various impulse buttons can also be operated from a central control point by snapping on a central on-off control module onto the left side of the E290 latching relay.

Switching sequence:
Local => OFF – ON
Central => OFF – ON
(the central command is the superordinate command)

The combination of a Main device plus central on-off control module can be used to switch multiple lights on and off at the same time without any dependence on the current switch position of the devices. The actual switch position of the various devices (on/off) can be indicated by snapping an auxiliary contact (attachable on the right side) to the control center. Another possibility would be the combination of an E290 with an E294 central on-off control module for various control voltages. This combination enables for example the cooperation with a PLC (programmable logic controller). Any number of different logical activations in respect of latching relays can be recorded and visualised.

Example of use within an industrial warehouse

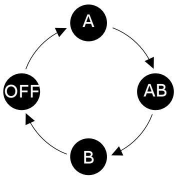


Command and signaling technical details

E291 sequential latching relays

Application using an E291S Sequential Latching Relay:
This independent special sequential latching relay switches the contact position in a preset fixed switching sequence.

Switching sequence:
OFF – A – AB – B – OFF

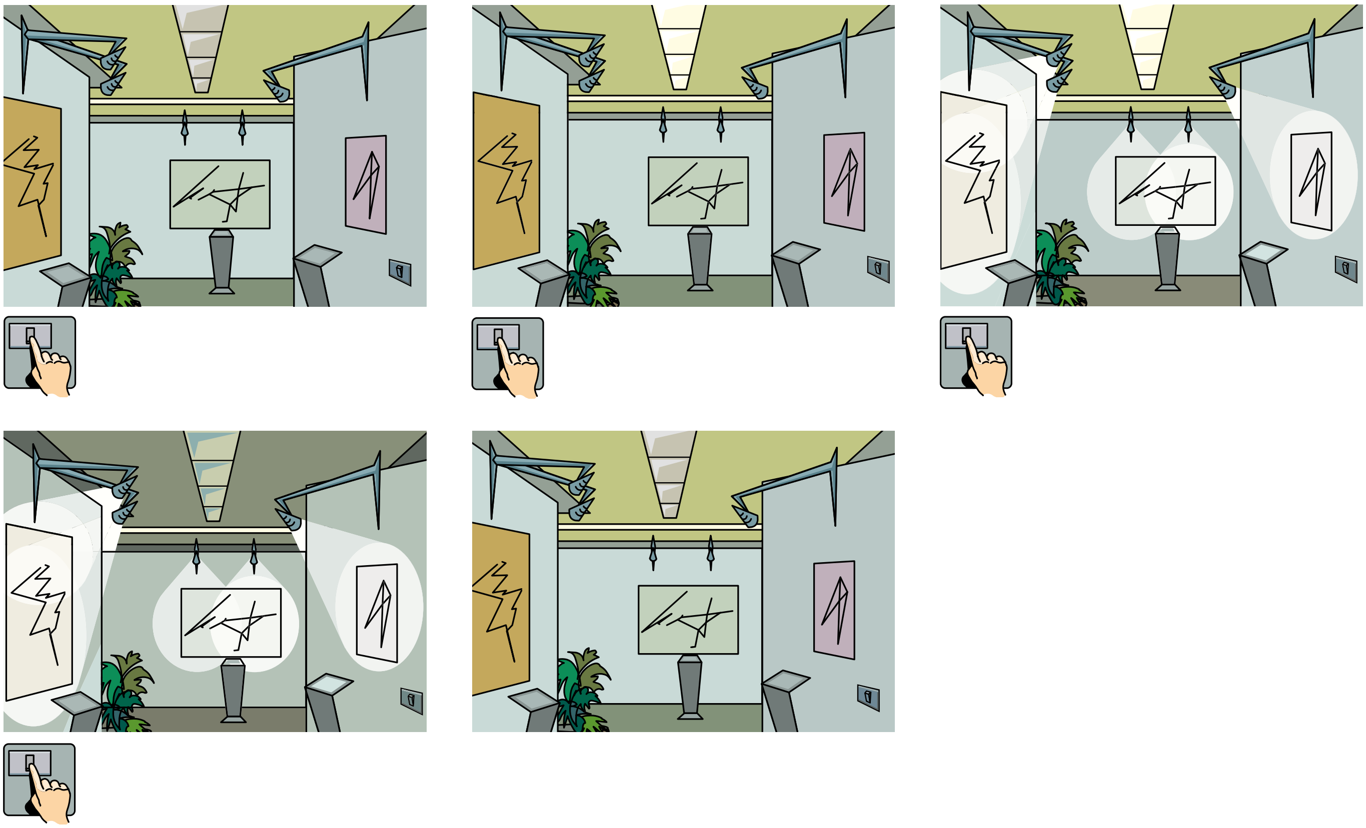


E291S latching relays with sequential contacts

Operating principle
The two contacts of the E291S latching relays switch indipendently their position (open/closed) at each impulse according to a preset sequence in the control circuit.

Application environments
The E291S latching relays are particularly indicated in environments and situations requiring the load sequential control through a single pushbutton circuit (offices, restaurants, etc.).

Example of installation
As shown in the diagrams, one of the possible applications is to mount the E291S latching relays inside the lighting system of an art gallery. The first pushbutton impulse will switch on the ceiling lights, the second triggers the wall lamps, the third switches off the ceiling lights and the fourth switches off the wall lamps.

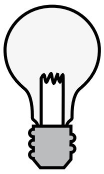
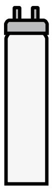
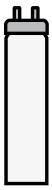
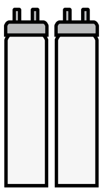
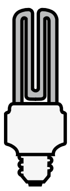


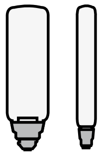
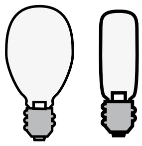
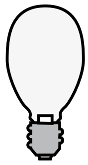
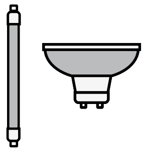
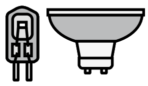
Command and signaling technical details

E290 latching relays

LATCHING RELAYS

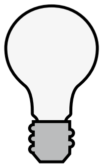
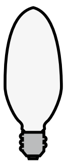
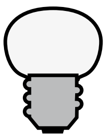
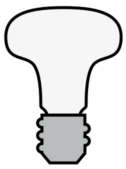
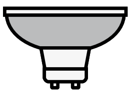
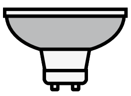
Information about lamp insertion between phase and neutral

	Power [W]	Number of switchable lamps	
		E290 - 16 A	E290 - 32 A
Incandescent lamps (230 V AC)			
	15	200	266
	25	120	160
	40	75	102
	60	50	65
	75	40	52
	100	30	40
	150	20	26
	200	15	20
	300	9	12
	500	5	7
Fluorescent lamps without power factor capacitors			
	18	81	110
	36	44	58
	40	38	53
	58	29	35
	65	26	34
Fluorescent lamps with power factor capacitors			
	18	103	132
	36	63	81
	40	40	77
	58	41	52
	65	37	48
Fluorescent twin-lamps			
	2 x 18	82	110
	2 x 36	41	55
	2 x 40	35	50
	2 x 58	23	30
	2 x 65	22	30
Lamps with electronic reactor			
	18	83	112
	36	46	61
	58	31	38
	2 x 18	40	56
	2 x 36	23	30
	2 x 58	14	19

	Power [W]	Number of switchable lamps	
		E290 - 16 A	E290 - 32 A
Low pressure sodium vapor lamps (SOX)			
	55	27	36
	90	16	22
	135	11	14
	180	8	11
	185	8	10
High pressure sodium vapor lamps (NAV)			
	70	15	18
	150	8	10
	250	4	6
	400	3	4
	1000	1	1
Metal halide and high pressure mercury vapor lamps (HQL)			
	50	30	40
	80	18	25
	125	12	16
	250	6	8
	400	3	5
	1000	1	2
230 V halogen lamps (HQI)			
	150	20	27
	250	12	16
	300	10	13
	400	7	10
	500	6	8
	1000	3	4
Very low voltage halogen lamps (12 or 24 V AC)			
	20	116	160
	50	46	64
	75	31	42
	100	24	32
	150	15	21
	200	12	16
	300	7	10

Command and signaling technical details

LED lamp latching relays

	Application for (in W)	P [W] of the LED component	Number of LED components: Latching Relays (E290) 16 A	Latching Relays (E290) 32 A	Installation Relays (E297) 16 A
Switchable total power P (W) per contact path			**200**	**250**	**200**
LED E27 glow lamp shape					
	40	5.5	36	45	25
	40	6.0	33	42	23
	40	7.0	29	36	20
	60	9.0	22	28	16
	60	9.5	21	26	15
	60	10.0	20	25	14
	75	11.5	17	22	12
	75	13.0	15	19	11
	100	15.0	13	17	9
	100	18.0	11	14	8
LED E14 Candle-shaped bulb					
	25	3.0	67	83	40
	25	4.0	50	63	30
	40	6.0	33	42	20
	40	6.0	33	42	20
27/E14 Drop-shaped bulb					
	25	3.0	67	83	40
	25	4.0	50	63	30
	40	6.0	33	42	20
LED E27/E14 Reflectors					
	40	4.5	44	56	27
	50	5.5	36	45	22
	40	8.5	24	29	14
	40	9.5	21	26	13
	40	13.0	15	19	9
LED Low-voltage reflectors					
	20	3.4	59	74	35
	35	5.5	36	45	22
	35	6.5	31	38	18
	35	7.0	29	36	17
	50	8.0	25	31	15
LED High-voltage reflectors					
	35	3.5	57	71	34
	35	4.0	50	63	30
	50	4.5	44	56	27
	50	5.0	40	50	24
	50	5.4	37	46	22

Command and signaling technical details

LED lamp latching relays

	Application for (in W)	P [W] of the LED component	Number of LED components		
			Latching Relays (E290)		Installation Relays (E297)
			16 A	32 A	16 A
Switchable total power P (W) per contact path			**200**	**250**	**200**
LEDTube 0.6 m fluorescent lamp with electronic ballast					
	18	10.5	19	24	11
LEDTube 1.2 m fluorescent lamp with electronic ballast					
	36	16.5	12	15	7
	36	18.0	11	14	7
	36	21.0	10	12	6
LEDTube 1.52 m fluorescent lamp with electronic ballast					
	18	10.5	19	24	11
	36	16.5	12	15	7
	36	18.0	11	14	7
	36	21.0	10	12	6
	58	22.0	9	11	5
	58	26.0	8	10	5
LEDTube 1.5 m with concentional/low-loss ballast					
	58	20.0	10	13	6
	58	23.0	9	11	5
	58	25.0	8	10	5
LEDTube 1.2m with concentional/low-loss ballast					
	36	16.0	13	16	8
	36	18.0	11	14	7
LEDTube 0.6m with concentional/low-loss ballast					
	18	8.0	25	31	15
	18	9.0	22	28	13

Command and signaling technical details

E290 latching relays

Use of lighted pushbuttons

Latching relays can be controlled through lighted pushbuttons, without any limitations in terms of connection of three-terminal types.

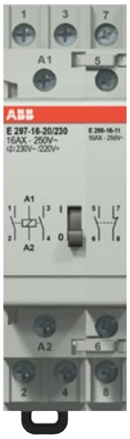
In two-terminals pushbuttons the current that flows through pushbutton lamps can trigger an unwanted activation; in order to avoid this there is the E296-CP compensation module, installed in parallel on the coil.

Number of E296-CP compensation modules	**Number of connectable lighted pushbuttons**	
	1P – 2P types	3P – 4P types
0	8	9
1	18	22
2	45	38

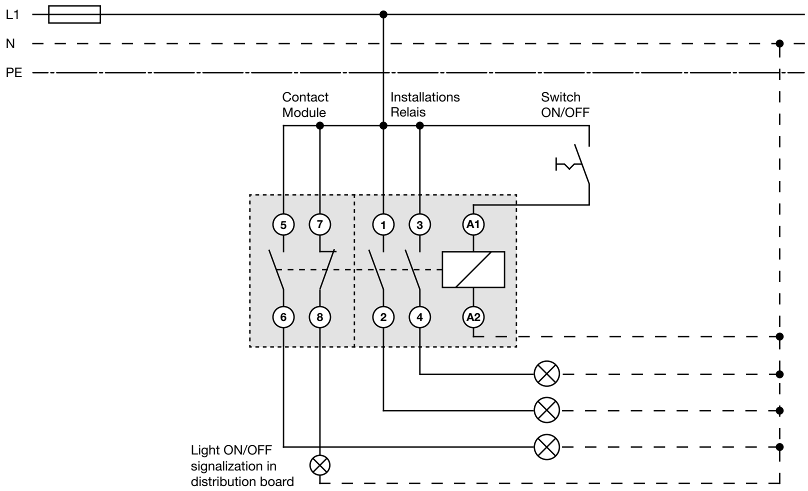
Command and signaling technical details

E297 installation relay

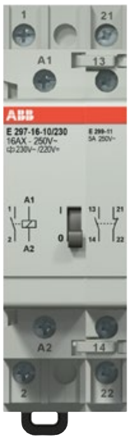
E297-16-20 + E298-16-11 — Installation Relay with Contact Module



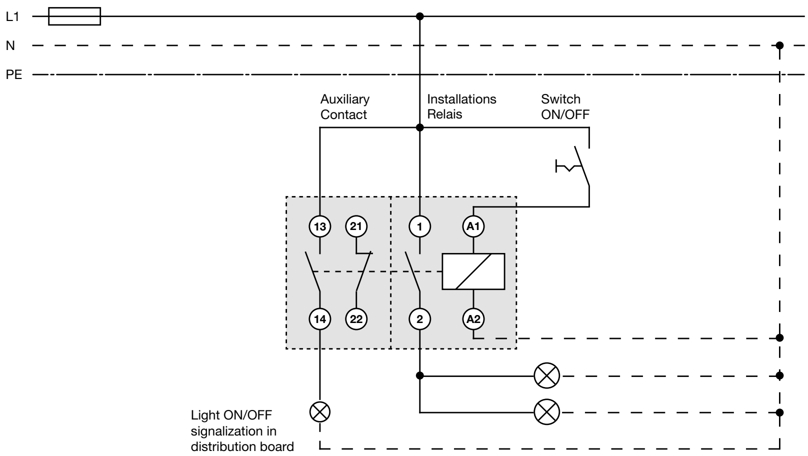
Light control via an Installation Relay E297 with connected Contact Module E298-16-11 (additional main contacts) to externally signal the switching state of the main contacts (ON/OFF).



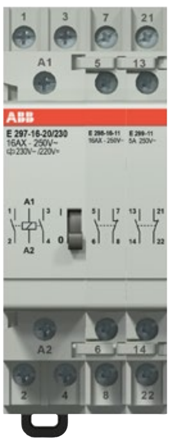
E297-16-10 + 299-11 — Installation Relay with Auxiliary Contact



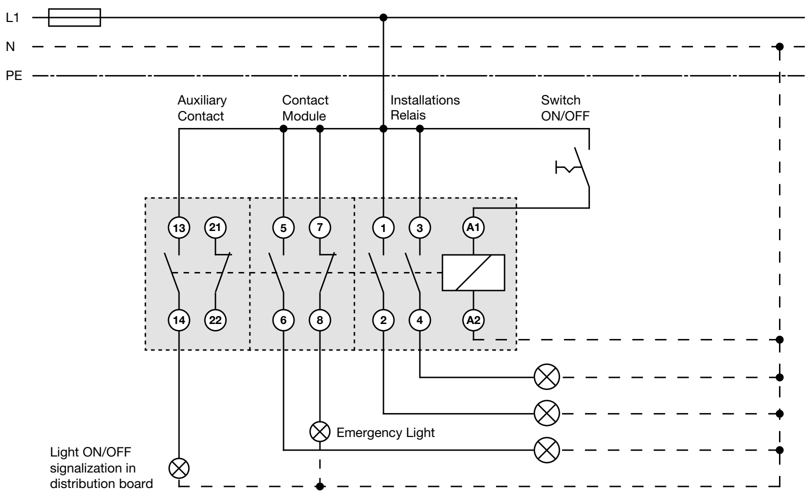
Application with a normal light control via an ON/OFF switch. The current condition indication of the light control (ON/OFF) is implemented, e.g., in the distribution board, with the help of the auxiliary contact (E299-11).



E297-16-20 + E298-16-11 + 299-11 — Installation Relay with Contact Module and Auxiliary Contact



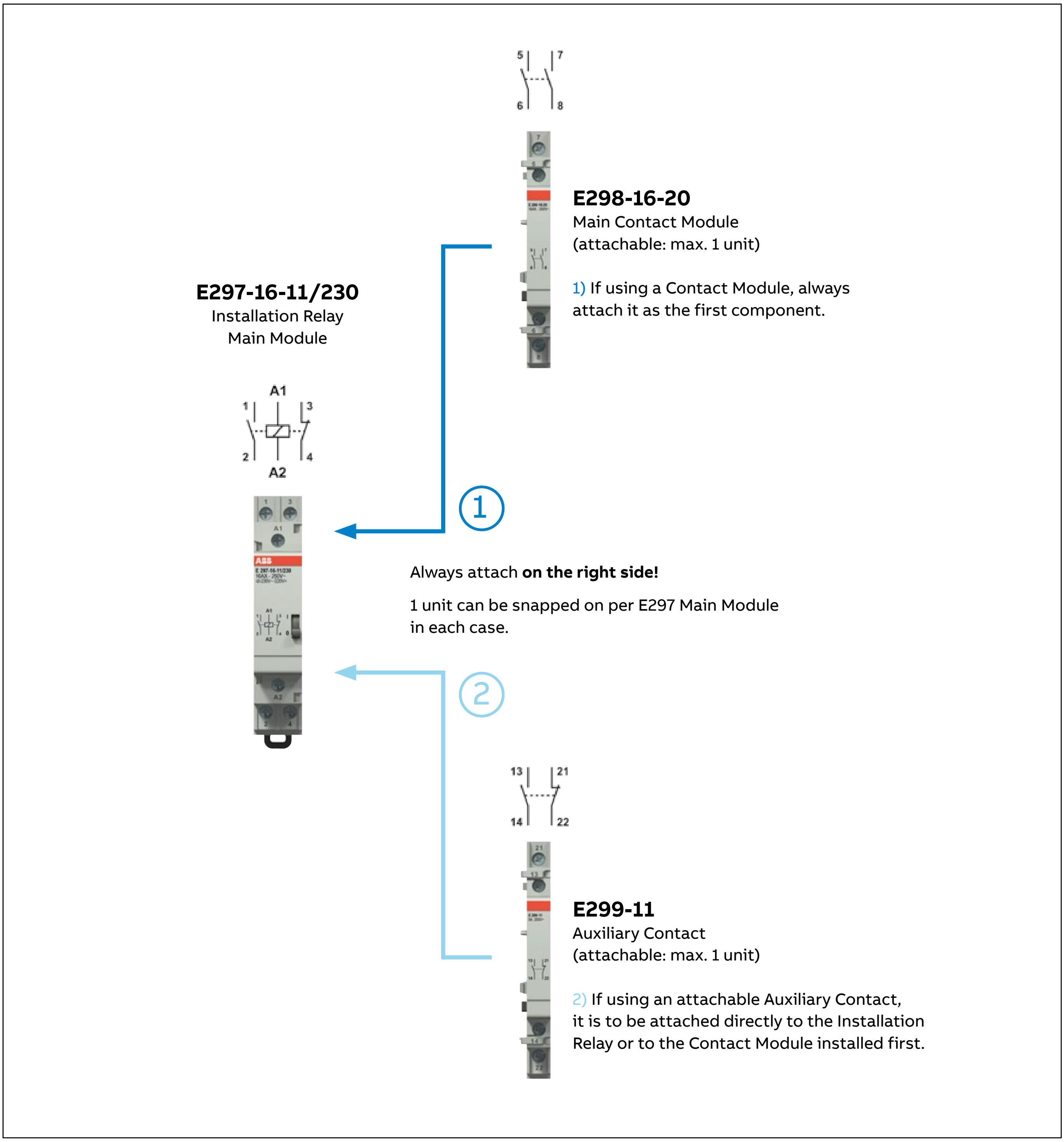
Combination of an installation relay E297 with an attached Contact Module E298-16-11 (additional main contacts) plus an Auxiliary Contact to clearly indicate the switching state of the main contacts (ON/OFF).



Command and signaling technical details

E297 installation relay

E297 Installation Relay



Safety information

If more than one Latching relay installed next to each other, it is recommended to use a intermediate piece (distance). This guarantees optimal heat dissipation by the main modules. The intermediate pieces (9 or 18mm wide) can be found in the order information as types ZLS725 or ZLS726 (the use depends on the application).

Command and signaling technical details
E297 installation relay

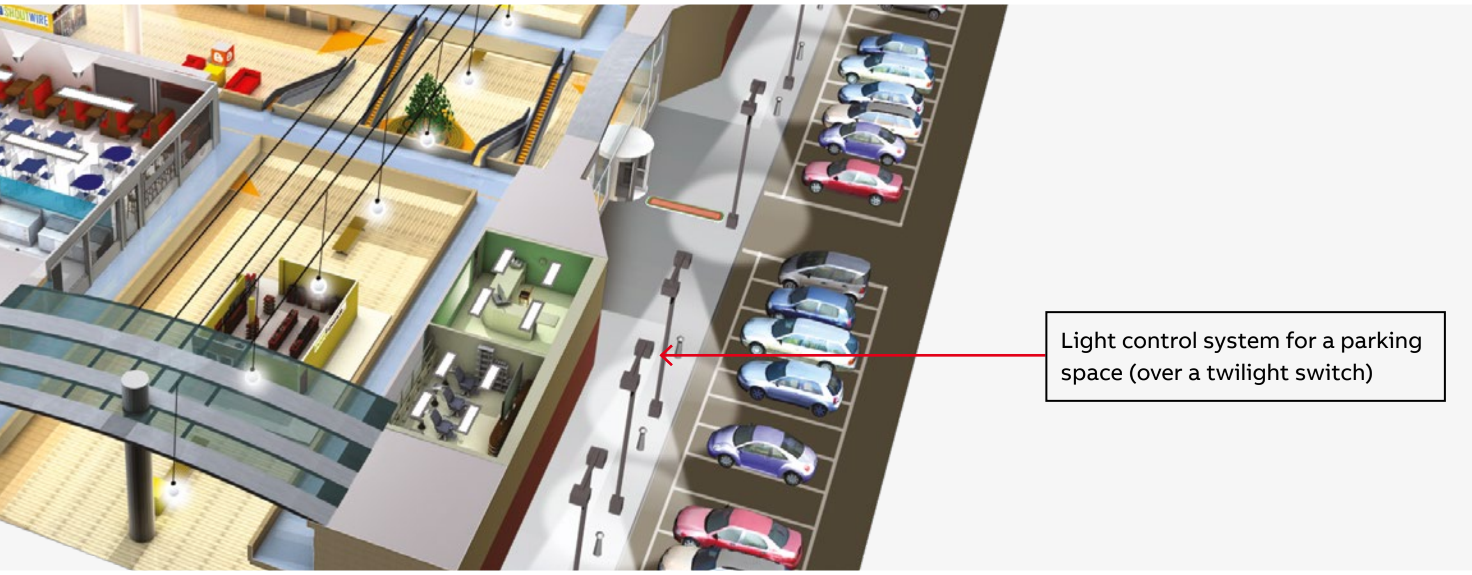
Because of the individual options for using the installation relays in building management systems, these devices can be used to realise a modern and reliable consumer control system.

Application for an E297 Installation Relay:
When current is applied to an installation relay, the relay coil attracts one of the main contacts and changes the contact position. The coil of an installation relay has to remain energised in order to hold the contact position. If the voltage is removed from the coil, the installation relay always returns to the off position.

Switching sequence:
OFF – ON

Main areas of application include exterior lighting for office buildings or supermarket car parks as well as other big installations. An extremely flexible and modern lighting control system can be created, using E297 installation relays. Activation can be carried out by means of a twilight switch or a timer but also by means of a simple on-off switch or another electrical control unit. Reliable switching of an exterior lighting system, for example, is realised by sending clear on and off control commands from an external control point. The magnetic coil has to be permanently energised in order for the installation relay to be held in the on position. The energy consumption of the installation relay is reduced to a minimum by the performance-optimised magnetic coil. The low switching noise also makes it suitable for professional use in closed inhabited areas.

Example of use within a commercial building

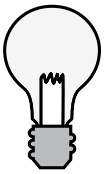
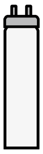
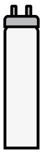
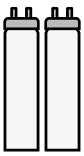
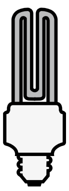


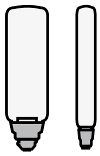
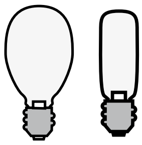
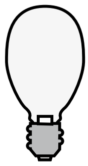
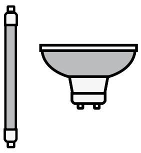
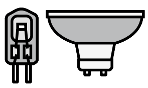
Command and signaling technical details

E297 installation relay

INSTALLATION RELAYS

Information about lamp insertion between phase and neutral

	Power [W]	Number of switchable lamps
Incandescent lamps (230 V AC)		
	15	120
	25	72
	40	45
	60	30
	75	24
	100	18
	150	12
	200	9
	300	6
	500	3
Fluorescent lamps without power factor capacitors		
	18	50
	36	25
	40	23
	58	16
	65	13
Fluorescent lamps with power factor capacitors		
	18	17
	36	13
	40	12
	58	8
	65	7
Fluorescent twin-lamps		
	2 x 18	50
	2 x 36	25
	2 x 40	23
	2 x 58	16
	2 x 65	13
Lamps with electronic reactor		
	1 x 18	38
	1 x 36	30
	1 x 58	17
	2 x 18	19
	2 x 36	15
	2 x 58	8

	Power [W]	Number of switchable lamps
Low pressure sodium vapor lamps (SOX)		
	55	6
	90	4
	135	3
	180	2
	185	2
High pressure sodium vapor lamps (NAV)		
	70	10
	150	5
	250	3
	400	2
	1000	-
Metal halide and high pressure mercury vapor lamps (HQL)		
	50	16
	80	10
	125	7
	250	3
	400	2
	1000	-
230 V halogen lamps (HQI)		
	150	12
	250	7
	300	6
	400	4
	500	3
	1000	2
Very low voltage halogen lamps (12 or 24 V AC)		
	20	72
	50	29
	75	20
	100	15
	150	10
	200	7
	300	5

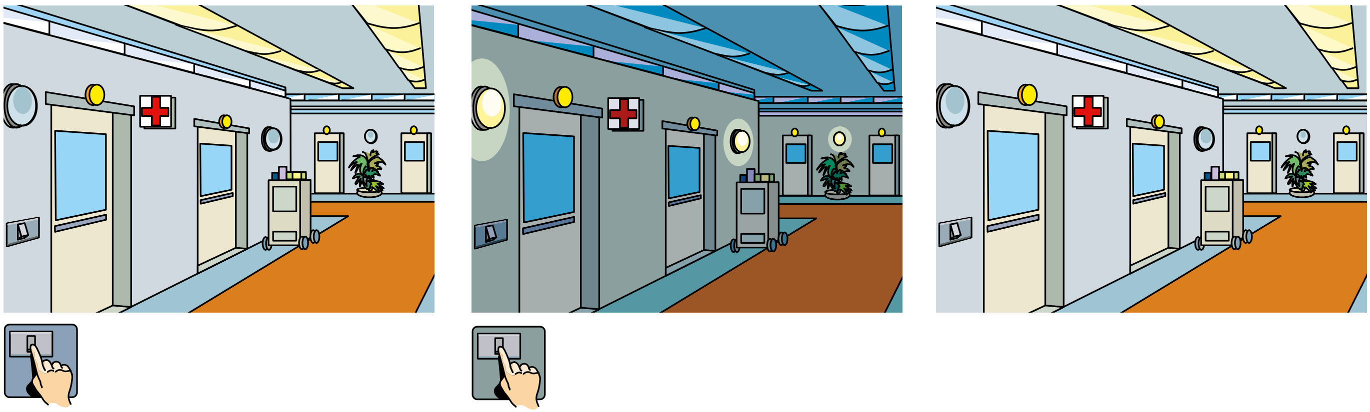
Command and signaling technical details

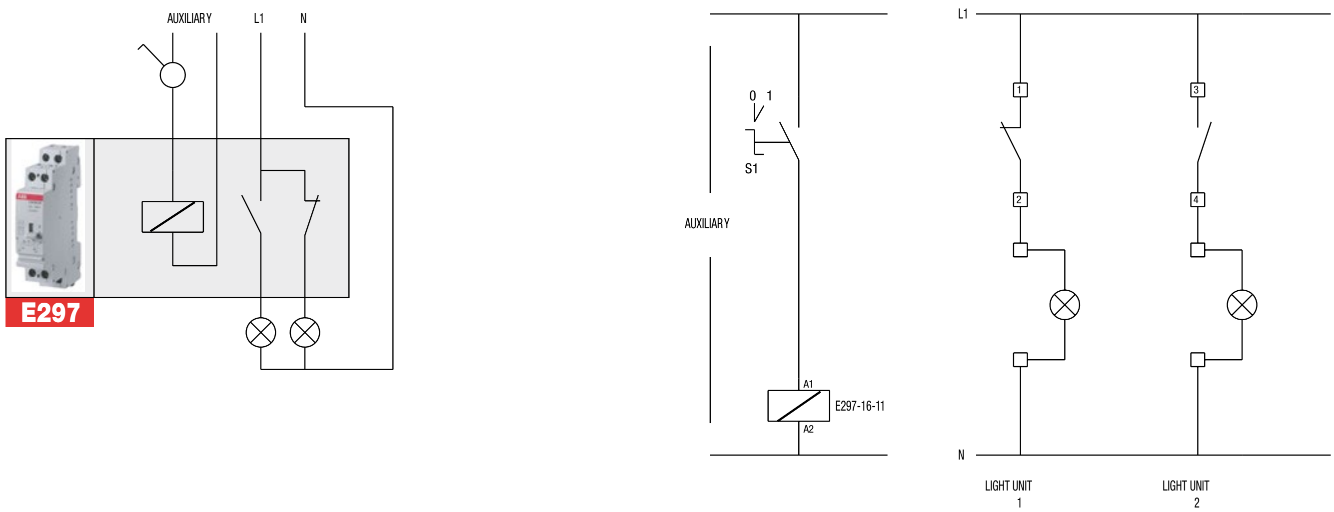
E297 installation relay

Operating principle
The E297 installation relays are 16 A contactors specifically engineered for residential and commercial applications and are available in a wide range of contact layouts and coil voltages.

Application environments
The E297 installation relays are particularly indicated in residential and commercial buildings for lighting control.

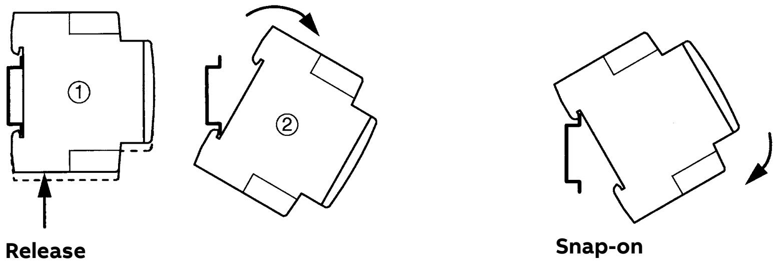
Example of installation
As shown in the diagrams, one of the possible applications is to mount the E297-16-11 installation relay with a NO and a NC contact inside the electric system of a hospital ward. The first control sent through a switch to the command circuit of the relay will turn off the ceiling lights and turn on the corridor lamps, while the second command returns to the previous state.





Command and signaling technical details

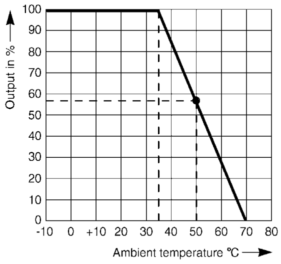
E 260 latching relays



Command and signaling technical details

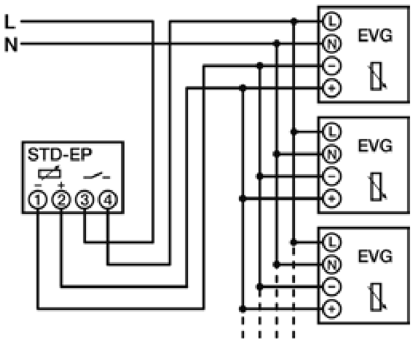
STD dimmers

Control power STD 50-3: 20-500 W/VA
STD 50-4: 40-420 W/VA

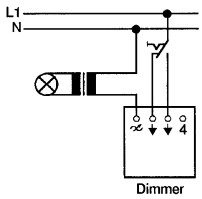


Influence of ambient temperature on the control power
The certified rated power is indicated on the dimmer.
Where higher ambient temperatures occur, reduce values as is specified in the diagram.
At 50 °C /122°F ambient temperature, the permissible load drops to 57%.

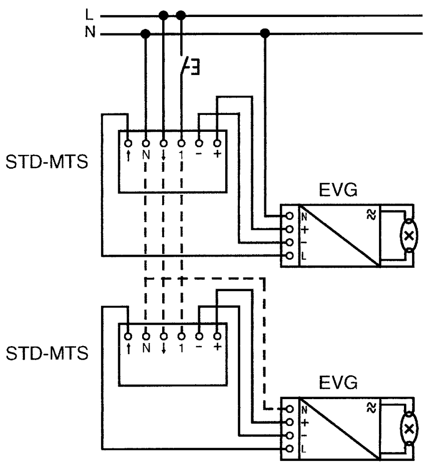
Electronic potentiometer



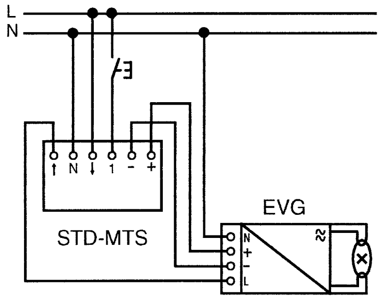
Dimmer STD 50-4 in two-way circuit, lv halogen lamps via electronic transformer



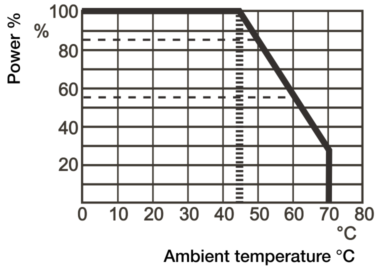
Brightness control of fluorescent lamps with 1 -10 V control input. Control of more than one memory touch controller STD-MTS via one push-button.

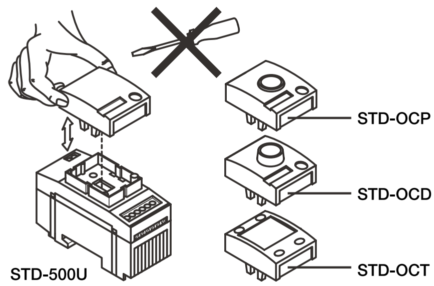


Brightness control of a fluorescent lamp with 1 - 10 V DC control input with memory touch controller STD-MTS with external pushbutton, e.g. E 225



Connected load / ambient temperature diagram





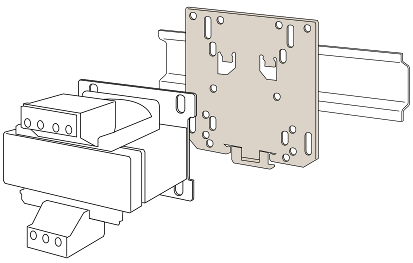
STD-500 U

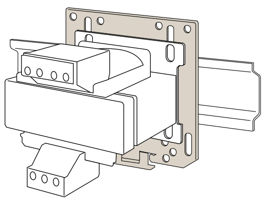
Command and signaling technical details

Modular transformers

Modular transformers
The range of System pro M compact modular transformers consists of a series of safety transformers for general use, TS-C with 12-24 V secondary and powers of 25, 40 and 63 VA, the TM range of bell transformers, with secondary voltages of 12-24 V and a maximum rated power of 10-15-30-40 VA, and the TS range of bell transformers, with secondary voltages of 8-12-24 V and a rated secondary power of 8-16-24 VA (some TS types are available with an integrated switch ON/OFF).

Modular safety transformers for general use TS-C, continuous functioning
Standard: IEC EN 61558-2-6
The TS-C safety transformer is an insulation transformer for supplying SELV circuits (with extremely low safety voltage) or PELV circuits (with extremely low protection voltage).
In contrast to the bell transformers, TS-C transformers can be used to continuously supply low voltage loads and they have a reduced voltage drop value. Even after a short-circuit they maintain their temperature below the specified limits. In addition they are equipped with a thermal sensitive restoring device which automatically restores power when the transformer is sufficiently cooled down or the overload has been removed.





Fail proof bell transformers TM series
Standard: IEC EN 61558-2-8
Following a short-circuit or an overload use the products may not continue to operate, but they continue assuring separation between primary and secondary circuits, safeguarding the user and adjacent electric parts: the serie includes 8 models with 10, 15, 30 and 40 VA power and 4, 8, 12 and 24 V output voltages.

Non-inherently short-circuit proof bell transformers TS series
Standard: IEC EN 61558-2-8
Even after a short-circuit they maintain their temperature below the specified limits. In fact they are equipped with a thermal protection device which automatically restores power when the transformer is sufficiently cooled down or the overload has been removed. The TS series includes 10 models with 8, 16, 24 VA power and output voltages of 4, 6, 8 and 12 and 24 V AC.
The TS8/SW series is equipped with an ON-OFF switch on the front side that allows the control of the load connected to transformer's secondary circuit. It includes 5 models with 8 VA power and output voltages of 4, 6, 8 and 12 V.

Command and signaling technical details

Control, isolating and safety transformers

Control, isolating and safety transformers
The choice of supply voltage for a control circuit must take into account two factors: the safety of users, and the functional reliability of the circuits, which can be dependent on the voltage drop.

Control transformer
Reference standard: CEI EN 61558-2-2:
Transformer for supplying control circuits, for example commands, signaling, interlocks, etc.

Isolating transformer
Reference standard: CEI EN 61558-2-4:
Transformer in which the primary and secondary windings are electrically separated by a double or reinforced insulation, to protect the circuit supplied by the secondary against hazards due to accidental simultaneous contact with earth and live parts, or grounded parts that may become live in the event of an insulation fault.

Safety transformer
Reference standard: CEI EN 61558-2-6:
Isolation transformer for supplying safety extra low voltage circuits (<50 V on no load). Accidental contact with the secondary winding phases can be withstood without any danger.

Impregnation and tropicalization
ABB transformers are fully impregnated using a thermal class F resin. This treatment improves the characteristics of the insulating materials, making the transformers suitable for installation in harsh environments. It also augments heat exchanges, thereby lowering the transformer temperature, prevents moisture from penetrating the windings and core, and minimises vibrations and the resultant noise.

Insulation classes
The duration of the insulation in the products depends on many factors, and in cases where the insulating material electrically segregates live parts from accessible parts, any alteration in its characteristics may put the safety of the user at risk.
The standards prescribe maximum temperature limits for transformer windings as a function of the insulation class.
ABB transformers are constructed using class B materials.
The maximum permitted ambient temperature is specified on the transformer rating plate as well as on this catalog.

Insulation class	T MAX
A	100 °C
E	115 °C
B	120 °C
F	140 °C
H	165 °C

Command and signaling technical details

Control, isolating and safety transformers

Protection of transformers

Protection on primary

On the primary side, the transformer cannot generate any overload by itself. During power up, however, a very high inrush current (approx. 20 In) is generated. Protections should therefore be calibrated in order to prevent their tripping during the transformer connection phase. The most suitable types of protection are:

- aM fuses
- S202 miniature circuit breakers, D characteristic.

Minimum protection on primary

Transformer power (VA)		230 V single phase	400 V single phase
50	aM fuse	0.5 A	0.315 A
100	aM fuse	1 A	0.63 A
	Breaker capacity	1.6 A	1 A
	Trip characteristic	D	D
160	aM fuse	1.6 A	1 A
	Breaker capacity	3 A	2 A
	Trip characteristic	D	D
200	aM fuse	2 A	1.25 A
	Breaker capacity	3 A	2 A
	Trip characteristic	D	D
250	aM fuse	2.5 A	1.6 A
	Breaker capacity	4 A	3 A
	Trip characteristic	D	D
320	aM fuse	3.15 A	2 A
	Breaker capacity	5 A	3 A
	Trip characteristic	D	D
400	aM fuse	4 A	2.5 A
	Breaker capacity	8 A	5 A
	Trip characteristic	D	D
630	aM fuse	6.3 A	4 A
	Breaker capacity	13 A	8 A
	Trip characteristic	D	D
1000	aM fuse	10 A	6 A
	Breaker capacity	20 A	13 A
	Trip characteristic	D	D
1600	aM fuse	16 A	10 A
	Breaker capacity	32 A	20 A
	Trip characteristic	D	D
2000	aM fuse	20 A	12 A
	Breaker capacity	40 A	25 A
	Trip characteristic	D	D
2500	aM fuse	25 A	16 A
	Breaker capacity	50 A	32 A
	Trip characteristic	D	D

Notes:
The protection specified in the table is the minimum “recommended” for protecting the supply line.
The breaking capacity of the primary miniature circuit breakers is a function of the supply line.

Protection on secondary

The secondary circuit must be protected against overload and short-circuit. Moreover, additional protection may need to be adopted depending on the distribution system type.

- Overload: The tripping current value of the protection used should be equal to or lower than the secondary current of the transformer.
- Short-circuit: Any short-circuit in the most distant point of the line should make the protection device trip in less than 5 seconds (IEC 60364). The protection of the transformer and the protection of the line may coincide when the transformer supplies power to a single line and a full compatibility has been ensured. The suitable secondary protection can be found on the selection tables.

Command and signaling technical details

Control, isolating and safety transformers

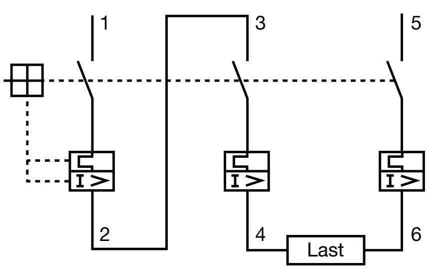
Transformer				Circuit Breaker for Transformer Protection		
Type	Rated Power (VA)	Input Voltage (V)	Nominal current (A)	Type	Ordering Code	Current setting (A)
TM-...50...	50	230	0.22	MS132-0.25T	1SAM340000R1002	0.22
TM-...100...	100	230	0.43	MS132-0.63T	1SAM340000R1004	0.43
TM-...160...	160	230	0.70	MS132-1.0T	1SAM340000R1005	0.70
TM-...200...	200	230	0.87	MS132-1.0T	1SAM340000R1005	0.87
TM-...250...	250	230	1.09	MS132-1.6T	1SAM340000R1006	1.09
TM-...320...	320	230	1.39	MS132-1.6T	1SAM340000R1006	1.39
TM-...400...	400	230	1.74	MS132-2.5T	1SAM340000R1007	1.74
TM-...630...	630	230	2.74	MS132-4.0T	1SAM340000R1008	2.74
TM-...1000...	1000	230	4.35	MS132-6.3T	1SAM340000R1009	4.35
TM-...1600...	1600	230	6.96	MS132-10T	1SAM340000R1010	6.96
TM-...2000...	2000	230	8.70	MS132-10T	1SAM340000R1010	8.70
TM-...2500...	2500	230	10.87	MS132-12T	1SAM340000R1012	10.87
TM-...50...	50	400	0.13	MS132-0.16T	1SAM340000R1011	0.13
TM-...100...	100	400	0.25	MS132-0.25T	1SAM340000R1002	0.25
TM-...160...	160	400	0.40	MS132-0.4T	1SAM340000R1003	0.40
TM-...200...	200	400	0.50	MS132-0.63T	1SAM340000R1004	0.50
TM-...250...	250	400	0.63	MS132-0.63T	1SAM340000R1004	0.63
TM-...320...	320	400	0.80	MS132-1.0T	1SAM340000R1005	0.80
TM-...400...	400	400	1.00	MS132-1.6T	1SAM340000R1006	1.00
TM-...630...	630	400	1.58	MS132-2.5T	1SAM340000R1007	1.60
TM-...1000...	1000	400	2.50	MS132-4.0T	1SAM340000R1008	2.50
TM-...1600...	1600	400	4.00	MS132-6.3T	1SAM340000R1009	4.00
TM-...2000...	2000	400	5.00	MS132-10T	1SAM340000R1010	6.30
TM-...2500...	2500	400	6.25	MS132-10T	1SAM340000R1010	6.30

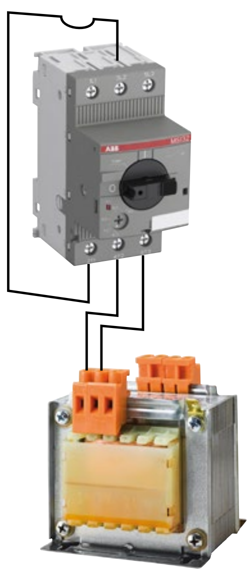
Properties

Each type of transformer detailed in the table above can be supplied on the primary side with a line protected by the corresponding Manual Motor Starter.
The indicated devices are calibrated to prevent from tripping during the transformer connection phase.

Caution: the motor starter do not protect the transformer, for this scope another compulsory protection must be installed on the secondary side as detailed on the transformers datasheet.

Wiring diagram with motorstarter

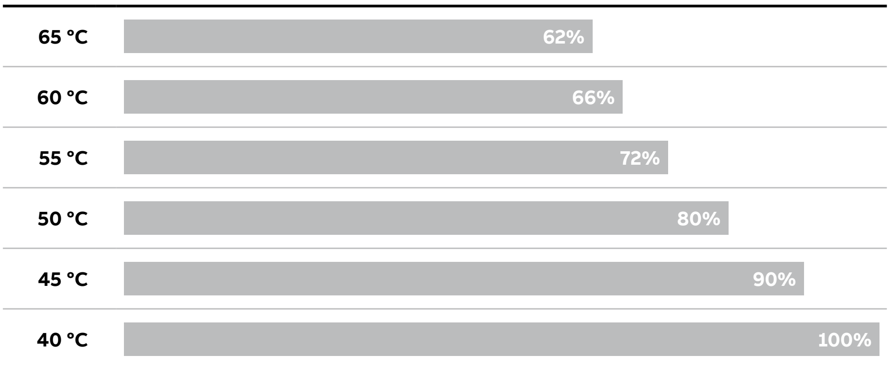




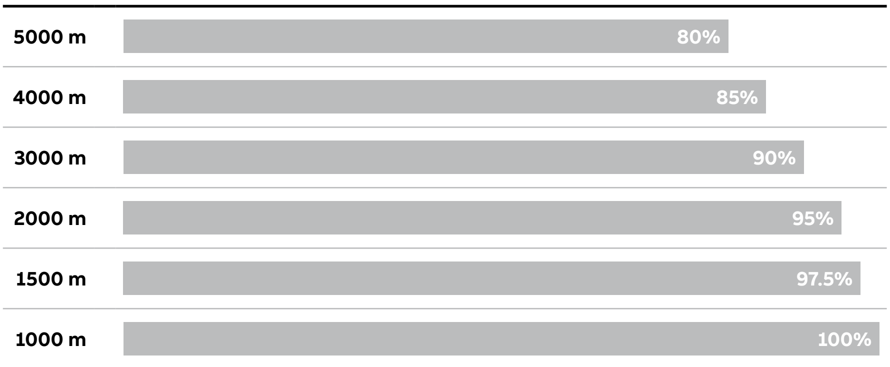
Command and signaling technical details

Control, isolating and safety transformers

Power draw according to temperature and altitude



Power draw % according to temperature



Power draw % according to altitude

TM-I

	Cable section			
	Primary		Secondary 115-230 V	
Power VA	Min. mm²	Min. mm²	Min. mm²	Min. mm²
50	0,5	4	0,5	4
100	0,5	4	0,5	4
160	0,5	1,5	0,5	1,5
200	0,5	1,5	0,5	1,5
250	0,5	1,5	0,5	1,5
320	0,5	1,5	0,5	1,5
400	0,5	1,5	0,5	1,5
630	0,5	2,5	0,5	2,5
1000	0,5	2,5	0,5	2,5
1600	0,5	2,5	0,5	2,5
2000	0,5	2,5	0,5	2,5
2500	0,5	2,5	0,5	2,5

Command and signaling technical details

Control, isolating and safety transformers

TM-S

	Cable section					
	Primary		Secondary 12-24V		Secondary 24-48V	
Power VA	Min. mm²	Min. mm²	Min. mm²	Min. mm²	Min.	Max.
50	0,5	4	0,5	4	0,5	4
100	0,5	4	0,5	4	0,5	4
160	0,5	1,5	0,5	1,5	0,5	1,5
200	0,5	1,5	0,5	1,5	0,5	1,5
250	0,5	1,5	0,5	1,5	0,5	1,5
320	0,5	1,5	0,5	2,5	0,5	2,5
400	0,5	1,5	0,5	2,5	0,5	2,5
630	0,5	2,5	0,5	2,5	0,5	2,5
1000	0,5	2,5	4	10	-	-
1600	0,5	2,5	1,5	50	-	-
2000	0,5	2,5	1,5	50	-	-
2500	0,5	2,5	1,5	50	-	-

TM-C

	Cable section					
	Primary		Secondary 12-24V		Secondary 24-48V	
Power VA	Min. mm²	Min. mm²	Min. mm²	Min. mm²	Min.	Max.
50	0,5	4	0,5	4	0,5	4
100	0,5	4	0,5	4	0,5	4
160	0,5	1,5	0,5	1,5	0,5	1,5
200	0,5	1,5	0,5	1,5	0,5	1,5
250	0,5	1,5	0,5	1,5	0,5	1,5
320	0,5	1,5	0,5	1,5	0,5	2,5
400	0,5	1,5	0,5	1,5	0,5	2,5
630	0,5	2,5	0,5	2,5	0,5	2,5
1000	0,5	2,5	0,5	2,5	4	10
1600	0,5	2,5	0,5	2,5	1,5	50
2000	0,5	2,5	0,5	2,5	1,5	50
2500	0,5	2,5	0,5	2,5	1,5	50

Transformer leaks

Power (VA)	No-load loss (W)	Load loss (W)
50	4	8.5
100	6,5	14
160	9	21
200	9	22
250	12	25
320	13	30
400	15	32
630	23	45
1000	36	60
1600	50	75
2000	60	90
2500	65	105

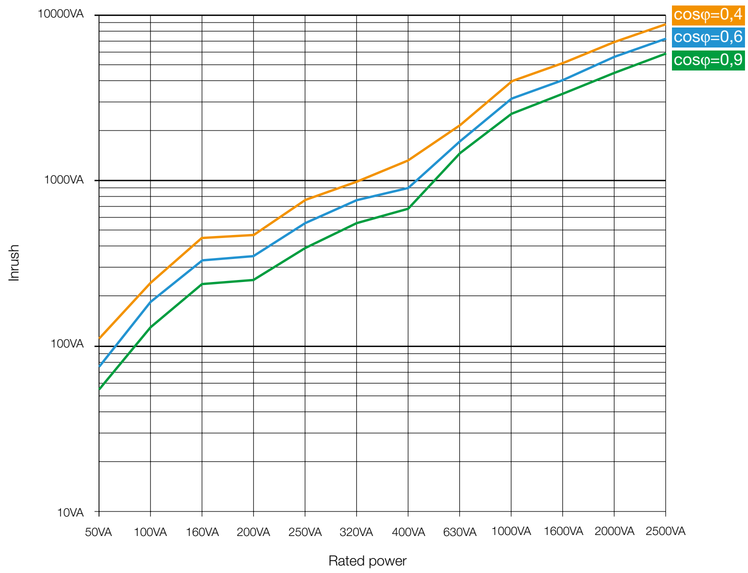
Command and signaling technical details
Control, isolating and safety transformers

Short circuit voltage, no-load output voltage variations

Power	(VA)	50	100	160	200	250	320	400	630	1000	1600	2000	2500
Vcc ①	(%)	10.6	7.5	5.2	4.8	9.5	6.9	6	4	3.5	3	2.8	2.3
ΔV ②	(%)	11	7.8	6	5.8	6.7	7	5.4	4.3	3.3	2.8	2	1.8

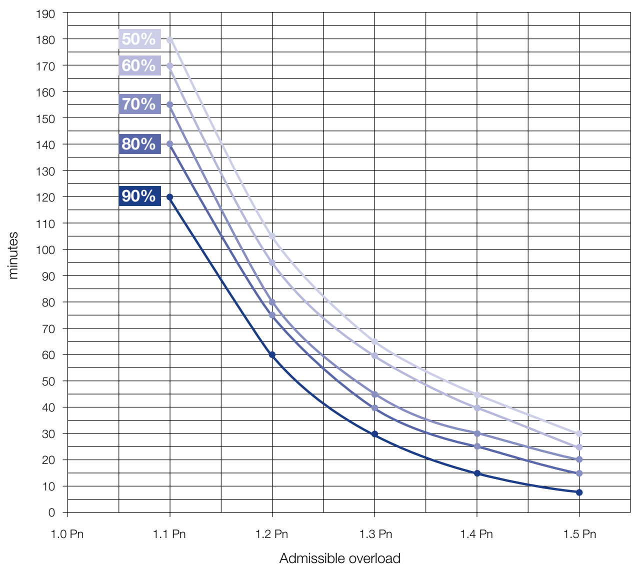
① Percent of rated supply voltage; ② Percent of rated output voltage

Inrush power trend



Admissible overload

If the transformer rated power is not drawn on a continuous basis, the transformer may be overloaded, according to the diagram below:



If a transformer is used with an intermittent duty cycle, it can be sized according to the formula:

$$P_{transformer} = P_{intermittent} * \sqrt{\frac{\text{operating time}}{\text{total cycle time (operating + pause time)}}}$$

with time expressed in minutes

Command and signaling technical details

Control, isolating and safety transformers

In control equipment, can I use the two secondary outputs of a single transformer to supply two different auxiliary circuits?
It is possible to simultaneously use both the secondary outputs of an ABB transformer to supply two circuits with different voltage ratings. The sum of the power draw from each circuit must not exceed the power rating of the transformer.

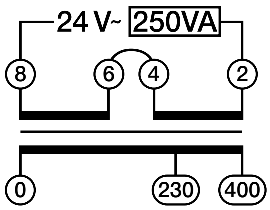
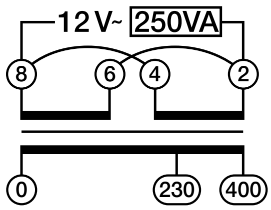
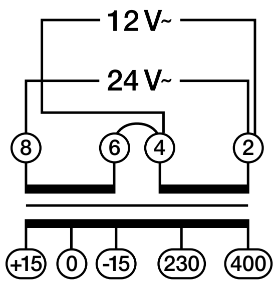
What type of transformer should be used to supply safety extra low voltage (SELV) circuits?
To construct a SELV circuit it is necessary to use a safety transformer compliant with the IEC EN 61558-2-6 standard, which guarantees both electrical separation of the systems by means of double insulation and the required extra low voltage (12-24 V±5%).

Can the secondary windings of two or more ABB single-phase transformers be connected in parallel?
It is possible to connect in parallel up to a maximum of 3 ABB transformers of equal power, bearing in mind that the total power which can be drawn will be equal to 90% of the sum of the individual powers. Pay great attention to terminal connection and, if necessary, test the circuit first in series and then in parallel.

In a piece of equipment supplied at 24 V a.c., I need to supply a cooling fan with a voltage rating of 230 V a.c. Can I use
a transformer, supplying it from the secondary?
It is possible to supply the transformers on the secondary side, but due to the nature of their construction, the voltage output from the primary may vary by 10-30% relative to the rated voltage.

How can I quickly size the power of a transformer?
P = 0.8 (Σ Pm + Σ Pr + Pa)
Σ Pm = Sum of all continuous power consumptions of contactors
Σ Pr = Sum of all the resistive powers
Pa = Inrush power of the largest contactor

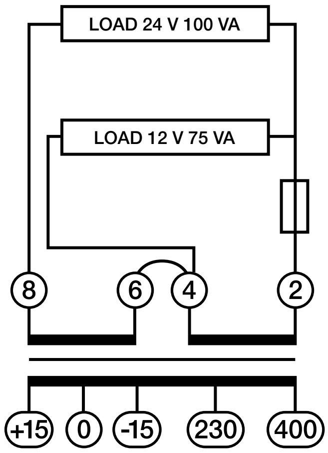
Use of two output voltages at the same time

<table>
<tr><th>Case A</th><th>Case B</th><th>Case C</th></tr>
<tr><td>
</td><td>
</td><td>
</td></tr>
<tr><td>Use of one output voltage: 24 V</td><td>Use of one output voltage: in 12 V</td><td>Use of two output voltages:
Output 1: 24 V
Output 2: 12 V</td></tr>
</table>

Command and signaling technical details

Control, isolating and safety transformers

Wiring rules for case c:
- The combined power delivered of the two outputs must not exceed the rated power.
- The power delivered on the output with less voltage must be at most:
- lower voltageP ≤ 0,5 x (ratedP – higher voltageP)
- The protection device for the secondary must be positioned at the point of the passing current of the two outputs and selected based on the higher voltage of the two loads:



The fuse must be selected based on the higher voltage of the load and positioned in the point where the current of the two loads passes.

Example:
Transformer with ratedP 250 VA
12-24 V
Fuse 10 A gG or S 202 C10 automatic circuit breaker.

Examples:
Transformer with a rated power of 250 VA and 12/24 V secondary voltage:

	Power on 24 V output	Power on 12 V output	Comment
Es.1	250 VA	-	Case A is: the full power is delivered on the 24 V output
Es.2	-	250 VA	Case B is: the full power is delivered on the 12 V output
Es.3	100 VA	75 VA	Case C is: The power is delivered on the two outputs.
			Rule 1: Total power ≤ ratedP Total power ≤ 250 VA OK Rule 2: lower voltageP ≤ 0,5 x (ratedP – higher voltageP) lower voltageP ≤ 0,5 x (250 – 100) lower voltageP ≤ 75 VA OK

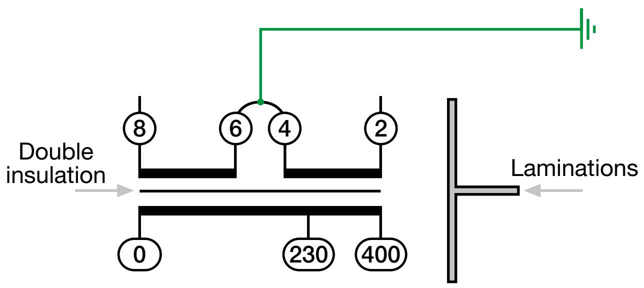
Connecting the transformer with the central point of the secondary to ground
Connection of the central point of the secondary of the transformer to ground makes it possible to decrease the potential of the secondary circuit in respect to ground, while maintaining the same output voltage.

Command and signaling technical details

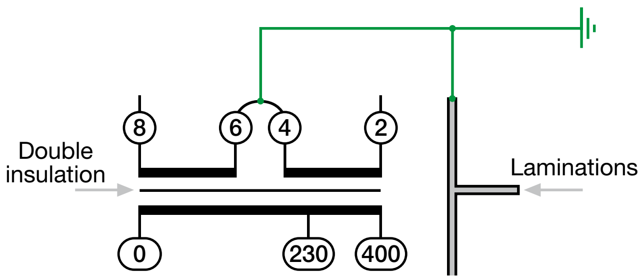
Control, isolating and safety transformers

Example:
with a transformer with 12/24 V output you can connect the central zero and deliver a voltage of -12 V / 0 V / +12 V. The voltage available to the secondary is always 24 V while the difference in potential in respect to the ground does not exceed 12 V, during normal operation.

Warning for grounding the central point for safety and insulating transformers:
If the lamination is grounded (with the Faston plug for example), the insulation properties of the safety and insulating transforms will be reduced: the insulation between the secondary and primary becomes one and not double/reinforced, thus decreasing the transformer properties.



Lamination not grounded
Connection 12-0-12 preserving double insulation



Lamination grounded
The insulation between the primary and secondary is reduced to that between the laminations and primary. Consequently, this assembly takes away the advantage of double insulation.

Command and signaling technical details

CP-D power supplies and the CP-D redundancy units

CP-D range – Technical data

Data at T_a = 25 °C, U_{in} = 230 V AC and rated values, unless otherwise indicated

Type		CP-D 12/0.83	CP-D 12/2.1
Input circuit - supply circuit		**L, N**	
Rated input voltage U_{in}		100-240 V AC	
Input voltage range		90-264 V AC / 120-375 V DC	
Frequency range AC		47-63 Hz	
Typical input current / typical power consumption	at 115 V AC	200 mA / 12.68 W	502 mA / 31.14 W
	at 230 V AC	128.3 mA / 13.01 W	277 mA / 31.2 W
Inrush current	at 115 / 230 V AC	16 A / 32 A	25 A / 50 A
Power failure buffering time		min. 30 ms	
Internal input fuse		1 A slow-acting / 250 V AC	2 A slow-acting / 250 V AC
Power factor correction (PFC)		no	
Indication of operational states			
Output voltage	DC ON: green LED	: output voltage applied	
	DC LOW: red LED	: output voltage too low	
Output circuit		**+, -**	**++, --**
Rated output voltage		12 V DC	
Tolerance of the output voltage		±1 %	
Adjustment range of the output voltage		-	12-14 V DC
Rated output power		10 W	25 W
Rated output current I_r	$T_a \leq 60$ °C	0.83 A	2.1 A
Derating of the output current	60 °C < $T_a \leq 70$ °C	2.5 %/°C	
Maximum deviation with	load change statical	max. 1 %	
	change of output voltage within the input voltage range	max. 1 %	
Control time		< 1 ms	
Starting time after applying the supply voltage	at I_r	1000 ms	
Rise time	at rated load	typ. 1 ms	
Residual ripple and switching peaks	BW = 20 MHz	50 mV	
Parallel connection		yes, using CP-D RU	
Series connection		yes, to increase voltage	
Resistance to reverse feed		18 V / 1 s	
Output circuit - No-load, overload and short-circuit behavior			
Characteristic curve of output		hiccup-mode	U/I characteristic curve
Short-circuit protection		continuous short-circuit stability	
Short-circuit behavior		continuation with output power limiting	
Current limiting at short circuit		typ. 1.4 A	typ. 5.9 A
Overload protection		output power limiting	
Overvoltage protection		15-16.5 V DC	
No-load protection		continuous no-load stability	
Starting of capacitive loads		unlimited	
General data			
Efficiency		typ. 78 %	typ. 82 %
Duty cycle		100 %	
Dimensions		see “Dimensional drawings”	
Material of housing		plastic	
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool	
Mounting position		horizontal	
Minimum distance to other units	horizontal / vertical	25 mm / 25 mm (0.98 in / 0.98 in)	
Degree of protection	housing / terminals	IP20 / IP20	
Protection class		II	

Command and signaling technical details

CP-D power supplies and the CP-D redundancy units

CP-D range – Technical data

Data at T_a = 25 °C, U_{in} = 230 V AC and rated values, unless otherwise indicated

Type		CP-D 12/0.83	CP-D 12/2.1
Electrical connection - Input circuit / Output circuit			
Connecting capacity	fine-strand with wire end ferrule	0.2-1.5 mm² (24-16 AWG)	0.2-2.5 mm² (24-14 AWG)
	rigid	0.2-2.5 mm² (26-12 AWG)	0.2-2.5 mm² (24-12 AWG)
Stripping length		4-5 mm (0.16-0.2 in)	7 mm (0.28 in)
Tightening torque		0.6 Nm (5 lb.in)	0.7 Nm (6 lb.in)
Environmental data			
Ambient temperature range	operation	-40…+70 °C (-40...+158 °F)	
	rated load	-40…+60 °C (-40...+131 °F)	
	storage	-40…+85 °C (-40...+185 °F)	
Altitude during operation	IEC/EN 60068-2-13	max. 4850 m	
Damp heat (cyclic) (IEC/EN 60068-2-30)		4 x 24 cycles, 40 °C, 95 % RH	
Vibration (sinusoidal) (IEC/EN 60068-2-6)		50 m/s², 10 Hz - 2 kHz	
Shock (half-sine) (IEC/EN 60068-2-27)		40 m/s², 22 ms	
Isolation data			
Rated insulation voltage U_i	input circuit / output circuit	3 kV AC	
Pollution degree		2	
Overvoltage category		II	
Standards / Directives			
Standards		IEC/EN 60950-1	
Low Voltage Directive		2014/35/EU	
EMC Directive		2014/30/EU	
RoHS Directive		2011/65/EU	
Protective low voltage		SELV (IEC/EN 60950-1)	
Electromagnetic compatibility			
Interference immunity to		IEC/EN 61000-6-2	
electrostatic discharge	IEC/EN 61000-4-2	level 4 (4 kV / 8 kV)	level 4 (4 kV / 15 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	level 3 (10 V/m)	
electrical fast transient/burst	IEC/EN 61000-4-4	level 4 (4 kV)	
surge	IEC/EN 61000-4-5	level 3 (2 kV L-L)	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	level 3 (10 V)	
Interference emission		IEC/EN 61000-6-3	
high-frequency radiated		class B	
high-frequency conducted		class B	

6

Command and signaling technical details

CP-D power supplies and the CP-D redundancy units

CP-D range – Technical data

Data at T_a = 25 °C, U_{in} = 230 V AC and rated values, unless otherwise indicated

Type		CP-D 24/0.42	CP-D 24/1.3	CP-D 24/2.5	CP-D 24/4.2
Input circuit - supply circuit		**L, N**			
Rated input voltage U_{in}		100-240 V AC			
Input voltage range		90-264 V AC /120-375 V DC			
Frequency range AC		47-63 Hz			
Typical input current / typical power consumption	at 115 V AC	184 mA / 11.62 W	600 mA / 37.92 W	1120 mA / 69.3 W	1800 mA / 117.3 W
	at 230 V AC	120.6 mA / 12 W	344 mA / 38.16 W	660 mA / 70.1 W	900 mA / 114.4 W
Inrush current	at 115 / 230 V AC	max. 16 A / 32 A	max. 25 A / 50 A	max. 30 A / 60 A	
Power failure buffering time		min. 30 ms		min. 60 ms	
Internal input fuse		1 A slow-acting / 250 V AC	2 A slow-acting / 250 V AC		3.15 A slow-acting / 250 V AC
Power factor correction (PFC)		no			
Indication of operational states					
Output voltage	DC ON: green LED	: output voltage applied			
	DC LOW: red LED	: output voltage too low			
Output circuit		**+, -**		**++, --**	
Rated output voltage		24 V DC			
Tolerance of the output voltage		±1 %			
Adjustment range of the output voltage		-	24-28 V DC		
Rated output power		10 W	30 W	60 W	100 W
Rated output current I_r		Ta m 60 °C: 0.42 A	Ta m 60 °C: 1.3 A	Ta m 55 °C: 2.5 A	Ta m 60 °C: 4.2 A
Derating of the output current		60 °C < Ta m 70 °C: 2.5 %/°C	60 °C < Ta m 70 °C: 2.5 %/°C	55 °C < Ta m 70 °C: 2.5 %/°C	60 °C < Ta m 70 °C: 2.5 %/°C
Maximum deviation with	load change statical	max. 1 %			
	change of output voltage within the input voltage range	max. 1 %			
Control time		< 1 ms			
Starting time after applying the supply voltage	at I_r	1000 ms			
Rise time	at rated load	typ. 1 ms			
Residual ripple and switching peaks	BW = 20 MHz	50 mV			
Parallel connection		yes, using CP-D RU			
Series connection		yes, to increase voltage			
Resistance to reverse feed		35 V / 1 s			
Output circuit - No-load, overload and short-circuit behavior					
Characteristic curve of output		hiccup-mode	U/I characteristic curve		
Short-circuit protection		continuous short-circuit stability			
Short-circuit behavior		continuation with output power limiting			
Current limiting at short circuit		typ. 0.78 A	typ. 4.2 A	typ. 6.05 A	typ. 11.5 A
Overload protection		output power limiting			
Overvoltage protection		30-33 V DC			
No-load protection		continuous no-load stability			
Starting of capacitive loads		unlimited			
General data					
Efficiency		typ. 80 %	typ. 83 %	typ. 86 %	typ. 89 %
Duty cycle		100 %			
Dimensions		see “Dimensional drawings”			
Material of housing		plastic			
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool			
Mounting position		horizontal			
Minimum distance to other units	horizontal / vertical	25 mm / 25 mm (0.98 in / 0.98 in)			
Degree of protection	housing / terminals	IP20 / IP20			
Protection class		II			

Command and signaling technical details

CP-D power supplies and the CP-D redundancy units

CP-D range – Technical data

Data at T_a = 25 °C, U_{in} = 230 V AC and rated values, unless otherwise indicated

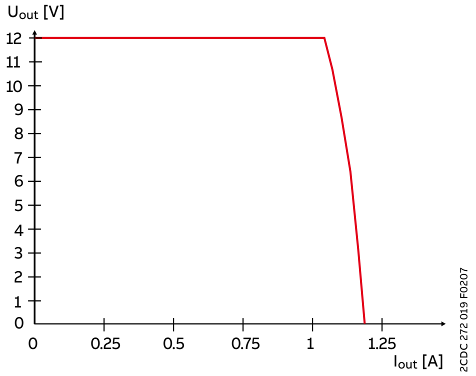
Type		CP-D 24/0.42	CP-D 24/1.3	CP-D 24/2.5	CP-D 24/4.2
Electrical connection - Input circuit / Output circuit					
Connecting capacity	fine-strand with wire end ferrule	0.2-1.5 mm² (24-16 AWG)	0.2-2.5 mm² (24-14 AWG)		
	rigid	0.2-2.5 mm² (26-12 AWG)	0.2-2.5 mm² (24-12 AWG)		
Stripping length		4-5 mm (0.16-0.2 in)		7 mm (0.28 in)	
Tightening torque		0.6 Nm (5 lb.in)		0.7 Nm (6 lb.in)	
Environmental data					
Ambient temperature range	operation	-40...+70 °C			
	rated load	-40...+60 °C		-40...+55 °C	-40...+60 °C
	storage	-40...+85 °C			
Altitude during operation	IEC/EN 60068-2-13	max. 4850 m			
Damp heat (cyclic) (IEC/EN 60068-2-30)		4 x 24 cycles, 40 °C, 95 % RH			
Vibration (sinusoidal) (IEC/EN 60068-2-6)		50 m/s², 10 Hz - 2 kHz			
Shock (half-sine) (IEC/EN 60068-2-27)		40 m/s², 22 ms			
Isolation data					
Rated insulation voltage U_i	input circuit / output circuit	3 kV AC		4 kV AC	3 kV AC
Pollution degree		2			
Overvoltage category		II			
Standards / Directives					
Standards		IEC/EN 60950-1			
Low Voltage Directive		2014/35/EU			
EMC Directive		2014/30/EU			
RoHS Directive		2011/65/EU			
Protective low voltage		SELV (IEC/EN 60950-1)			
Electromagnetic compatibility					
Interference immunity to		IEC/EN 61000-6-2			
electrostatic discharge	IEC/EN 61000-4-2	level 4 (4 kV / 8 kV)	level 4 (4 kV / 15 kV)		level 4 (4 kV / 8 kV)
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	level 3 (10 V/m)			
electrical fast transient/burst	IEC/EN 61000-4-4	level 4 (4 kV)			
surge	IEC/EN 61000-4-5	level 3 (2 kV L-L)			
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	level 3 (10 V)			
Interference emission		IEC/EN 61000-6-3			
high-frequency radiated		class B			
high-frequency conducted		class B			

Command and signaling technical details

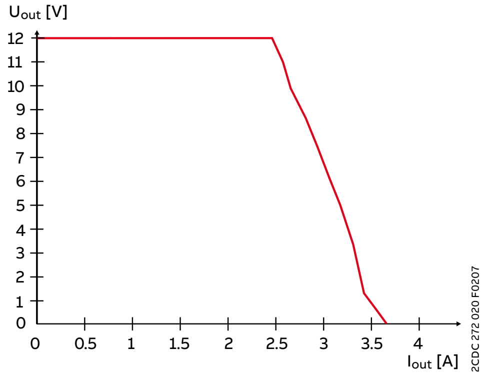
CP-D power supplies and the CP-D redundancy units

CP-D range – Technical diagrams

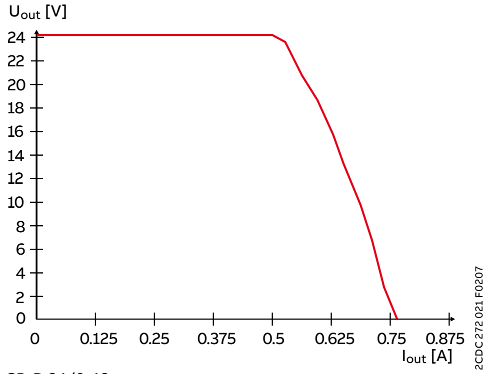
Characteristic curve of output at T_a = 25 °C



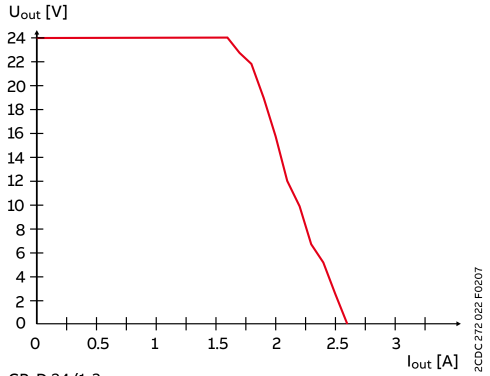
CP-D 12/0.83



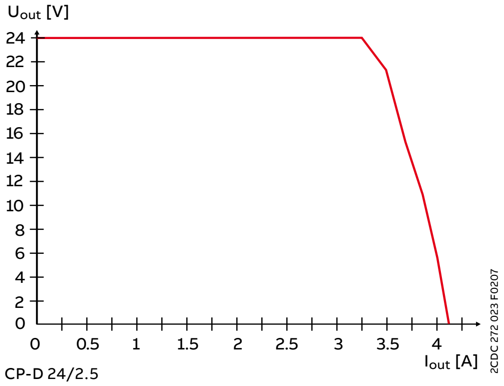
CP-D 12/2.1



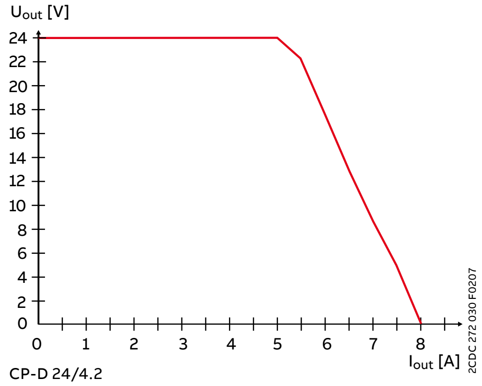
CP-D 24/0.42



CP-D 24/1.3

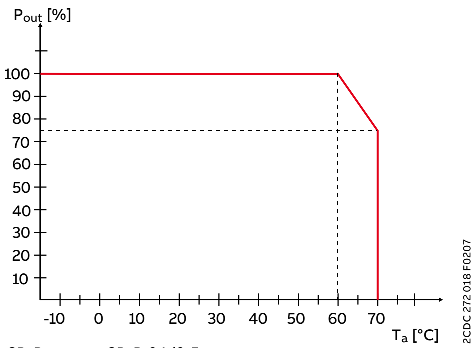


CP-D 24/2.5

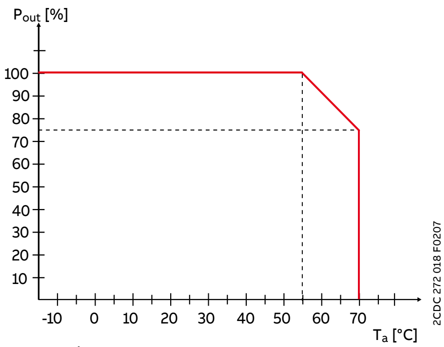


CP-D 24/4.2

Characteristic curve of temperature at rated output voltage



CP-D except CP-D 24/2.5



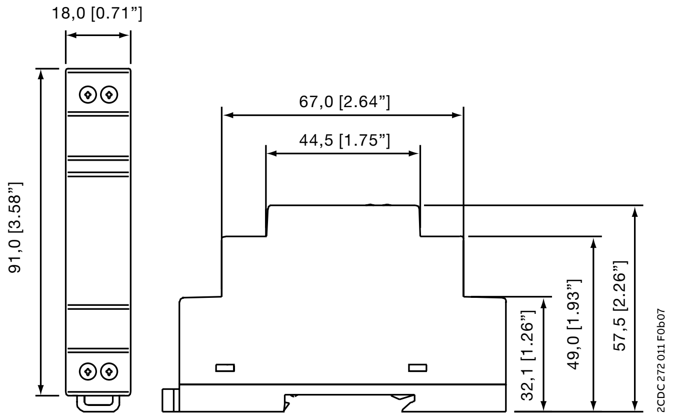
CP-D 24/2.5

Command and signaling technical details

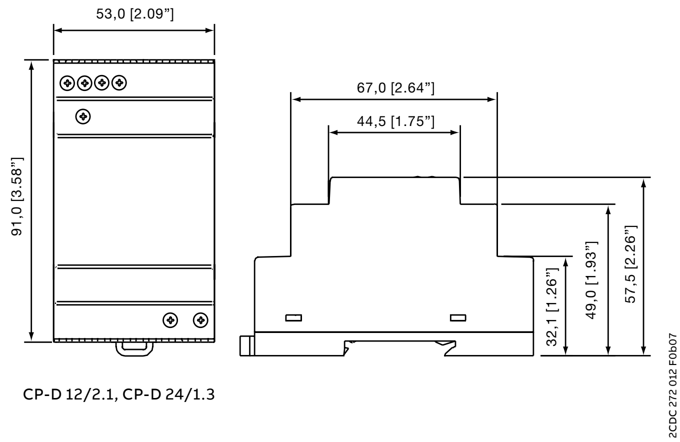
CP-D power supplies and the CP-D redundancy units
CP-D range – Technical diagrams

Dimensional drawings

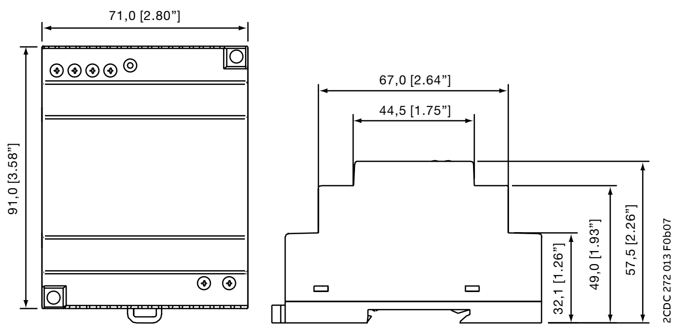
Dimensions in mm



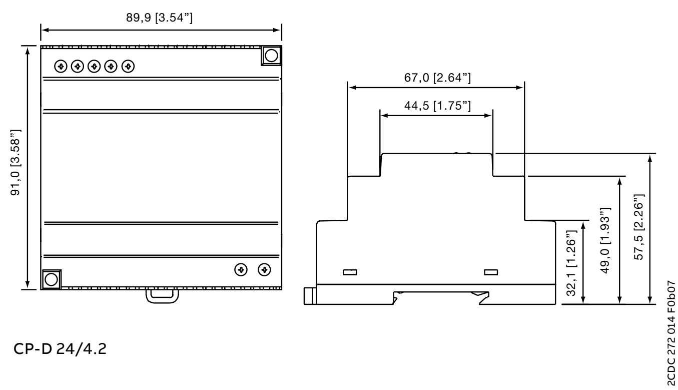
CP-D 12/0.83, CP-D 24/0.42



CP-D 12/2.1, CP-D 24/1.3



CP-D 24/2.5



CP-D 24/4.2

Command and signaling technical details

CP-D power supplies and the CP-D redundancy units

CP-D redundancy unit – Technical diagrams

Type		**CP-D RU**
Input circuit - Supply circuit		**IN 1 + + -, IN 2 + + -**
Rated input voltage U_{in}		24 V DC
Input voltage range		9-35 V DC
Rated input current I_{in} per channel		5 A
Maximum input current per channel		10 A for 300 s
Transient overvoltage protection		no
Output circuit		**OUT + + +, - - -**
Rated output voltage U_{out}		24 V DC
Voltage drop		typ. 0.5 V
Rated output current I_{out}		10 A
Resistance to reverse feed		< 35 V
General data		
MTBF		on request
Duty cycle		100 %
Dimensions		see “Dimensional drawings”
Material of housing		plastic
Mounting		DIN rail, snap-on mounting without any tool
Mounting position		1, 7
Minimum distance to other units	horizontal / vertical	25 mm (0.98 in) / 25 mm (0.98 in)
Electrical connection - Input circuit / Output circuit		
Connecting capacity	fine-strand with (out)wire end ferrule	0.2-2.5 mm^2 (24-14 AWG)
	rigid	0.2-2.5 mm^2 (24-12 AWG)
Stripping length		7.0 mm (0.28 in)
Tightening torque		0.67 Nm (6 lb.in)
Environmental data		
Ambient temperature range	operation	-40...+70 °C
	storage	-40...+85 °C
Relative humidity	RH at 40 °C	20-95 %, no condensation
Vibration (IEC/EN 60068-2-6)		mounting by rail: 10-500 Hz, 2 G, along X, Y, Z each axis, 60 min for each axis
Shock (IEC/EN 60068-2-27)		15 G, 11 ms, 3 axis, 6 faces, 3 times for each face
Standards / Directives		
Standards		IEC/EN 61204-3, IEC/EN 60950-1
RoHS Directive		2011/65/EU
Electromagnetic compatibility		
Interference immunity to		EN 55024
electrostatic discharge	IEC/EN 61000-4-2	level 3, air discharge 8 kV, contact discharge 4 kV
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	level 3, 10 V/m
electrical fast transient/burst	IEC/EN 61000-4-4	level 3, 2 kV / 5 kHz
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	level 3, 10 V
Interference emission		EN 55022
high-frequency radiated	IEC/CISPR 22 / EN 55022	class B
high-frequency conducted	IEC/CISPR 22 / EN 55022	class B

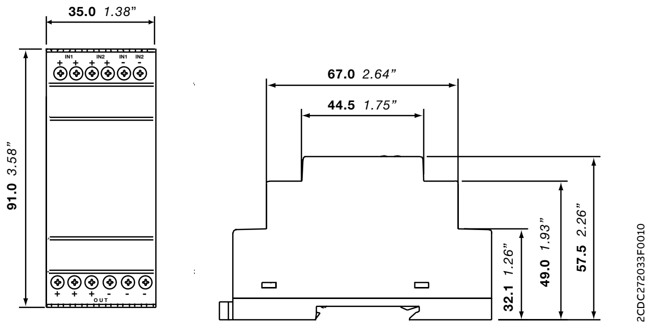
Command and signaling technical details

CP-D power supplies and the CP-D redundancy units

CP-D redundancy unit – Technical diagrams

Dimensional drawings

Dimensions in mm



CP-D RU

Command and signaling technical details

Modular sockets

Modular sockets

This table gives an indication of the voltage, frequency and modular socket solutions in each country. Please consider that installation rules may change in each country, and control the local regulations before installing.

Country	Volt.		Freq.		Modular sockets					
	110-130 V	220-250 V	50 Hz	60 Hz	M1011	M1363	M1170	M1173	M1174	M1175
Afghanistan		■	■				■	■	■	■
Albania		■	■				■	■	■	■
Algeria	■	■	■				■	■	■	■
American Samoa	■	■		■			■	■	■	■
Andorra		■	■				■	■	■	■
Angola		■	■				■	■	■	■
Argentina		■	■				■	■	■	■
Armenia		■	■				■	■	■	■
Aruba	■	■		■			■	■	■	■
Australia		■	■							
Austria		■	■				■	■	■	■
Azerbaijan		■	■				■	■	■	■
Azores		■	■				■	■	■	■
Bahrain		■	■			■				
Balearic Islands		■	■				■	■	■	■
Bangladesh		■	■			■	■	■	■	■
Belarus		■	■				■	■	■	■
Belgium		■	■						■	
Belize	■	■		■		■				
Benin		■	■						■	
Bhutan		■	■			■	■	■	■	■
Bolivia	■	■	■				■	■	■	■
Bosnia & Herzegovina		■	■				■	■	■	■
Botswana		■	■			■				
Brazil	■	■		■			■	■	■	■
Brunei		■	■			■				
Bulgaria		■	■				■	■	■	■
Burkina Faso		■	■				■	■	■	■
Burundi		■	■				■	■	■	■
Cambodia		■	■			■	■	■	■	■
Cameroon		■	■				■	■	■	■
Canary Islands		■	■				■	■	■	■
Cape Verde		■	■				■	■	■	■
Central African Republic		■	■				■	■	■	■
Chad		■	■				■	■	■	■
Channel Islands		■	■			■				
Chile		■	■				■	■	■	■
Comoros		■	■				■	■	■	■
Congo Dem.Rep. (Zaire)		■	■				■	■	■	■
Congo, People's Rep. of		■	■				■	■	■	■
Cook Islands		■	■							
Croatia		■	■				■	■	■	■
Cuba	■	■		■			■	■	■	■
Cyprus		■	■			■	■	■	■	■
Czech Republic		■	■						■	
Denmark		■	■				■	■	■	■
Djibouti		■	■				■	■	■	■
Dominica		■	■			■				
East Timor		■	■				■	■	■	■
Egypt		■	■				■	■	■	■
Equatorial Guinea		■	■				■	■	■	■
Eritrea		■	■				■	■	■	■
Estonia		■	■				■	■	■	■
Ethiopia		■	■		■		■	■	■	■
Faeroe Islands		■	■				■	■	■	■
Falkland Islands		■	■			■				
Fiji		■	■							
Finland		■	■				■	■	■	■
France		■	■						■	
French Guyana	■	■	■				■	■	■	■
Gabon		■	■				■	■	■	■
Gambia		■	■			■				
Georgia		■	■				■	■	■	■
Germany		■	■				■	■	■	■
Ghana		■	■			■				
Gibraltar		■	■			■	■	■	■	■
Greece		■	■				■	■	■	■
Greenland		■	■				■	■	■	■
Grenada		■	■			■				
Guadeloupe		■	■				■	■	■	■
Guatemala	■	■		■		■				
Guinea		■	■				■	■	■	■
Guinea-Bissau		■	■				■	■	■	■
Guyana		■		■		■				
Hong Kong		■	■			■				
Hungary		■	■				■	■	■	■
Iceland		■	■				■	■	■	■
India		■	■				■	■	■	■
Indonesia	■	■	■			■	■	■	■	■
Iran		■	■				■	■	■	■
Iraq		■	■			■	■	■	■	■
Ireland		■	■			■				
Isle of Man		■	■			■	■	■	■	■
Israel		■	■				■	■	■	■
Italy		■	■				■	■	■	■
Ivory Coast		■	■				■	■	■	■
Jordan		■	■		■	■	■	■	■	■
Kazakhstan		■	■				■	■	■	■
Kenya		■	■			■				
Kiribati		■	■							
Korea, North		■		■			■	■	■	■
Korea, South	■	■		■			■	■	■	■
Kuwait		■	■			■	■	■	■	■
Kyrgyzstan		■	■				■	■	■	■
Laos		■	■				■	■	■	■
Latvia		■	■				■	■	■	■

Main countries are highlighted

Command and signaling technical details

Modular sockets

Country	Volt.		Freq.		Modular sockets					
	110-130 V	220-250 V	50 Hz	60 Hz	M1011	M1163	M1170	M1173	M1174	M1175
Lebanon	■	■	■			■	■	■	■	■
Lithuania		■	■				■	■	■	■
Luxembourg		■	■				■	■	■	■
Macau		■	■			■				
Macedonia		■	■				■	■	■	■
Madagascar	■	■	■				■	■	■	■
Madeira		■	■				■	■	■	■
Malawi		■	■			■				
Malaysia		■	■			■				
Maldives		■	■		■	■	■	■		
Mali		■	■				■	■	■	■
Malta		■	■			■				
Martinique		■	■				■	■	■	■
Mauritania		■	■				■	■	■	■
Mauritius		■	■			■	■	■	■	■
Moldova		■	■				■	■	■	■
Monaco		■	■				■	■	■	■
Mongolia		■	■				■	■	■	■
Montenegro		■	■				■	■	■	■
Morocco	■	■	■				■	■	■	■
Mozambique		■	■				■	■	■	■
Myanmar (form. Burma)		■	■				■	■	■	■
Nauru		■	■							
Nepal		■	■				■	■	■	■
Netherlands		■	■				■	■	■	■
Netherlands Antilles	■	■	■	■			■	■	■	■
New Caledonia		■	■				■	■	■	■
New Zealand		■	■							
Niger		■	■				■	■	■	■
Nigeria		■	■			■				
Norway		■	■				■	■	■	■
Oman		■	■			■				
Pakistan		■	■				■	■	■	■
Papua New Guinea		■	■							
Paraguay		■	■				■	■	■	■
Peru		■		■			■	■	■	■
Philippines		■		■			■	■	■	■
Poland		■	■				■	■	■	■
Portugal		■	■				■	■	■	■
Qatar		■	■			■				
Réunion Island		■	■						■	
Romania		■	■				■	■	■	■

Country	Volt.		Freq.		Modular sockets					
	110-130 V	220-250 V	50 Hz	60 Hz	M1011	M1163	M1170	M1173	M1174	M1175
Russian Federation		■	■				■	■	■	■
Rwanda		■	■		■		■	■	■	■
Samoa		■	■							
San Marino		■	■				■	■	■	■
Saudi Arabia	■	■		■		■	■	■	■	■
Senegal		■	■				■	■	■	■
Serbia		■	■				■	■	■	■
Seychelles		■	■			■				
Sierra Leone		■	■			■				
Singapore		■	■			■				
Slovakia		■	■						■	
Slovenia		■	■				■	■	■	■
Somalia	■	■	■				■	■	■	■
Spain		■	■				■	■	■	■
Sri Lanka		■	■			■				
St. Kitts and Nevis		■		■		■				
St. Lucia		■	■			■				
St. Vincent		■	■			■	■	■	■	■
Sudan		■	■				■	■	■	■
Suriname	■	■		■			■	■	■	■
Sweden		■	■				■	■	■	■
Swiss		■	■		■		■	■	■	■
Syria		■	■				■	■	■	■
Tahiti	■	■		■			■	■	■	■
Tajikistan		■	■				■	■	■	■
Tanzania		■	■			■				
Thailand		■	■				■	■	■	■
Togo		■	■				■	■	■	■
Tonga		■	■							
Tunisia		■	■				■	■	■	■
Turkey		■	■				■	■	■	■
Turkmenistan		■	■				■	■	■	■
Uganda		■	■			■				
Ukraine		■	■				■	■	■	■
United Arab Emirates		■	■			■				
United Kingdom		■	■			■				
Uruguay		■	■				■	■	■	■
Uzbekistan		■	■				■	■	■	■
Vietnam	■	■	■			■	■	■	■	■
Yemen, Rep. of		■	■			■				
Zambia		■	■			■	■	■	■	■
Zimbabwe		■	■			■				

Fuse detail

2CSC400759F0001

Indicator light detail

6

Command and signaling technical details

Modular sockets

M1175-FL modular socket with fuse

Operating principle
The modular sockets with fuse are ideal wherever continuity of service is essential. The embedded fuse protecting the phase prevents tripping of the main protection switch in the event of a malfunction of the device plugged into the socket.

Application environments
The modular sockets are suitable for all electrical distribution or automation panels, to allow connection of non modular equipment such as measuring and maintenance instruments etc.

Example of installation
As illustrated in the figures, a modular socket allows to supply non modular devices directly from the electrical panel.
If the connected device malfunctions, there is the risk that the entire electrical system will be put out of service due to tripping of an MCB.
This is prevented by blowing of the fuse incorporated into the socket, thus assuring continuity of service.