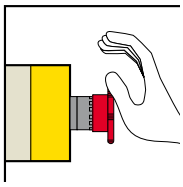
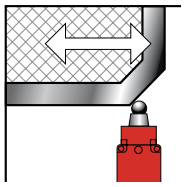
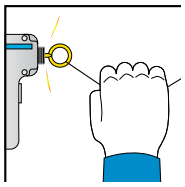
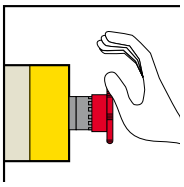
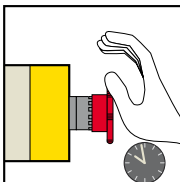
Safety relays

Safety relays
Preventa™ safety relay modules

Applications			
Modules		**For Emergency stop and switch monitoring**	
			
Maximum achievable safety level		PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061
Conformity to standards		EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1
Product certifications		UL, CSA, TÜV	UL, CSA, BG
Number of circuits			
	Safety	3 N.O.	3 N.O.
	Additional	1 solid-state output for signalling to PLC	1 relay output for signalling to PLC
Display		2 LEDs	2 LEDs
Supply voltage		∼ and 24 V ⎓ 48 V ∼ 115 V ∼ 230 V ∼	∼ and 24 V ⎓
Synchronization time between inputs		Unlimited	Unlimited
Input channel voltage			
	24 V/48 V version	∼ and 24 V ⎓/48 V ∼	24 V ⎓
	24 V/48 V or 110 V/120 V/230 V version	115 V ∼/230 V –	–
Module type		**XPSAC**	**XPSAXE**
Pages		3/15	3/15

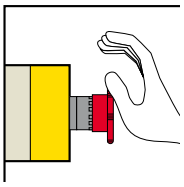
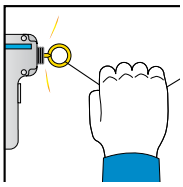
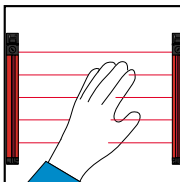


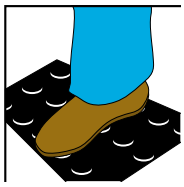


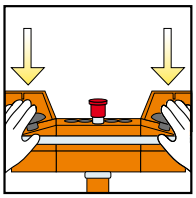


For Emergency stop and switch monitoring	For Emergency stop and protective guard applications	For Emergency stop and switch monitoring	
			
PLe/Category 4 (instantaneous safety outputs) and PLd/Category 3 (time delay safety outputs) conforming to EN/ISO 13849-1, SILCL3 (instantaneous safety outputs) and SILCL2 (time delay safety outputs) conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN ISO 13849-1, SILCL3 conforming to EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 (instantaneous safety outputs) and PLd/Category 3 (time delay safety outputs) conforming to EN/ISO 13849-1, SILCL3 (instantaneous safety outputs) and SILCL2 (time delay safety outputs) conforming to EN/IEC 61508 and EN/IEC 62061
EN/IEC 60204-1, EN/ISO 13850, EN 1088/ISO 14119, EN/IEC 60947-1, EN/IEC 60947-5-1	EN 62061 EN ISO 13849-1 EN 50156-1 EN 60204-1 EN/IEC 61496-1 IN/IEC 60947-5-1	EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/ISO 13850, EN 1088/ISO 14119
UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, BG
2 N.O. instantaneous + 3 N.O. time delay	3 N.O. instantaneous + 3 N.O. time delay	3 N.O. instantaneous + 3 N.O. time delay	2 N.O. instantaneous + 1 N.O. time delay
4 solid-state outputs for signalling to PLC	1 N.C.	3 solid-state outputs for signalling to PLC	–
4 LEDs	5 LEDs	11 LEDs	3 LEDs
∼ and 24 V ⎓ 115 V ∼ 230 V ∼	⎓ 24 V ∼ 115…230 V	24 V ⎓	24 V ⎓
75 ms (automatic start)	1	Unlimited or 1.5 s (depending on wiring)	Unlimited
24 V ⎓/–	24 V ⎓/–	24 V ⎓/–	24 V ⎓/–
48 V ∼/48 V –	24 V ⎓/–	– –	– –
XPSATE	**XPSATR**	**XPSAV**	**XPSABV**
3/20	3/29	3/20	3/20

Safety relays
Preventa™ safety relay modules

Applications				
Modules	**For Emergency stop and switch monitoring**		**For Emergency stop, switch or solid-state output safety light curtain monitoring**	
				
Maximum achievable safety level	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	
Conformity to standards	EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 61496-1 (type 4)	EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	
Product certifications	UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, TÜV	
Number of circuits				
	Safety	3 N.O.		7 N.O.
	Additional	–		2 N.C. + 4 solid-state outputs for signalling to PLC
Display	3 LEDs			4 LEDs
Supply voltage	∿ and 24 V ⎓			∿ and 24 V ⎓ 115 V ∿ and 24 V ⎓ 230 V ∿ and 24 V ⎓
Synchronization time between inputs	Unlimited			
Input channel voltage				
	24 V/48 V version	⎓ 24 V/–		24 V ⎓/–
	24 V/48 V or 110 V/120 V/230 V version	– –		24 V ∿/24 V –
Module type	**XPSAF**	**XPSAFL**	**XPSAR**	
Pages	3/33	3/37	3/41	

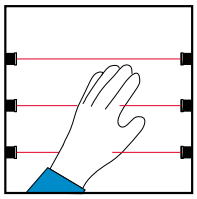


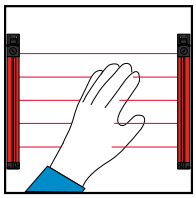


For Emergency stop, switch, sensing mat/edges or solid-state output safety light curtain monitoring	For electrical monitoring of two-hand control stations		
			
PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLc/Category 1 conforming to EN/ISO 13849-1 SILCL1 conforming to EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061
EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	EN 574 type III A, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 62061	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN 574 type III C/ISO 13851	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN 574 type III C/ISO 13851
UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, BG	UL, CSA, TÜV
3 N.O. instantaneous	1 N.O.	2 N.O.	2 N.O.
1 N.C. + 4 solid-state outputs for signalling to PLC	1 N.C.	1 N.C.	2 solid-state outputs for signalling to PLC
4 LEDs	2 LEDs	3 LEDs	3 LEDs
∿ and 24 V ⎓ 48 V ∿ 110 V ∿ and 24 V ⎓ 120 V ∿ and 24 V ⎓ 230 V ∿ and 24 V ⎓	∿ and 24 V ⎓ 115/230 V ∿	∿ and 24 V ⎓ 115/120 V ∿ 230 V ∿	24 V ⎓
Unlimited or 2 s, 4 s (depending on wiring)	500 ms	500 ms	500 ms
24 V ⎓/–	24 V ⎓/–	24 V ⎓	24 V ⎓/–
– 24 V ⎓/24 V/24 V	– 24 V ∿/24 V	– –	– –
XPSAK	**XPSBAE**	**XPSBCE**	**XPSBF**
3/47	3/55	3/55	3/55

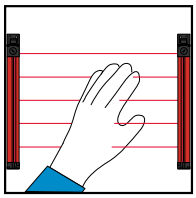
Safety relays
Preventa™ safety relay modules

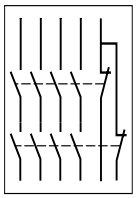
Applications

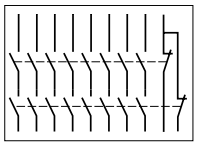




Modules	**For control of 1 to 4 single-beam photo-electric sensors XU2 S (transmitter-receiver pair)**	**For monitoring 2 to 4 type 2 and type 4 light curtains (transmitter-receiver pair)**
		
Maximum achievable safety level	PLc/Category 2 conforming to EN/ISO 13849-1, SILCL1 conforming to EN/IEC 61508 and EN/IEC 62061	PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061
Conformity to standards	EN/IEC 61496-1, EN/IEC 61496-2, EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1	EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 61496-1, EN/IEC 61496-2
Product certifications	UL, CSA, IFA	UL, CSA, TÜV
Number of circuits		
Safety	2 N.O.	2 solid-state PNP (N.O.)
Additional	4 solid-state PNP N.O. outputs for signalling to PLC	1 PNP N.O. + 1 NPN N.O. output for signalling to PLC
Display	4 LEDs	9 LEDs + 2-digit display
Supply voltage	24 V ⎓	⎓ 24 V
Synchronization time between inputs	–	–
Input channel voltage		
24 V/48 V version	–	24 V/–
115 V/230 V version	–	–
Module type	**XPSCM**	**XPSLCD**
Pages	3/62	3/69



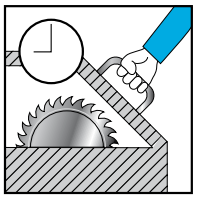




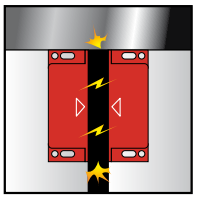
For monitoring type 2 and type 4 light curtains Compact and slim ranges	For extending the number of safety contacts	
		
PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061 (when connected to the appropriate module)	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061 (when connected to the appropriate module)
EN/IEC 61496-1, EN/IEC 61496-2, EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1
UL, CSA, TÜV	UL, CSA, BG	UL, CSA, TÜV
2 solid-state	4 N.O.	8 N.O.
1 PNP + 1 NPN output for signalling to PLC	2 N.C.	1 N.C.
14 LEDs + 2-digit display	2 LEDs	3 LEDs
24 V ⎓	∿ and 24 V ⎓	∿ and 24 V ⎓ 115 V ∿ 230 V ∿
3 s or infinite	–	–
–	–	–
–	–	–
XPSLCM	**XPSECME**	**XPSECPE**
3/74	3/81	3/81

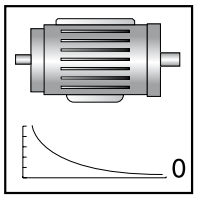
Safety relays
Preventa™ safety relay modules

Applications



Modules	**For the monitoring of applications requiring safety time delays**	
		
Maximum achievable safety level	PLd/Category 3 conforming to EN/ISO 13849-1, SILCL2 conforming to EN/IEC 61508 and EN/IEC 62061	PLd/Category 3 conforming to EN/ISO 13849-1, SILCL2 conforming to EN/IEC 61508 and EN/IEC 62061
Conformity to standards	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1
Product certifications	UL, CSA, TÜV	UL, CSA, TÜV
Number of circuits		
Safety	1 N.O. time delayed	1 N.O. pulse type
Additional	2 N.C. + 2 solid-state outputs for signalling to PLC	
Display	4 LEDs	
Supply voltage	∿ and 24 V ⎓ 115 V ∿ 230 V ∿	
Synchronization time between inputs	–	–
Module type	**XPSTSA**	**XPSTSW**
Pages	3/85	3/85

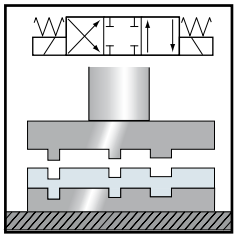




For coded magnetic switch monitoring		For zero speed detection of AC or DC motors which produce a remanent voltage in their windings due to residual magnetism
For 2 max.	**For 6 max.**	
		
PLe/Category 4 conforming to EN/ISO 13849-1 SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1 SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLd/Category 3 conforming to EN/ISO 13849-1, SILCL2 conforming to EN/IEC 61508 and EN/IEC 62061
EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-3	EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-3	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1
UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, TÜV
2 N.O.		1 N.O. + 1 N.C.
2 solid-state outputs for signalling to PLC		2 solid-state outputs for signalling to PLC
3 LEDs	15 LEDs	4 LEDs
⎓ 24 V		24 V ⎓ 115 V ∿ 230 V ∿
500 ms		–
XPSDMB	**XPSDME**	**XPSVNE**
3/89	3/89	3/95

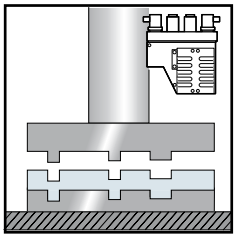
Safety relays
Preventa™ safety relay modules

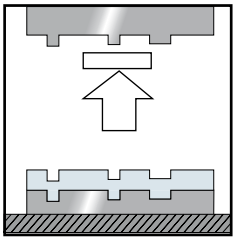
Applications



Modules	**For dynamic monitoring of hydraulic valves on linear presses**

Functions	PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061
Conformity to standards	EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 693, EN 50082-2
Product certifications	UL, CSA
Number of circuits	
Safety	2 N.O. + 1 N.C.
Additional	–
Display	8 LEDs
Supply voltage	⎓ 24 V
Synchronization time between inputs	–
Module type	**XPSPVT**
Pages	3/101





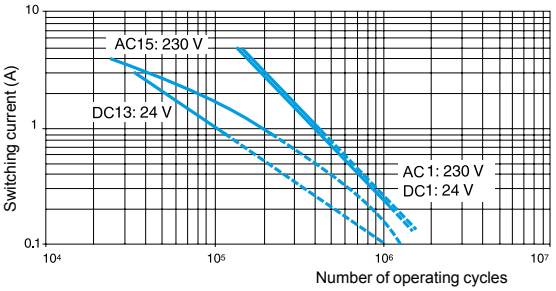
For dynamic monitoring of double-bodied solenoid valves	For safety stop at top dead center with automatic overtravel monitoring and control
	
PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061	PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061
EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 692, EN 50082-2	EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 692, EN 50082-2
UL, CSA	UL, CSA
1 N.O. + 1 N.C.	3 N.O.
4 solid-state outputs for signalling to PLC	4 solid-state outputs for signalling to PLC
8 LEDs	8 LEDs
⎓ 24 V ∿ 115 V ∿ 230 V	– ∿ 115 V ∿ 230 V
–	–
XPSPVK	**XPSOT**
3/105	3/110

3

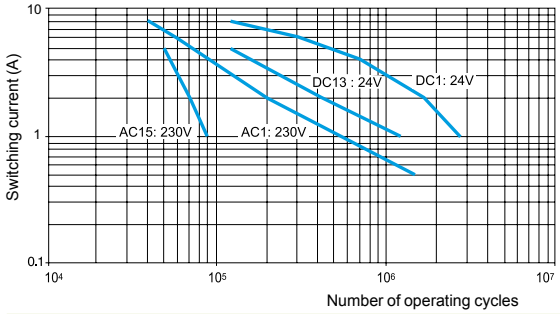
Electrical life

Electrical life curves of safety contacts conforming to EN 60947-5-1, table C2

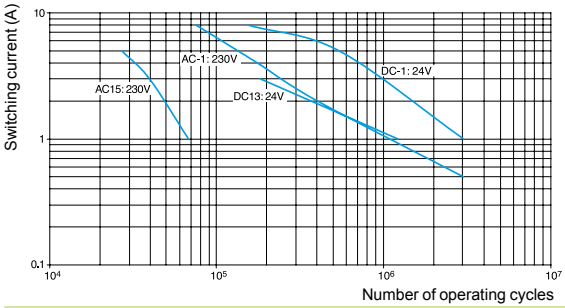
XPSAC, XPSTSA, XPSTSW, XPSBAE, XPSCM, XPSOT, XPSPVK, XPSPVT, XPSVNE



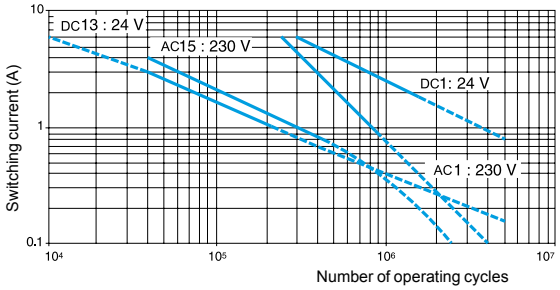
XPSAXE, XPSECME



XPSATR

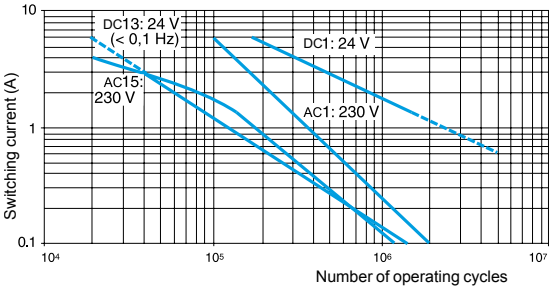


XPSECPE

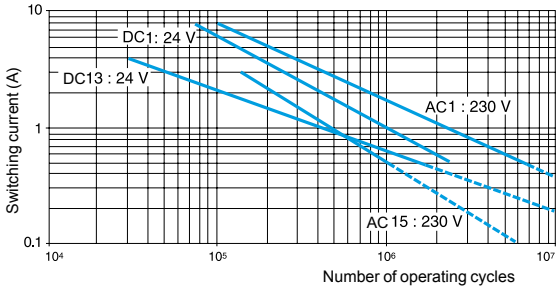


XPSATE

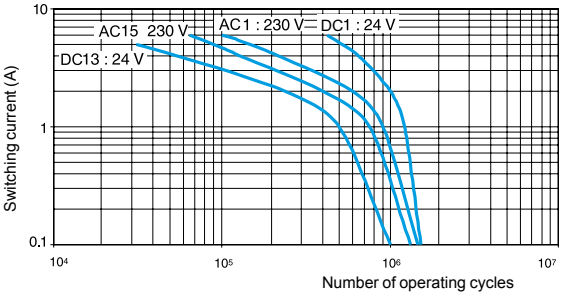
24 V ⎓ version



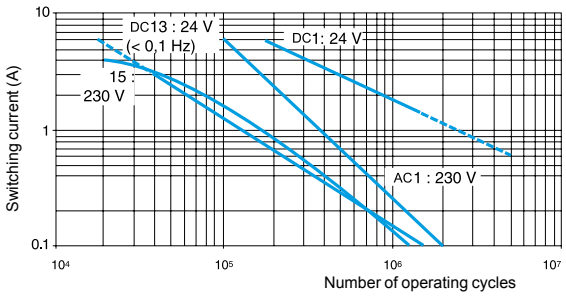
115 V ∼ + 230 V ∼ version



XPSAF, XPSAK, XPSAFL

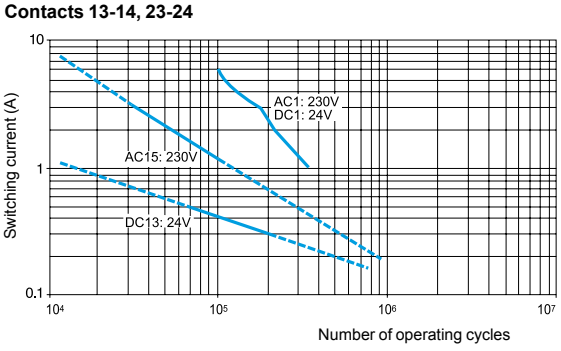


XPSAV, XPSMP, XPSVC, XPSBF, XPSMC

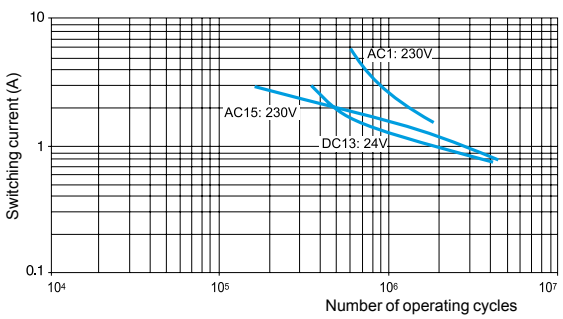


XPSABV

Contacts 13-14, 23-24



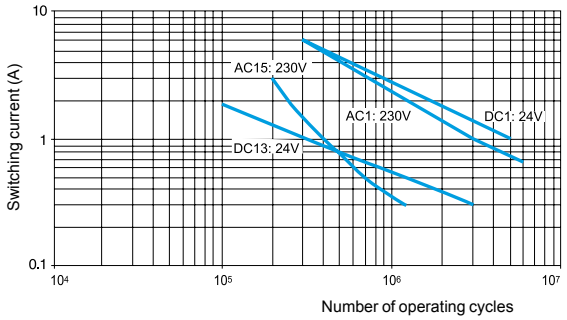
Contacts 37-38



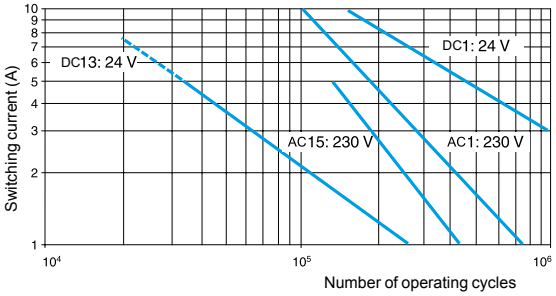
Electrical life (continued)

Electrical life curves of safety contacts conforming to EN 60947-5-1, table C2

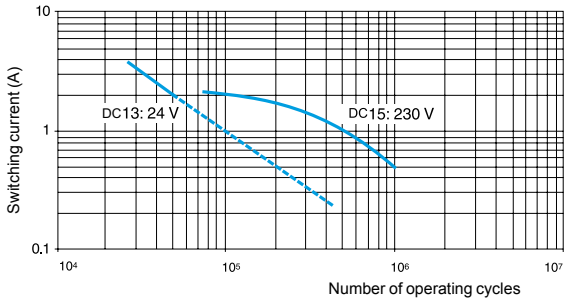
XPSBCE



XPSAR



XPSDMB, XPSDME



Electrical life

The product life expressed is based on average usage and normal operating conditions. The above statements are not intended to nor shall they create any express or implied warranties as to product operation or life. For information on the limited warranty offered on this product please refer to the Square D terms and conditions of sale found in the "Square D by Schneider Electric" *Digest.*

Definition of tests

Determination of electrical life conforming to EN 60947-5-1 (table C2)

Type of current	Utilization category	Start-up			Breaking		
		Current	Voltage	Cos φ	Current	Voltage	Cos φ
a.c. supply	AC-15	10 x Ie	Ue	0.7	Ie	Ue	0.4
Type of current	**Utilization category**	**Start-up**			**Breaking**		
		Current	**Voltage**	**T0.95**	**Current**	**Voltage**	**T0.95**
d.c. supply	DC-13	Ie	Ue	50 ms	Ie	Ue	50 ms

Ie: operational current measured. Ue: operational voltage measured. Cos φ: power factor. T0.95: time taken to reach 95% of nominal current.

Notes

The tests are carried out with a frequency of 6 switching operations per minute and with no additional protection of the components connected to the safety outputs.
The use of additional protection for the components connected to the safety outputs significantly increases the durability of the safety outputs.

Determination of the breaking capacity conforming to EN 60947-5-1 (table 4)

Utilization category	Start-up			Breaking			Total number of switching operations	Switching operations per minute for 1 to 1000 switching operations	Switching operations per minute for 1001 to 6050 switching operations	Minimum duration of switching operation
	Current	Voltage	Cos φ	Current	Voltage	Cos φ				
AC-15	10 x Ie	Ue	0.3	Ie	Ue	0.3	6050	60	6	50 ms
Utilization category	**Start-up**			**Breaking**			**Total number of switching operations**	**Switching operations per minute for 1 to 1000 switching operations**	**Switching operations per minute for 1001 to 6050 switching operations**	**Minimum duration of switching operation**
	Current	**Voltage**	**T0.95**	**Current**	**Voltage**	**T0.95**				
DC-13	Ie	Ue	50 ms	Ie	Ue	50 ms	6050	60	6	50 ms

Ie: operational current measured. Ue: operational voltage measured. Cos φ: power factor. T0.95: time taken to reach 95% of nominal current.

Notes

The maximum values for the breaking capacity of the safety outputs in the various utilization categories are not fixed and depend on the power factor and on the switching frequency. The test definition for the "breaking capacity" and "durability" tables in the European standard EN 60947-5-1 uses different values for the power factor and the switching frequency.
The power factor (cos φ) in the "breaking capacity" table (0.3) is greater than that in the "durability" table (0.7).
In the "breaking capacity" table, the switching frequency of the safety outputs is higher for the first 1000 switching operations (60 per minute) than that for 1001 to 6050 switching operations (6 per minute).
Consequently, the maximum breaking capacity values determined using the "breaking capacity" table are lower than those in the "durability" table.

Safety relays

Preventa™ safety relay modules types XPSAC, XPSAXE

For Emergency stop and switch monitoring

Operating principle

Safety relay modules XPSAC and XPSAXE are used for monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1 and also meet the requirements for the electrical monitoring of switches in protection devices conforming to standard EN 1088/ISO 14119. They provide protection for both the machine operator and the machine by immediately stopping the dangerous movement on receipt of a stop instruction from the operator, or on detection of an anomaly in the safety circuit itself.
To aid diagnostics, the modules have LEDs which provide information on the monitoring circuit status.

The XPSAC module has 3 safety outputs and a solid-state output for signaling to the PLC.
The XPSAXE module has 3 safety outputs and a relay output for signaling to the PLC.

Specifications

Module type			XPSAC, XPSAC●●●●P	XPSAXE●●●●P, XPSAXE●●●●C
Maximum achievable safety level			PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061	PL e/Category 4 conforming to EN/ISO 13849-1 SILCL 3 conforming to EN/IEC 62061
Reliability data (1)	Mean Time To dangerous Failure ($MTTF_d$)	**Years**	210.4	457
	Diagnostic Coverage (DC)	**%**	> 99	> 99
	Probability of dangerous Failure per Hour (PFH_d)	**1/h**	3.56×10^{-9}	3×10^{-8}
Conformity to standards			EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1
Product certifications			UL, CSA, TÜV	UL, CSA, BG
Supply	Voltage	**V**	∿ and 24 ⎓, 48 ∿, 115 ∿, 230 ∿	∿ and 24 ⎓
	Voltage limits		- 20 to + 10% (24 V ∿) - 20 to + 20% (24 V ⎓) - 15 to + 10% (48 V ∿) - 15 to + 15 % (115 V) - 15 to + 10% (230 V)	- 15 to + 10%
	Frequency	**Hz**	50/60	50/60
Power consumption		**W**	< 1.2 (24 V ⎓)	–
		VA	< 2.5 (24 V ∿) < 6 (48 V ∿) < 7 (115 V ∿) < 6 (230 V ∿)	< 1.6 (for 24VDC) / < 2.2 (for 24VAC)
Start button monitoring			No	No
Control unit voltage (at nominal supply voltage)			Identical to supply voltage	
	24 V version	**V**	24 ∿ (approx. 90 mA), 24 ⎓ (approx. 40 mA)	24 ⎓
	48 V version	**V**	48 ∿ (approx. 100 mA)	–
	115 V version	**V**	115 ∿ (approx. 60 mA)	–
	230 V version	**V**	230 ∿ (approx. 25 mA)	–
Outputs	Voltage reference		Relay hard contacts	Relay hard contacts
	Number and type of safety circuits		3 N.O. (13-14, 23-24, 33-34)	3 N.O. (13-14, 23-24, 33-34)
	Number and type of additional circuits		1 solid-state	1 N.C. relay (41-42)
	Breaking capacity in AC-15	**VA**	C300: inrush 1800, maintained 180	B300
	Breaking capacity in DC-13		24 V/2 A L/R = 50 ms	24 V/1.5 A L/R = 50 ms
	Max. thermal current (Ithe)	**A**	6	8/5 (N.O. / N.C.)
	Max. total thermal current	**A**	10.5	12
	Output fuse protection, using fuses conforming to IEC/EN 947-5-1, DIN VDE 0660 part 200	**A**	4 gG (gI) or 6 fast acting	6gG
	Minimum current	**mA**	10	10
	Minimum voltage	**V**	17	17
Electrical life			See page 3/12	
Response time on input opening		**ms**	< 100	< 80
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp)		**kV**	3 (overvoltage category III, conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)	4 (overvoltage category III, conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)
LED display			2	2
Operating temperature		**°F (°C)**	+ 14 to + 131 (- 10 to + 55)	- 13 to +131 (- 25 to + 55)
Storage temperature		**°F (°C)**	- 13 to +185 (- 25 to + 85)	- 13 to +167 (- 25 to + 75)
Degree of protection conforming to IEC/EN 60529	Terminals		IP 20	IP 20
	Enclosure		IP 40	IP 40

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Principle: page 3/14 | Specifications: page 3/14 | References: page 3/15 | Wiring diagrams: page 3/16 | Dimensions: page 3/112

Safety relays

Preventa™ safety relay modules types XPSAC, XPSAXE

For Emergency stop and switch monitoring

Specifications (continued)

Module type				XPSAC	XPSAC●●●●P	XPSAXE●●●●P	XPSAXE●●●●C
Connection	Type	Terminals		Captive screw clamp terminals	Captive screw clamp terminals	Captive screw clamp terminals	Spring terminals
		Terminal block		Integrated in module	Removable from module	Removable from module	Removable from module
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14 to 2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.2 to 2.5 mm²)		
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm²)			
				With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm²)	With bezel, flexible cable: 0.25 to 2.5 mm²	With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm²)
	2-wire connection	Without cable end		Solid or flexible cable: 26-20 AWG (0.14 to 0.75 mm²)	Solid cable: 24-18 AWG (0.2 to 1 mm²), flexible cable: 24-16 AWG (0.2 to 1.5 mm²)	Solid or flexible cable: 24-18 AWG (0.2 to 1 mm²)	–
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25 – 1.0 mm²)			–
				Double, with bezel, flexible cable: 20-16 AWG (0.5 to 1.5 mm²)			Double, with bezel, flexible cable: 0-18 AWG (0.5 to 1 mm²)

References

XPSAC●●●●

XPSAC●●●●P

XPSAXE5120P

XPSAXE5120C

Description	Connection	Number of instantaneous opening safety circuits	Additional outputs	Supply	Reference	Weight oz (kg)
Safety modules for Emergency stop and switch monitoring	Captive screw clamp terminals Terminal block integrated in module	3	1 solid-state	∼ and ⎓, 24 V	**XPSAC5121**	5.643 (0.160)
				48 V ∼	**XPSAC1321**	7.408 (0.210)
				115 V ∼	**XPSAC3421**	7.408 (0.210)
				230 V ∼	**XPSAC3721**	7.408 (0.210)
	Captive screw clamp terminals Terminal block removable from module	3	1 solid-state	∼ and ⎓, 24 V	**XPSAC5121P**	5.643 (0.160)
				48 V ∼	**XPSAC1321P**	7.408 (0.210)
				115 V ∼	**XPSAC3421P**	7.408 (0.210)
				230 V ∼	**XPSAC3721P**	7.408 (0.210)
			1 relay	∼ and ⎓, 24 V	**XPSAXE5120P**	8.078 (0.229)
	Spring terminals Terminal block removable from module	3	1 relay	∼ and ⎓, 24 V	**XPSAXE5120C**	8.078 (0.229)

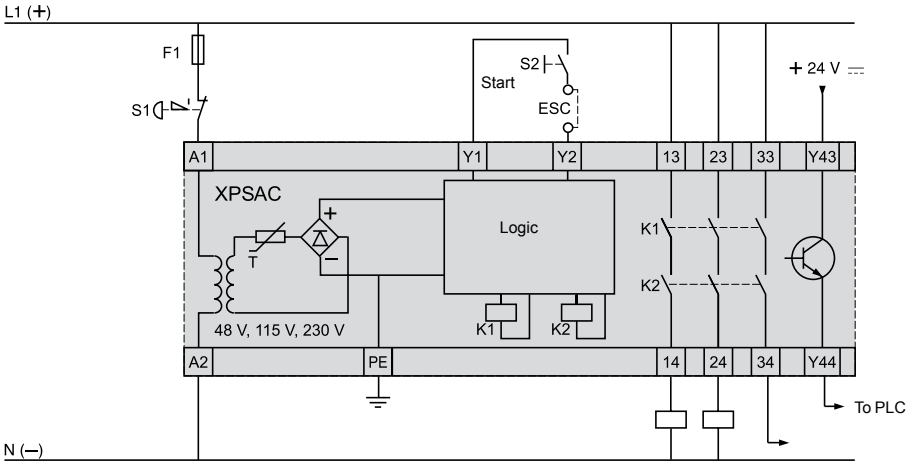
Safety relays

Preventa™ safety relay modules type XPSAC

For Emergency stop and switch monitoring

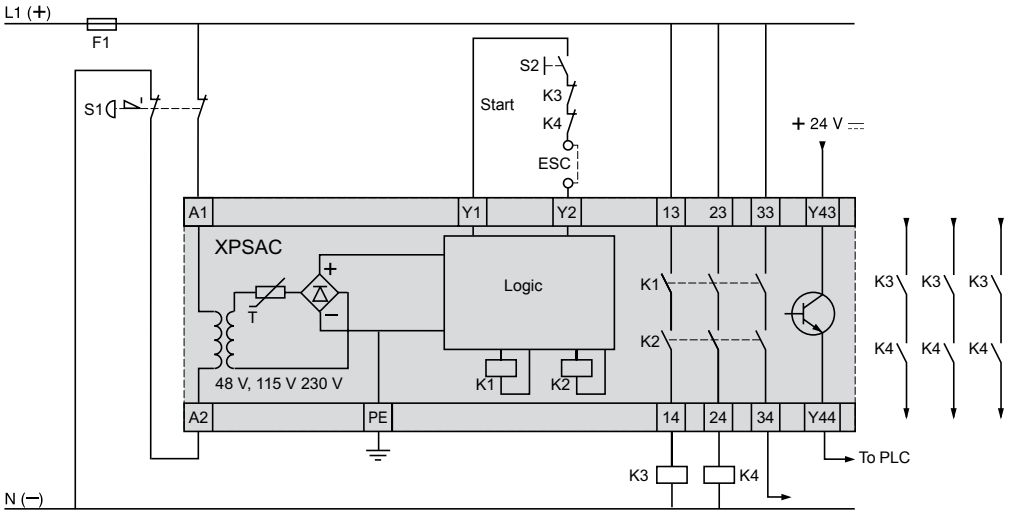
XPSAC

Module XPSAC associated with an Emergency stop button with 1 N.C. contact



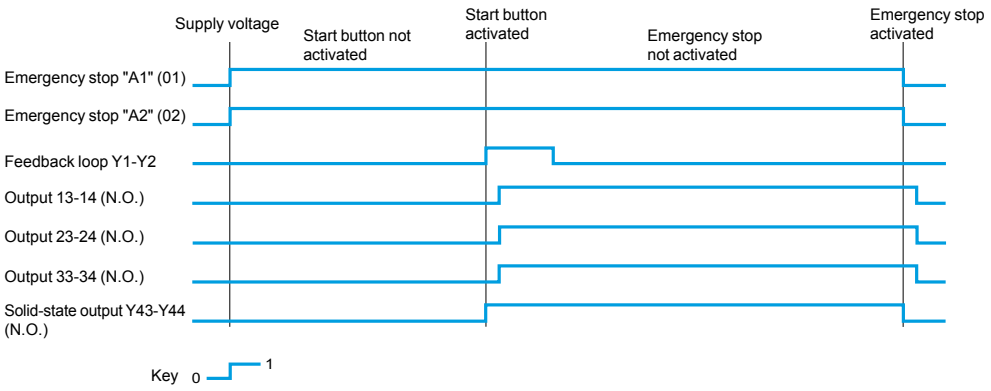
S1: Emergency stop
S2: Start button
Y1-Y2: Feedback loop.
ESC: External start conditions.

Module XPSAC associated with an Emergency stop button with 2 N.C. contacts (recommended application)

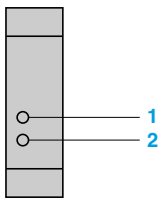


S1: Emergency stop
S2: Start button
Y1-Y2: Feedback loop.
ESC: External start conditions.

Functional diagram of module XPSAC



LED details

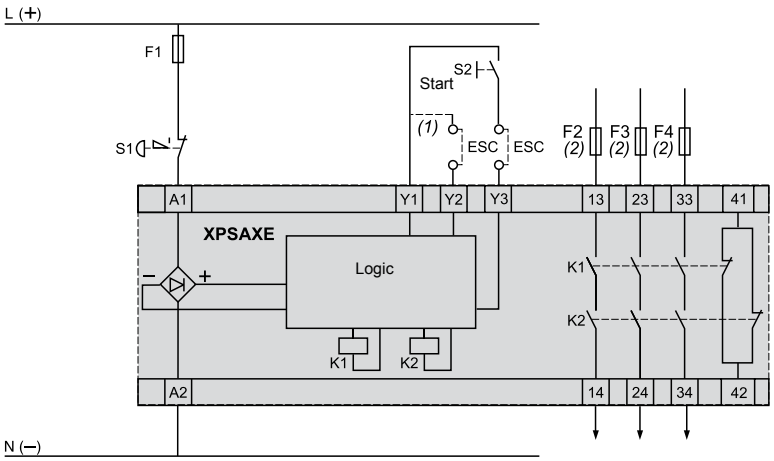


1 Supply voltage A1-A2.
2 K1-K2 status (N.O. safety outputs closed).

Principle: page 3/14 | Specifications: page 3/14 | References: page 3/15 | Wiring diagrams: page 3/16 | Dimensions: page 3/112

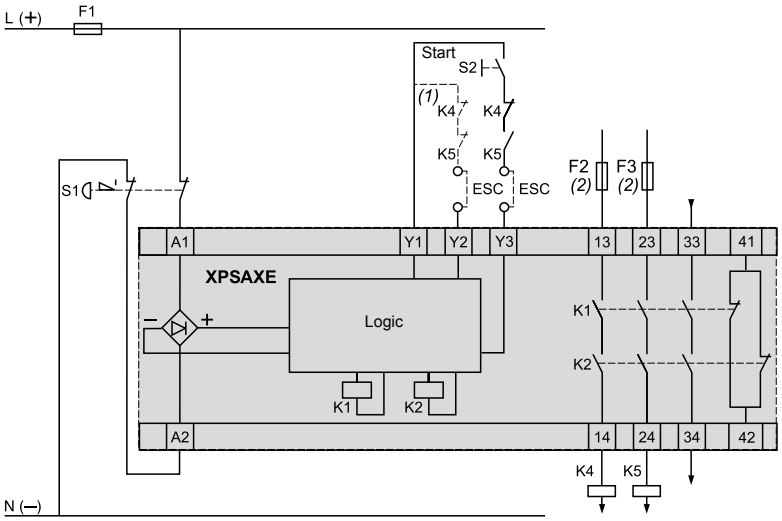
XPSAXE

Module XPSAXE associated with an Emergency stop button with 1 N.C. contact



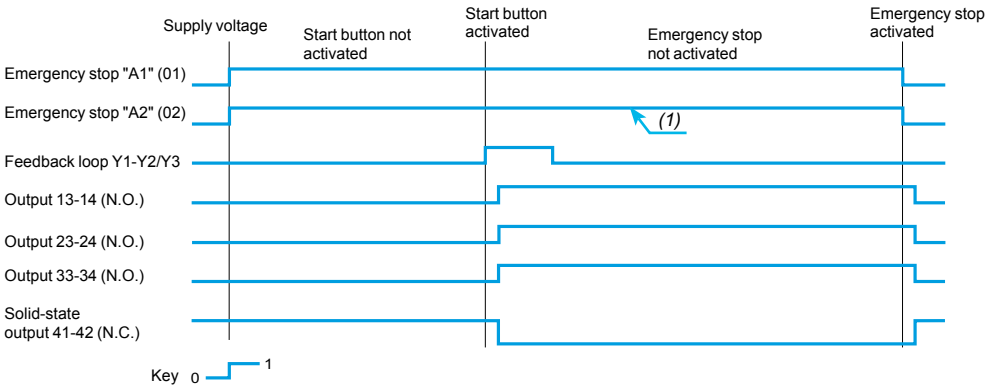
S1: Emergency stop
S2: Start
Y1-Y2: Feedback loop
ESC: External start conditions
(1) Automatic reset
(2) Maximum fuse rating: see page 3/14.

Module XPSAXE associated with an Emergency stop button with 2 N.C. contacts (recommended application)



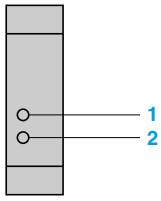
S1: Emergency stop
S2: Start
Y1-Y2: Feedback loop
ESC: External start conditions
(1) Automatic reset
(2) Maximum fuse rating: see page 3/14.

Functional diagram of module XPSAXE



(1) Only for Emergency stop button with 2 N.C. contacts.

LED details



1 Supply voltage A1-A2.
2 K1-K2 status (N.O. safety outputs closed).

Safety relays

Preventa™ safety relay modules types XPSAV, XPSABV, XPSATE

For Emergency stop and switch monitoring

Operating principle

Safety relay modules XPSAV, XPSABV and XPSATE are used for monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1 and also meet the requirements for the electrical monitoring of switches in protection devices conforming to standard EN 1088 / ISO 14119.
They provide protection for both the machine operator and the machine by immediately stopping the dangerous movement on receipt of a stop instruction from the operator, or on detection of an anomaly in the safety circuit itself.

In addition to the stop category 0 instantaneous opening safety outputs (3 for XPSAV, 2 for XPSABV and 2 for XPSATE), the modules incorporate stop category 1 time delay outputs (3 for XPSAV, 1 for XPSABV and 3 for XPSATE) which allow for controlled deceleration of the motor components until a complete stop is achieved (for example, motor braking by variable speed drive).

At the end of the preset delay, the supply is disconnected by opening the time delay output circuits.
For module XPSAV, the time delay of the 3 output circuits is adjustable, in 15 preset values, between 0 and 300 seconds using selector buttons.
For module XPSABV, the time delay of the output circuit is adjustable between 0.15 and 3 seconds or 1.5 and 30 seconds, depending on the model, using a selector switch.
For module XPSATE, the time delay of the 3 output circuits is adjustable between 0 and 30 seconds using a 12-position selector switch.
Module XPSAV also incorporates 3 solid-state signaling outputs for signaling to the process PLC.
Module XPSATE incorporates 4 solid-state signaling outputs for signaling to the process PLC.
To aid diagnostics, the modules have LEDs which provide information on the monitoring circuit status.

The Start button monitoring function is configurable depending on the wiring.

Specifications

Module type			**XPSAV11113, XPSAV11113P**	**XPSABV●●●●C, XPSABV●●●●P**	**XPSATE●●●●, XPSATE●●●●P**
Maximum achievable safety level			PL e/Category 4 conforming to EN/ISO 13849-1 SILCL 3 (instantaneous safety outputs and time delay safety outputs) conforming to EN/IEC 62061	PL e/Category 4 (instantaneous safety outputs) and PL d/Category 3 (time delay safety outputs) conforming to EN/ISO 13849-1, SILCL 3 (instantaneous safety outputs) and SILCL 2 (time delay safety outputs) conforming to EN/IEC 62061	PL e/Category 4 (instantaneous safety outputs) and PL d/Category 3 (time delay safety outputs) conforming to EN/ISO 13849-1, SILCL 3 (instantaneous safety outputs) and SILCL 2 (time delay safety outputs) conforming to EN/IEC 62061
Reliability data (1) (instantaneous safety outputs)	Mean Time To dangerous Failure ($MTTF_d$)	**Years**	75.8	53	134.8
	Diagnostic coverage (DC)	**%**	> 99	> 99	> 99
	Probability of dangerous Failure per Hour (PFH_d)	**1/h**	7.95×10^{-9}	3×10^{-8}	6.81×10^{-9}
Reliability data (1) (time delay safety outputs)	Mean Time To dangerous Failure ($MTTF_d$)	**Years**	75.8	53	54.5
	Diagnostic coverage (DC)	**%**	> 99	> 60 and < 90	98.4
	Probability of dangerous Failure per Hour (PFH_d)	**1/h**	7.95×10^{-9}	2×10^{-7}	1.96×10^{-8}
Conformity to standards			EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/ISO 13850, EN 1088/ISO 14119,	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/ISO 13850, EN 1088/ISO 14119	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/ISO 13850, EN 1088/ISO 14119
Product certifications			UL, CSA, TÜV	UL, CSA, BG	UL, CSA, TÜV
Supply	Voltage	**V**	24 ⎓	24 ⎓	∿ and 24 ⎓, 115 ∿, 230 ∿
	Voltage limits		- 20 to + 20%	- 15 to + 10%	- 20 to + 10% (24 V) - 15 to + 15% (115 V) - 15 to + 10% (230 V)
	Frequency	**Hz**	–	–	50/60
Power consumption		**W**	< 5	< 3	< 8
Module inputs fuse protection			Internal, electronic		
Adjustable time delay		**s**	0 to 300	0.15 to 3 or 1.5 to 30	0 to 30
Start button monitoring			Yes/No (configurable by terminal wiring diagrams)		
Control unit voltage (at nominal supply voltage)			Between input terminals S21-S22, S31-S32 or S11-S12	Between input terminals S11-S12, S21-S22 or S11-S31	Between input terminals S11-S12, S21-S22 or S11-B1
	24 V version	**V**	24	24	24
	115 V, 230 V version	**V**	–		48

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Principle: page 3/18 | Specifications: page 3/18 | References: page 3/20 | Wiring diagrams: page 3/21 | Dimensions: page 3/112

Safety relays

Preventa™ safety relay modules types XPSAV, XPSABV, XPSATE

For Emergency stop and switch monitoring

Specifications (continued)

Module type			XPS...	AV11113	AV11113P	ABV●●●●P	ABV●●●●C	ATE●●●●	ATE●●●●P
Calculation of wiring resistance RL between input terminals			Ω	100 max. Maximum cable length: 2000 m		RL = $\frac{Ue}{Un}$ x 160-127 Ue = true voltage applied to terminals A1-A2 Un = nominal supply voltage		RL max. = $\frac{U\ int - U\ min.}{I\ min.}$ Ue = true voltage applied to terminals A1-A2 U int (terminals S11-S21) = supply voltage Ue - 3 V (24 V version) U int between 42 V and 45 V, with typical value = 45 V (115 V, 230 V version) Calculated max. RL must be equal to or greater than the true value	
Synchronization time between inputs			**s**	For guard: 1.5 For Emergency stop: unlimited		< 0.5		Approx. 0.075 For automatic start, terminals S33-Y2 and Y3-Y4 linked	
Outputs	Voltage reference			Relay hard contacts					
	No. and type of instantaneous opening safety circuits			3 N.O. (03-04, 13-14, 23-24)		2 N.O. (13-14, 23-24)		2 N.O. (13-14, 23-24, 33-34)	
	No. and type of time delay opening safety circuits			3 N.O. (37-38, 47-48, 57-58)		1 N.O. (37-38)		3 N.O. (57-58, 67-68, 77-78)	
	Number and type of additional circuits			3 solid-state		–		4 solid-state	
	Breaking capacity in AC-15	Instantaneous outputs	**VA**	C300: inrush 1800, maintained 180		B300: inrush 3600, maintained 360		C300: inrush 1800, maintained 180	
		Time delay outputs	**VA**	C300: inrush 1800, maintained 180		B300: inrush 3600, maintained 360		C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13	Instantaneous outputs		24 V/1.25 A L/R = 50 ms		24 V/1.5 A L/R = 50 ms		24 V/1.0 A L/R = 50 ms	
		Time delay outputs		24 V/1.25 A L/R = 50 ms		24 V/1.5 A L/R = 50 ms		24 V/1.0 A L/R = 50 ms	
	Breaking capacity of solid-state outputs			24 V/20 mA		–		–	
	Max. thermal current (Ithe)	Instantaneous outputs	**A**	3.3 for all 3, or 6 for 1 and 2 for 2, or 4 for 2 and 2 for 1		6		5	
		Time delay outputs	**A**	3.3 for all 3, or 6 for 1 and 2 for 2, or 4 for 2 and 2 for 1		6		2.5	
	Max. total thermal current		**A**	20		12		8	
	Output fuse protection, using fuses conforming to IEC/EN 60947-5-1, DIN VDE 0660 part 200	Instantaneous outputs	**A**	4 gG or 6 fast acting		6 gG		6 gG	
		Time delay outputs	**A**	4 gG or 6 fast acting		6 gG		4 gG	
	Minimum current		**mA**	10 *(1)*		10		10 *(1)*	
	Minimum voltage		**V**	17 *(1)*		17		17 *(1)*	
Electrical life				See page 3/12					
Response time on instantaneous opening inputs			**ms**	< 30		< 200		< 20	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)					
Rated impulse withstand voltage (Uimp)			**kV**	4 (overvoltage category III, conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)					
LED display				11		3		4	
Operating temperature			**°F (°C)**	+ 14 to + 131 (- 10 to + 55)		- 13 to +131 (- 25 to + 55)		+ 14 to + 131 (- 10 to + 55)	
Storage temperature			**°F (°C)**	- 13 to +185 (- 25 to + 85)		- 13 to +167 (- 25 to + 75)		- 13 to +185 (- 25 to + 85)	
Degree of protection conforming to IEC/EN 60529		Terminals		IP 20					
		Enclosure		IP 40					
Wiring diagrams		Type of terminals		Captive screw clamp terminals			Spring terminals	Captive screw clamp terminals	
		Type of terminal block		Integrated in module	Removable from module				
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14 to 2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.2 to 2.5 mm²)			Solid or flexible cable: 26-14 AWG (0.14 to 2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.25 to 2.5 mm²)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm²)					
				With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm²)	With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm²)	With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm²)
	2-wire connection	Without cable end		Solid or flexible cable: 26-20 AWG (0.14 to 0.75 mm²)	Solid cable: 24-18 AWG (0.2 to 1 mm²) Flexible cable: 24-16 AWG (0.2 to 1.5 mm²)	Solid or flexible cable: 24-18 AWG (0.2 to 1 mm²)	–	Solid or flexible cable: 26-20 AWG (0.14 to 0.75 mm²)	Solid cable: 24-18 AWG (0.2 to 1 mm²) Flexible cable: 24-16 AWG (0.2 to 1.5 mm²)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25 to 1 mm²)			–	Without bezel, flexible cable: 24-18 AWG (0.25 to 1 mm²)	
				Double, with bezel, flexible cable: 20-16 AWG (0.5 to 1.5 mm²)		Double, with bezel, flexible cable: 20-18 AWG (0.5 to 1 mm²)		Double, with bezel, flexible cable: 20-16 AWG (0.5 to 1.5 mm²)	

(1) The module is also capable of switching low power loads (17 V/10 mA) provided that the contact has not been used for switching high power loads (possible contamination or wear of the gold layer on the contact tips).

Safety relays

Preventa™ safety relay modules types XPSAV, XPSABV, XPSATE

For Emergency stop and switch monitoring

References

Description	Number of safety circuits	Additional outputs	Setting range of time delay	Supply	Connection	Reference	Weight oz (kg)
Safety modules for Emergency stop and switch monitoring	6 N.O. (3 N.O. time delay)	3 solid-state	0 to 300 s	24 V ⎓	Captive screw clamp terminals Terminal block integrated in module	**XPSAV11113**	11.288 (0.320)
	6 N.O. (3 N.O. time delay)	3 solid-state	0 to 300 s	24 V ⎓	Captive screw clamp terminals Terminal block removable from module	**XPSAV11113P**	11.288 (0.320)
	3 N.O. (1 N.O. time delay)	–	0.15 to 3 s	24 V ⎓	Captive screw clamp terminals Terminal block removable from module	**XPSABV1133P**	9.877 (0.280)
				24 V ⎓	Spring terminals Terminal block removable from module	**XPSABV1133C**	9.700 (0.275)
			1.5 to 30 s	24 V ⎓	Captive screw clamp terminals Terminal block removable from module	**XPSABV11330P**	9.877 (0.280)
				24 V ⎓	Spring terminals Terminal block removable from module	**XPSABV11330C**	9.700 (0.275)
	5 N.O. (3 N.O. time delay)	4 solid-state	0 to 30 s	∿/24 V ⎓	Captive screw clamp terminals Terminal block integrated in module	**XPSATE5110**	9.877 (0.280)
					Captive screw clamp terminals Terminal block removable from module	**XPSATE5110P**	9.877 (0.280)
				115 V ∿	Captive screw clamp terminals Terminal block integrated in module	**XPSATE3410**	13.404 (0.380)
					Captive screw clamp terminals Terminal block removable from module	**XPSATE3410P**	13.404 (0.380)
				230 V ∿	Captive screw clamp terminals Terminal block integrated in module	**XPSATE3710**	13.404 (0.380)
					Captive screw clamp terminals Terminal block removable from module	**XPSATE3710P**	13.404 (0.380)

XPSAV11113

XPSAV11113P

XPSABV●●●●P

XPSABV●●●●C

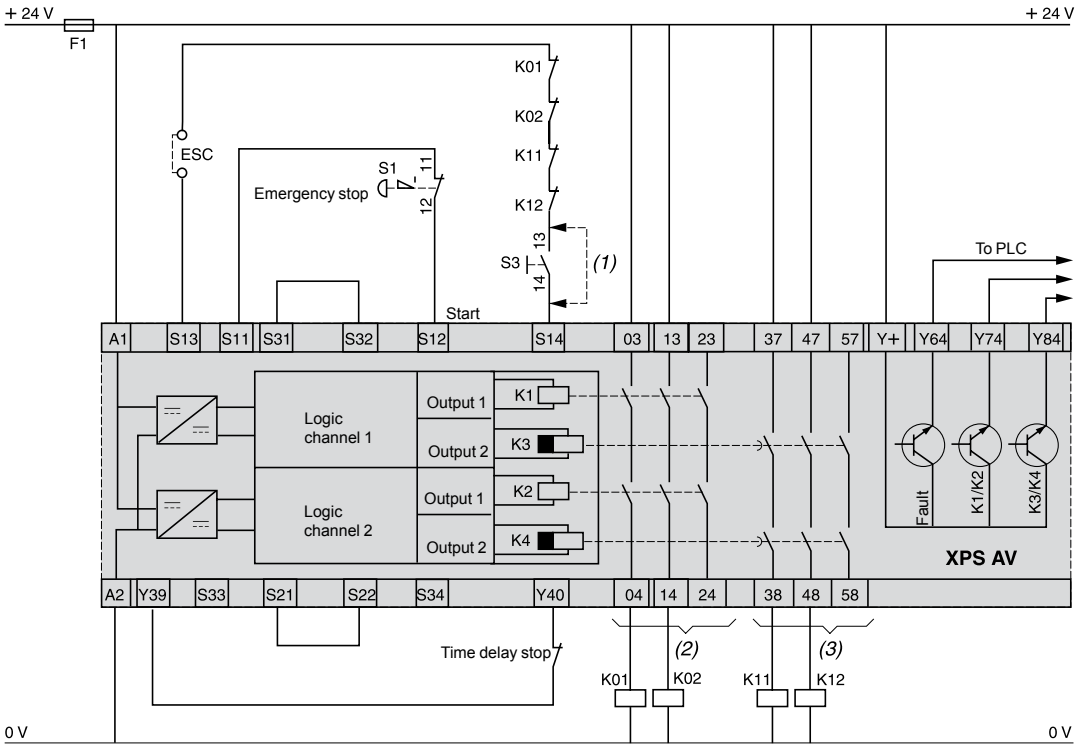
XPSATE5110

Principle: page 3/18 | Specifications: page 3/18 | References: page 3/20 | Wiring diagrams: page 3/21 | Dimensions: page 3/112

Safety relays
Preventa™ safety relay modules type XPSAV
For Emergency stop and switch monitoring

XPSAV

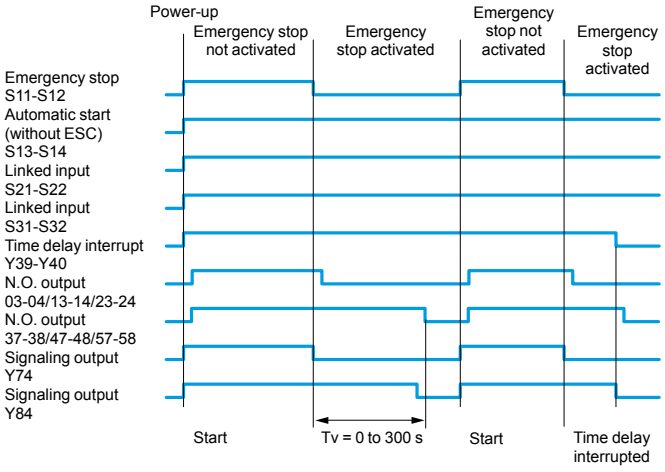
Module XPSAV associated with an Emergency stop button with 1 N.C. contact, automatic start or unmonitored start



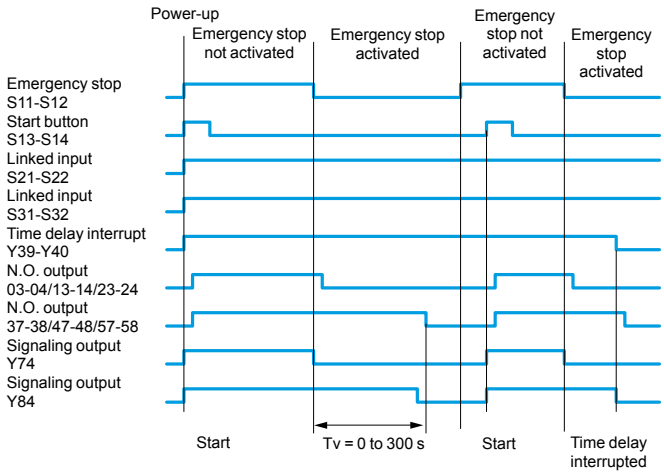
(1) Link for automatic start.
(2) Instantaneous opening safety outputs (stop category 0).
(3) Time delay opening safety outputs (stop category 1).
ESC = External start conditions.

Functional diagrams

Automatic start



Unmonitored start



Automatic start
There is no start contact or it is jumpered (wiring between terminals S13 - S14).
Note: Automatic start function is not available on the XPSAV with 2 channel wiring on the inputs. Automatic start function is only available on single channel wiring on the inputs.

Unmonitored start
The output is activated on closing of the start contact.

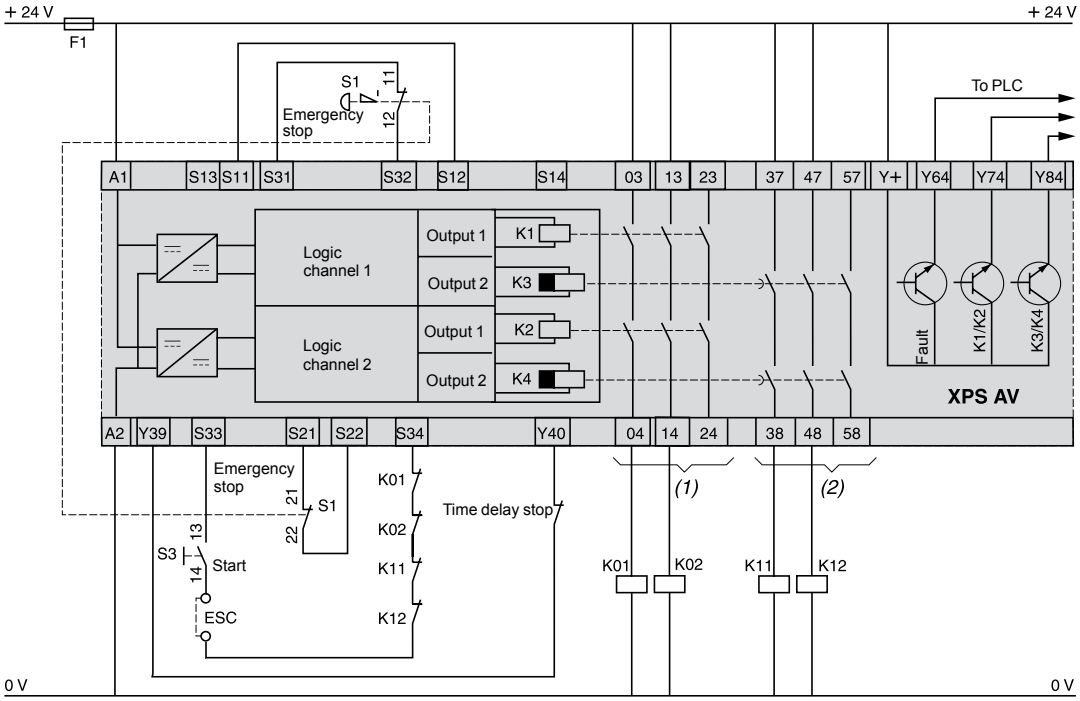
Monitored start
The start input is monitored so that there is no start-up in the event of the start contact being jumpered or the start circuit being closed for more than 10 seconds. Start-up is triggered following activation of the start button (push-release function) on opening of the contact (wiring between terminals S33-S34).

Principle: page 3/18 | Specifications: page 3/18 | References: page 3/20 | Wiring diagrams: page 3/21 | Dimensions: page 3/112

3

XPSAV

Module XPSAV associated with an Emergency stop button with 2 N.C. contacts, monitored start*

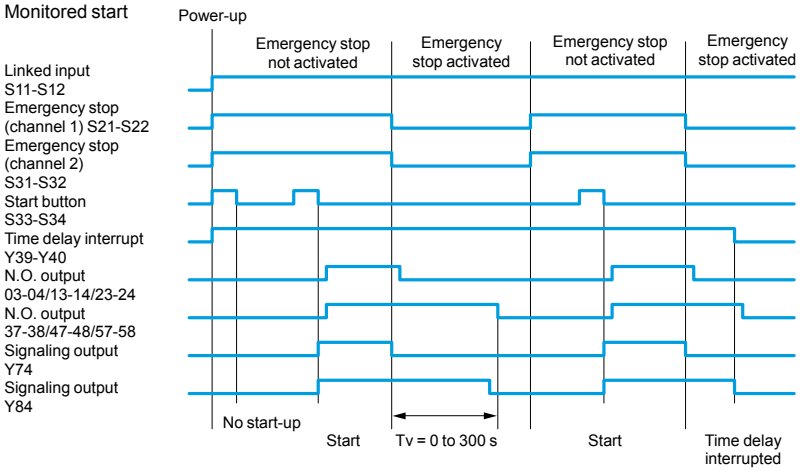


(1) Instantaneous opening safety outputs (stop category 0).
(2) Time delay opening safety outputs (stop category 1).
ESC = External start conditions.

**Automatic start function is not available on the XPSAV with 2 channel wiring on the inputs. Automatic start function is only available on single channel wiring on the inputs.*

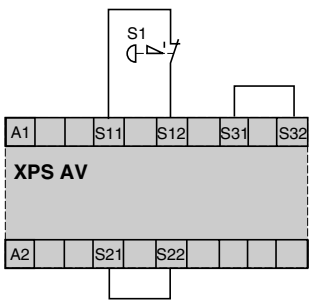
Functional diagram

Monitored start

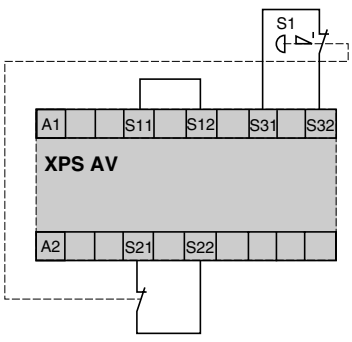


Emergency stop monitoring function configuration

1-channel wiring



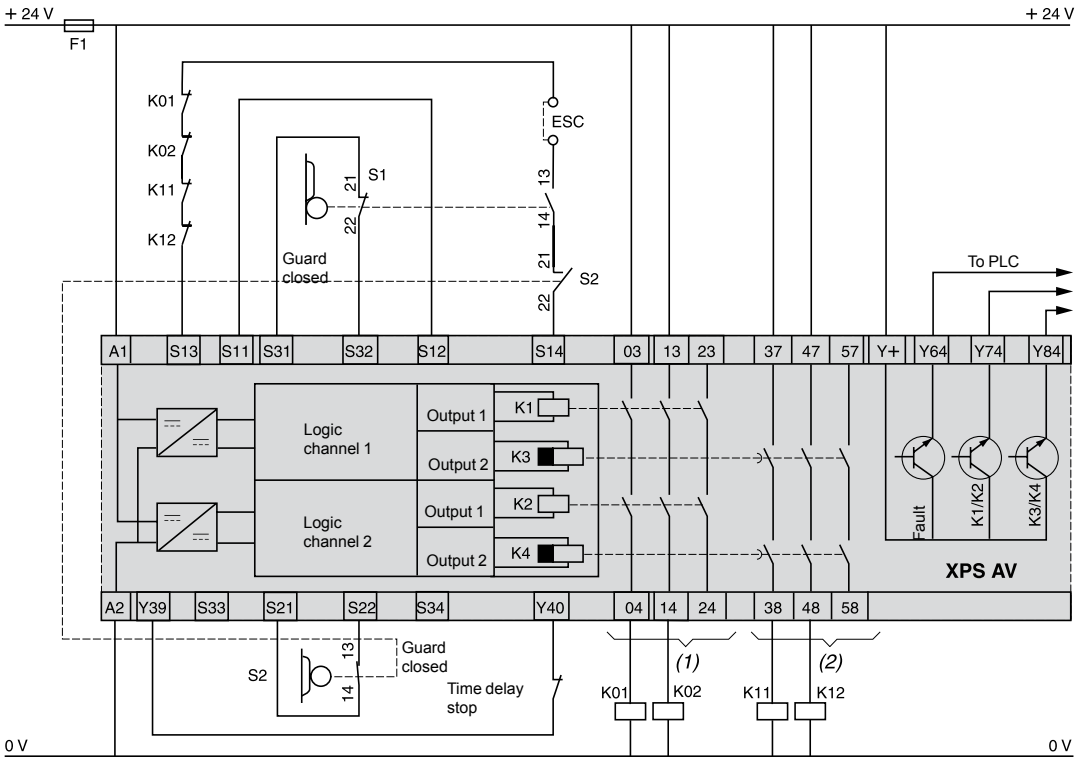
2-channel wiring, with short-circuit detection



Principle: page 3/18 | Specifications: page 3/18 | References: page 3/20 | Wiring diagrams: page 3/21 | Dimensions: page 3/112

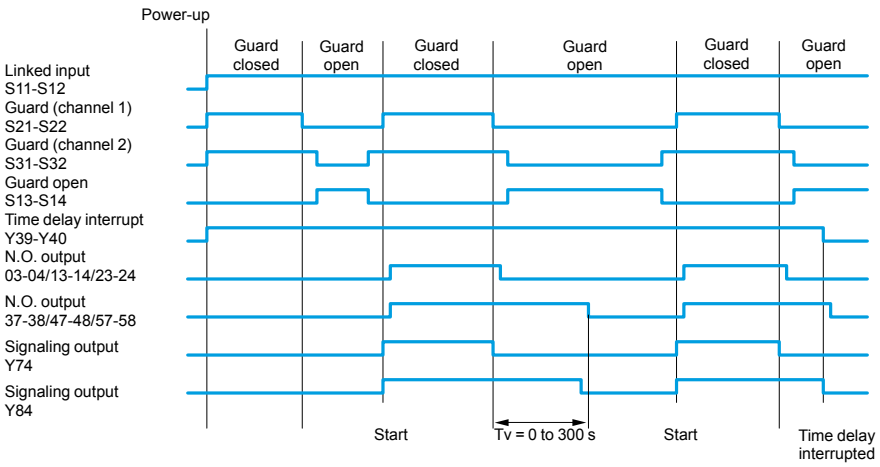
XPSAV

Monitoring of a movable guard associated with 2 switches
Automatic start (diagram shown for guard closed)

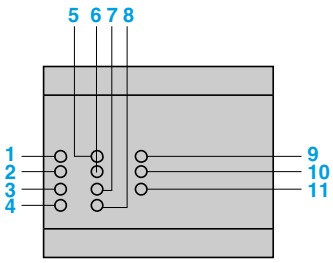


(1) Instantaneous opening safety outputs (stop category 0).
(2) Time delay opening safety outputs (stop category 1).
ESC = External start conditions.

Functional diagram



LED details

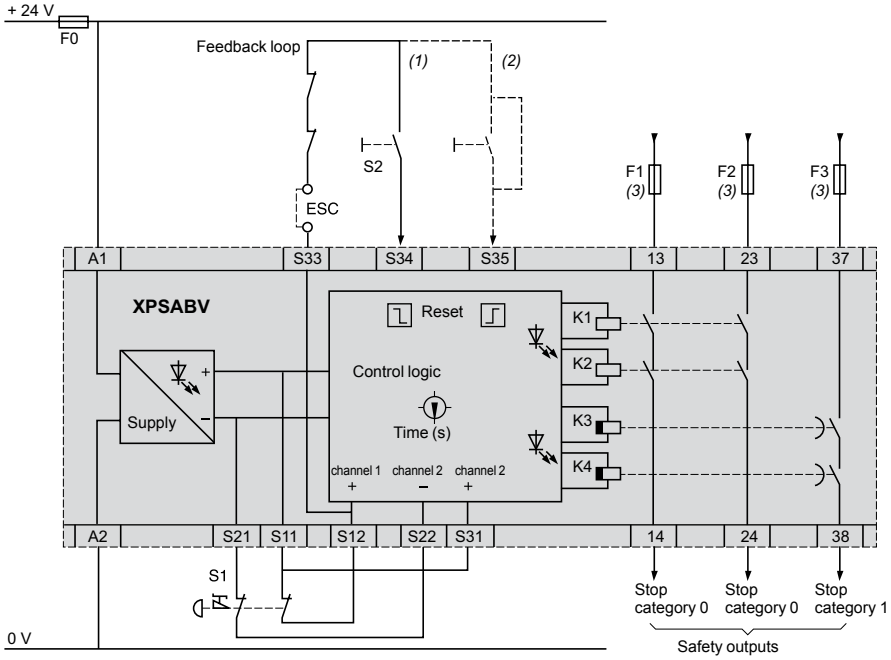


1 S12 input status.
2 S22 input status.
3 S32 input status.
4 S34 input status.
5 S14 input status.
6 Y40 input status (time delay stop).
7 K1/K2 status (N.O. instantaneous opening safety outputs).
8 K3/K4 status (time delay opening safety outputs).
9 Supply voltage A1-A2.
10 Fault.
11 Configuration mode.

3

XPSABV

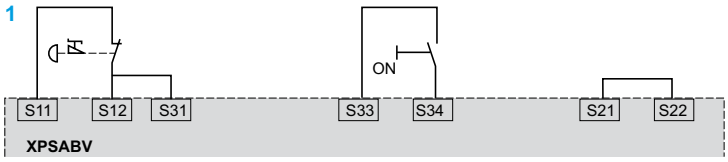
Module XPSAV associated with an Emergency stop button with 2 N.C. contacts, monitored start



S1: Emergency stop
S2: Start button
ESC = External start conditions.
(1) With start button monitoring.
(2) Without start button monitoring or automatic start.
(3) Maximum fuse rating: see page 3/18.

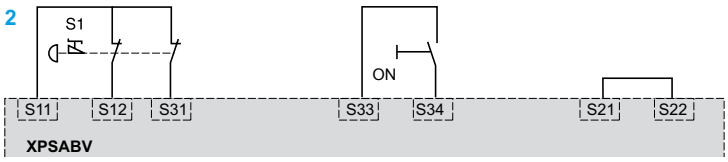
Emergency stop or switch monitoring function configurations

1



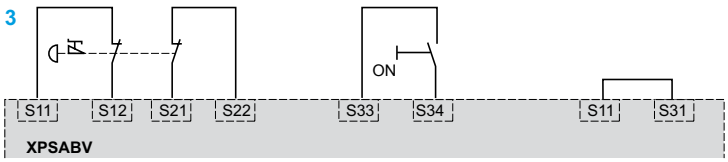
1-channel Emergency stop, manual start	Start with S34 button monitoring	Jumper

2



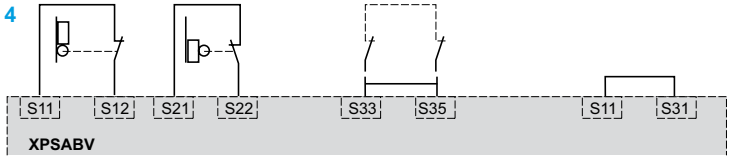
Short-circuit monitoring 2-channel Emergency stop, manual start	Start with S34 button monitoring	Jumper

3



Short-circuit monitoring 2-channel Emergency stop, manual start	Start with S34 button monitoring	Jumper

4

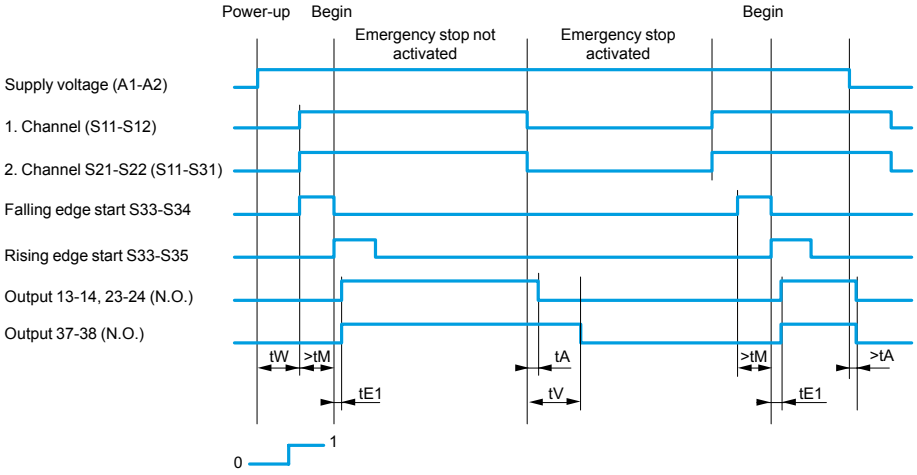


Machine guard with short-circuit monitoring, automatic start	Jumper or feedback loop for external contactors (automatic start S35)	Jumper

XPSABV

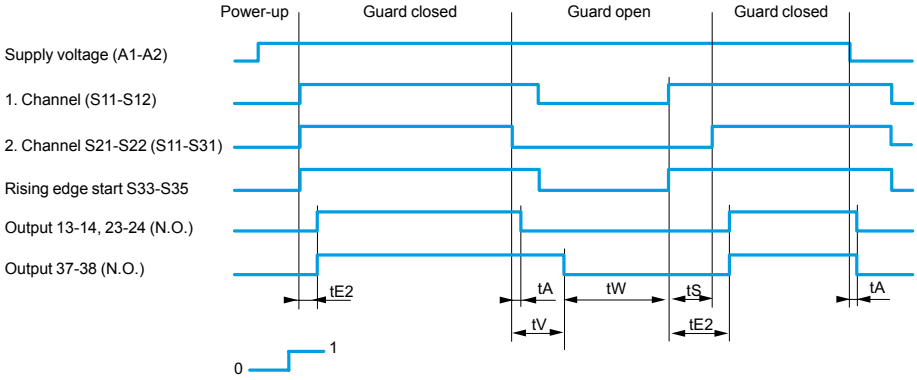
Functional diagrams

Emergency stop monitoring: configurations 1, 2 and 3



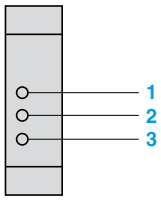
tW: Recovery time
tE: On-delay
tm: Min. ON time
tA: Response time
tV: Off-delay (adjustable)
tS: Synchronization time

Switch monitoring: configuration 4



tW: Recovery time
tE: On-delay
tm: Min. ON time
tA: Response time
tV: Off-delay (adjustable)
tS: Synchronization time

LED details

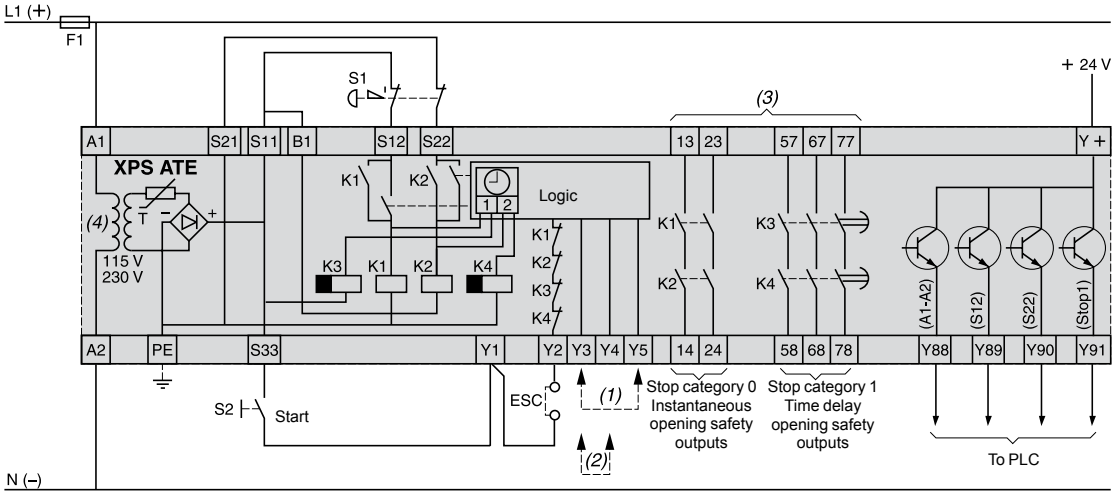


1 Supply voltage A1-A2
2 K1/K2 status
3 K3/K4 status

3

XPSATE

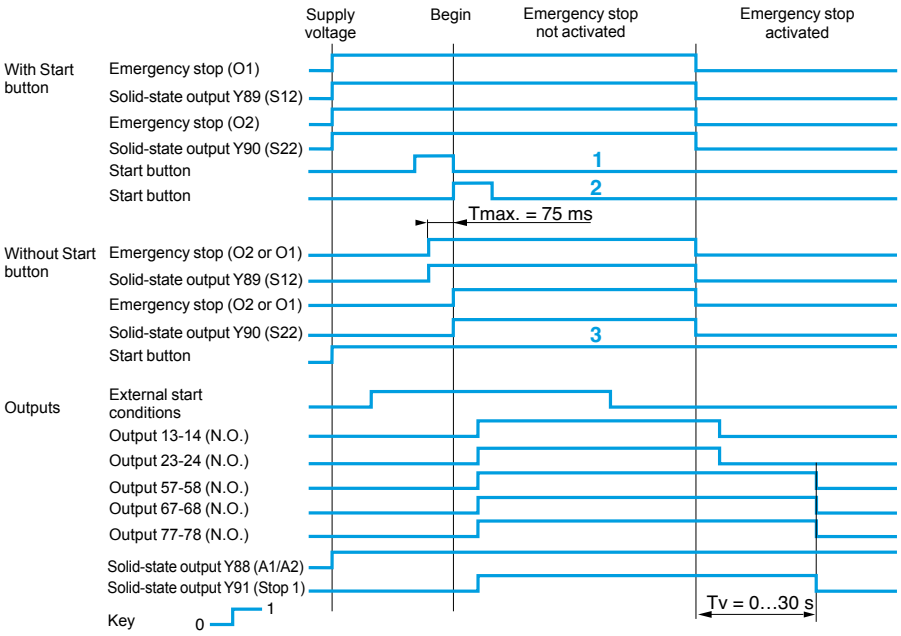
Module XPSATE associated with an Emergency stop button*



S1: Emergency stop button with 2 N.C. contacts (recommended application).
S2: Start button.
ESC: External start conditions.
Y1 (S33) - Y2: Feedback loop.
F1: 4 A max.
(1) With start button monitoring.
(2) Without start button monitoring.
(3) The outputs must be fuse protected. Technical specifications for maximum rating of fuses, see page 3/18.
(4) ∼ 115/230 V only.

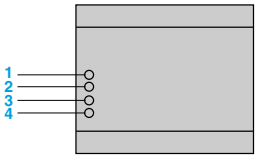
**For automatic start, jumper S2 (N.O. start button between terminals S33-Y1). This is only feasible when configured without start button monitoring (Y3 and Y4 jumpered). If S2 is jumpered and the module is configured for start button monitoring (Y3 and Y5 jumpered), the N.O. safety contacts will not close.*

Functional diagram of module XPSATE with Emergency stop button monitoring



1 With start button monitoring (Y3-Y5 connection).
2 Without start button monitoring (Y3-Y4 connection).
3 Without start button (connection Y3-Y4 and S33-Y1). Tv: adjustable time.

LED details

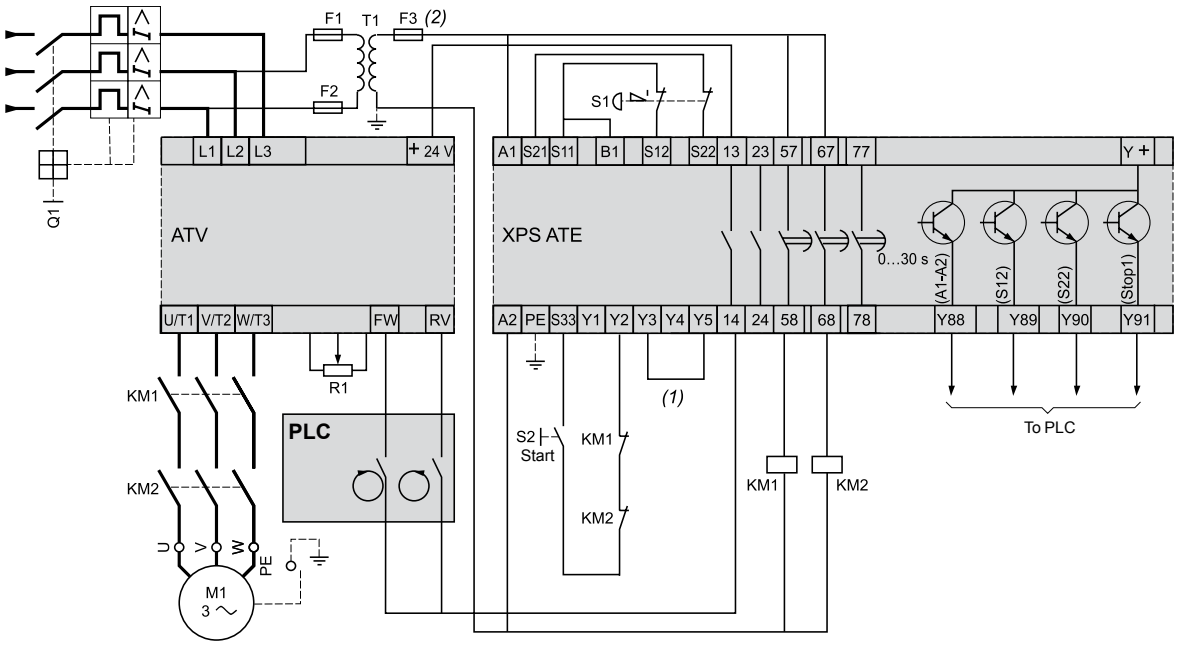


1 1Supply voltage A1-A2, internal electronic fuse status.
2 S12 (A) input status.
3 S22 (B) input status.
4 Stop category 1 outputs closed.

Principle: page 3/18 | Specifications: page 3/18 | References: page 3/20 | Wiring diagrams: page 3/21 | Dimensions: page 3/112

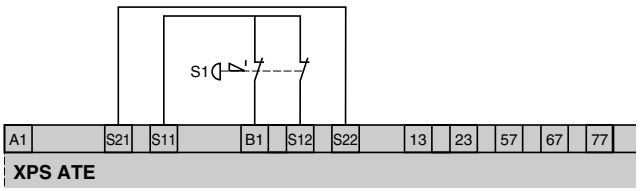
XPSATE

Example of a circuit combining an Emergency stop module with a variable speed drive



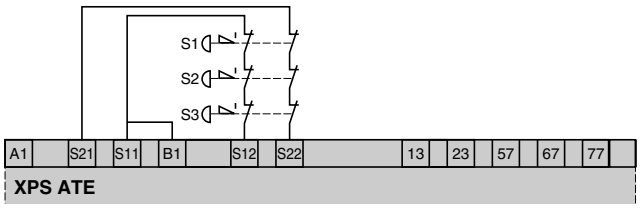
S1: Emergency stop button with 2 N.C. contacts (recommended application).
S2: Start button
(1) With start button monitoring.
(2) Technical specifications for establishing maximum rating of fuses, see page 3/18.

Connection with 1 Emergency stop button



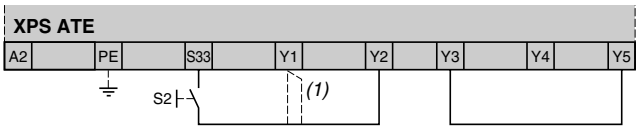
Both input channels are supplied at the same potential.
S1: Emergency stop button with 2 N.C. contacts
A short-circuit between the 2 inputs is not detected.

Connection with multiple Emergency stop buttons



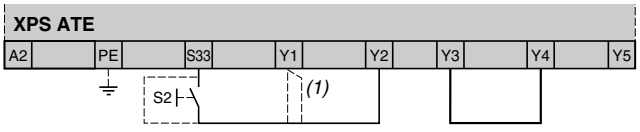
The 2 input channels are supplied at different potentials.
A short-circuit between the 2 inputs is detected.

Configuration with start button monitoring
(functional diagram for Start button 1, see page 3/21)



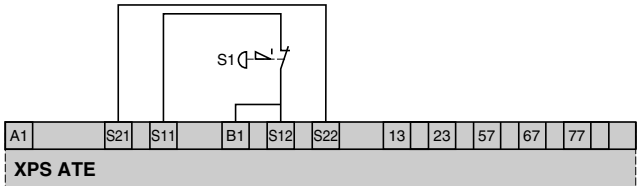
(1) Auxiliary terminal (to be used to separate the feedback loop from the wiring to the start button).

Configuration without start button monitoring
(functional diagram for Start button 2, see page 3/21)



(1) Auxiliary terminal (to be used to separate the feedback loop from the wiring to the start button).

Monitoring an Emergency stop button with 1 N.C. contact



S1: Emergency stop button with 1 N.C. contact.
Not all faults are detected: a short-circuit on the Emergency stop pushbutton is not detected.

Safety relays

Preventa™ safety relay modules type XPSATR

For Emergency stop and switch monitoring

Specifications

Module type				XPSATR●●●●P	XPSATR●●●●C
Maximum achievable safety level				PL e/Category 4 (instantaneous safety outputs and time delay safety outputs) conforming to EN/ISO 13849-1, SILCL 3 (instantaneous safety outputs and time delay safety outputs) conforming to EN/IEC 62061	
Reliability data (1) (instantaneous safety outputs and time delay safety outputs)	Mean Time To dangerous Failure ($MTTF_d$)		**Years**	85	
	Diagnostic coverage (DC)		**%**	> 99	
	Probability of dangerous Failure per Hour (PFH_d)		**1/h**	2×10^{-9}	
Conformity to standards				EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/ISO 13850, EN 1088/ISO 14119	
Product certifications				UL, CSA, BG	
Supply	Voltage		**V**	24 V ⎓, 115–230 V ∿	
	Voltage limits			- 15 to + 10% (24 V ⎓) - 15 to + 10% (115–230 V ∿)	
	Frequency		**Hz**	50/60	
Power consumption			**W/VA**	24 V ⎓: 2.8 W 115–230 V ∿: 3.2 W/6.3 VA	
Module inputs fuse protection				Internal, electronic	
Adjustable time delay			**s**	0.1 to 3 or 0.1 to 30	
Outputs	Voltage reference			Relay hard contacts	
	No. and type of instantaneous opening safety circuits			3 N.O. (13-14, 23-24, 33-34)	
	No. and type of time delay opening safety circuits			3 N.O. (57-58, 67-68, 77-78)	
	Number and type of additional circuits			1 N.C. (41-42)	
	Breaking capacity in AC-15	Instantaneous outputs	**VA**	C300: inrush 1800, maintained 180	
		Time delay outputs	**VA**	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13	Instantaneous outputs		24 V/1.5 A L/R = 50 ms	
		Time delay outputs		24 V/1.5 A L/R = 50 ms	
	Max. total thermal current		**A**	8	
	Output fuse protection		**A**	6 gG, conforming to IEC/EN 60947-5-1, DIN VDE 0660 part 200	
	Minimum current		**mA**	5	
	Minimum voltage		**V**	17	
Electrical life				See page 3/12	
Response time on instantaneous opening inputs			**ms**	< 200	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp)			**kV**	4 (overvoltage category III, conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				5	
Operating temperature			**°F (°C)**	- 13 to +131 (- 25 to + 55)	
Storage temperature			**°F (°C)**	- 13 to +167 (- 25 to + 75)	
Degree of protection conforming to IEC/EN 60529		Terminals		IP20	
		Enclosure		IP40	
Wiring diagrams		Type of terminals		Captive screw clamp terminals	Spring terminals
		Type of terminal block		Removable from module	
	1-wire connection	Without cable end		Solid or flexible cable: 24-12 AWG (0.2 to 2.5 mm^2)	
		With cable end		Solid or flexible cable: 24-12 AWG (0.2 to 2.5 mm^2)	
				With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm^2)	With bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm^2)
	2-wire connection	Without cable end		Solid cable: 24-18 AWG (0.2 to 1.0 mm^2) Flexible cable: 24-16 AWG (0.2 to 1.5 mm^2)	–
		With cable end		Without bezel, flexible cable: 22-18 AWG (0.25 to 1.0 mm^2)	–
				With bezel, flexible cable: 20-16 AWG (0.5 to 1.5 mm^2)	With bezel, flexible cable: 20-18 AWG (0.5 to 1.0 mm^2)

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Safety relays

Preventa™ safety relay modules type XPSATR

For Emergency stop and switch monitoring

Operating principle

Safety relay modules XPSATR meet the requirements of Performance Level PL e/ Category 4 conforming to standard EN ISO 13849-1.

Safety relay modules XPSATR are electronic, redundant and self-monitoring devices with positively driven relays.

They are used for monitoring Emergency stop circuits (single or two-channel) and protective guarding applications.
The modules conform to standards EN/ISO 13850 and EN 60204-1.

They provide protection for both the machine operator and the machine by immediately stopping the hazardous movement on receipt of a stop instruction from the operator or guarding switches, or on detection of an anomaly in the safety circuit itself. XPSATR incorporates 3 N.O. and 1 N.C. instantaneous contacts and 3 time-delayed N.O. contacts.

To aid diagnostics, the modules have 5 LEDs on the front face which provide information on the monitoring circuit status.

References

XPSATR●●●●P

XPSATR●●●●C

Description	Connection	Number of safety circuits	Additional outputs	Time setting range	Supply	Reference	Weight oz (kg)
Safety relay modules for emergency stop and safety guards monitoring	Captive screw clamp terminals Terminal block removable from module	3 N.O. + 3 N.O. time delay	1 N.C.	0.1…3 s	⎓ 24 V	**XPSATR1153P**	11.640 (0.330)
				0.1…3 s	∼ 115…230 V	**XPSATR3953P**	12.346 (0.350)
				0…30 s	⎓ 24 V	**XPSATR11530P**	11.640 (0.330)
				0…30 s	∼ 115…230 V	**XPSATR39530P**	12.346 (0.350)
	Cage clamp terminals Terminal block removable from module	3 N.O. + 3 N.O. time delay	1 N.C.	0.1…3 s	⎓ 24 V	**XPSATR1153C**	11.640 (0.330)
				0.1…3 s	∼ 115…230 V	**XPSATR3953C**	12.346 (0.350)
				0…30 s	⎓ 24 V	**XPSATR11530C**	11.640 (0.330)
				0…30 s	∼ 115…230 V	**XPSATR39530C**	12.346 (0.350)

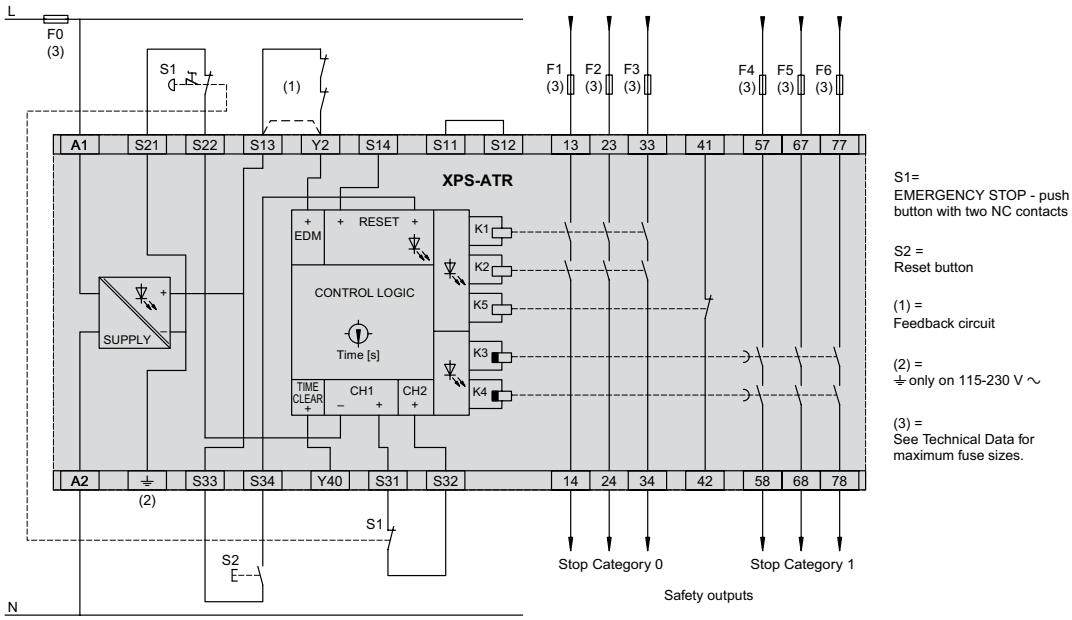
Safety relays

Preventa™ safety relay modules type XPSATR

For Emergency stop and switch monitoring

XPSATR

Module XPSATR associated with an Emergency stop button with 2 N.C. contacts, monitored start



S1=
EMERGENCY STOP - push button with two NC contacts

S2 =
Reset button

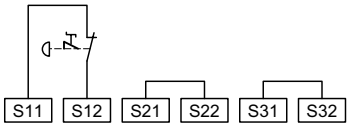
(1) =
Feedback circuit

(2) =
⏚ only on 115-230 V ∼

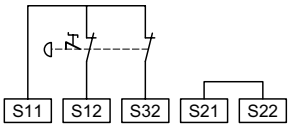
(3) =
See Technical Data for maximum fuse sizes.

Emergency stop monitoring function configuration

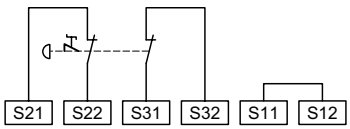
1-channel wiring
Emergency stop button with single N.C. contact



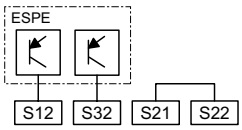
2-channel wiring
Emergency stop button with 2 N.C. contacts, without short circuit protection



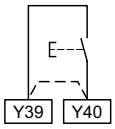
2-channel wiring
Emergency stop button with 2 N.C. contacts, with short circuit protection



ESPE (light curtain) without short circuit protection

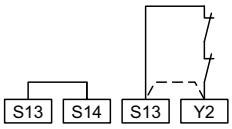


Time clear, end delay time

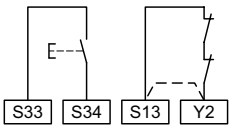


Start configurations

Automatic start with feedback loop



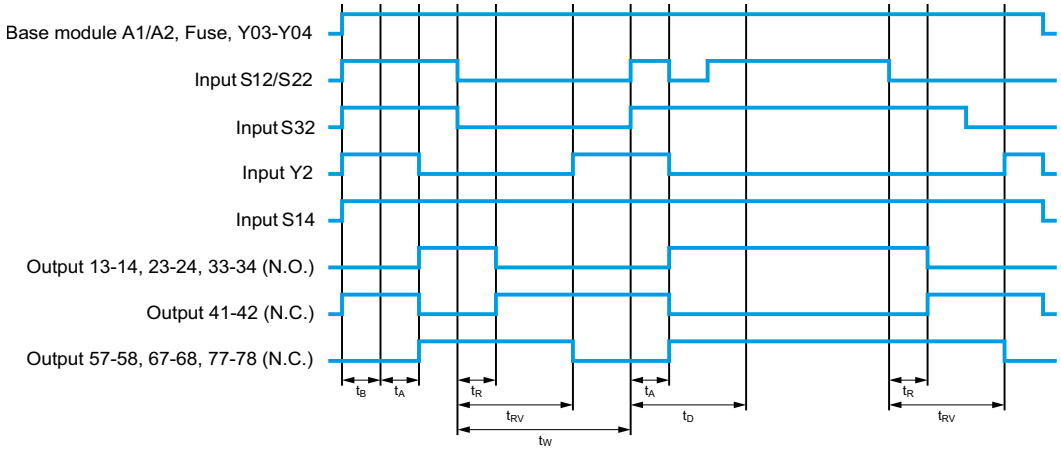
With start button monitoring and feedback loop



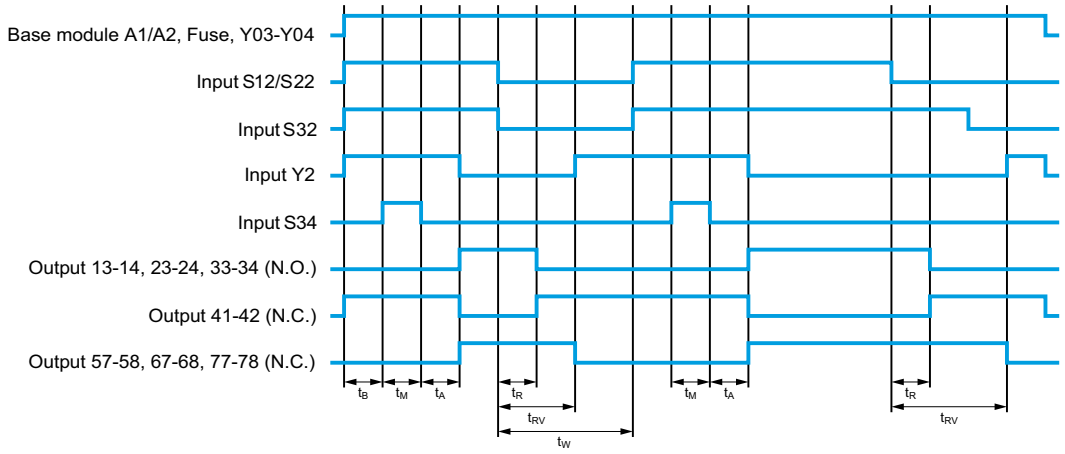
XPSATR

Functional diagrams

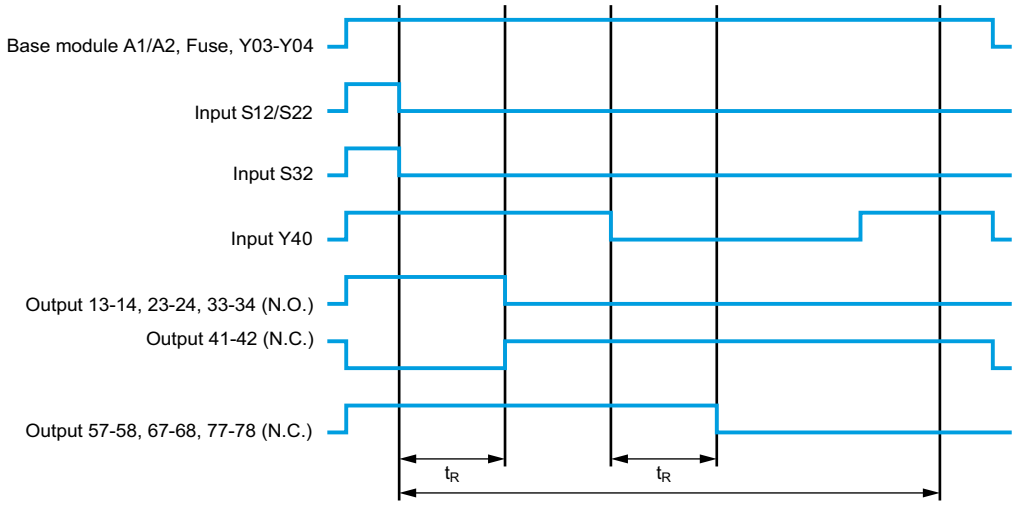
Switch monitoring with automatic start



Switch monitoring with monitored start



Switch monitoring withend time delay function



t_B Ready time
t_A Response time
t_M Minimum actuation time
t_R Release time
t_{RV} Release delay time
t_W Recovery time
t_D Discrepancy time

Legend:
On Off

Safety relays

Preventa™ safety relay modules type XPSAF

For Emergency stop and switch monitoring

Operating principle

Safety relay modules XPSAF are used for:

- Monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1.
- Electrical monitoring of switches activated by protection devices conforming to standard EN 1088/ISO 14119.

Housed in a compact enclosure, the modules have 3 safety outputs.
Preventa™ safety relay modules XPSAF●●●●P incorporate removable terminal blocks, thus optimizing machine maintenance.
To aid diagnostics, the modules have 3 LEDs on the front cover which provide information on the monitoring circuit status.
The Start button monitoring function is configurable depending on the wiring.

Specifications

Module type				XPSAF5130	XPSAF5130P
Maximum achievable safety level				PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061	
Reliability data (1)	Mean Time To dangerous Failure (MTTFd)		**Years**	243	
	Diagnostic Coverage (DC)		**%**	> 99	
	Probability of dangerous Failure per Hour (PFHd)		**1/h**	4.62×10^{-9}	
Conformity to standards				EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/ISO 13850, EN 50082-2	
Product certifications				UL, CSA, BG	
Supply	Voltage		**V**	∿ and ⎓ 24	
	Voltage limits			- 15…+ 10%	
	Frequency		**Hz**	50/60	
Power consumption			**VA**	≤ 5	
Module inputs fuse protection				Internal, electronic	
Start button monitoring				Yes/No (configurable by terminal connections)	
Control unit voltage and current				⎓ 24 V/30 mA approx. (at nominal supply voltage)	
Maximum wiring resistance RL			Ω	90	
Synchronization time between inputs A and B				Unlimited	
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			3 N.O. (13-14, 23-24, 33-34)	
	Breaking capacity in AC-15		**VA**	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms	
	Max. thermal current (Ithe)		**A**	6	
	Max. total thermal current		**A**	18	
	Output fuse protection		**A**	4 gG or 6 fast acting, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	
	Minimum current		**mA**	10	
	Minimum voltage		**V**	17	
Electrical life				See page 3/12	
Response time on input opening			**ms**	≤ 40	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)			**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				3	
Operating temperature			**°F (°C)**	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			**°F (°C)**	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection conforming to IEC/EN 60529		Terminals		IP 20	
		Enclosure		IP 40	
Connections		Type		Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14…2.5 mm^2)	Solid or flexible cable: 24-14 AWG (0.2…2.5 mm^2)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm^2)	With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm^2)	Solid cable: 24-18 AWG (0.2…1 mm^2), flexible cable: 24-16 AWG (0.2…1.5 mm^2)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm^2)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm^2)	Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm^2)

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Principle: page 3/32 | Specifications: page 3/32 | References: page 3/33 | Wiring diagrams: page 3/33 | Dimensions: page 3/112

Safety relays

Preventa™ safety relay modules type XPSAF

For Emergency stop and switch monitoring

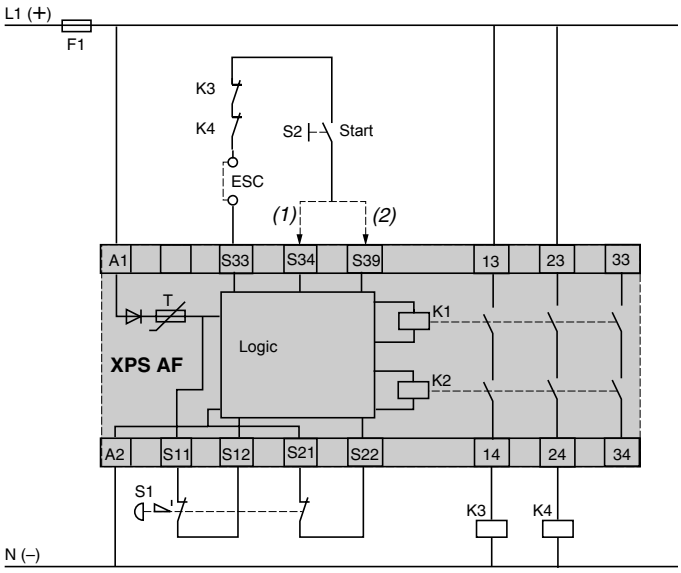
References

	Description	Type of terminal block connection	Number of safety circuits	Supply	Reference	Weight oz (kg)
 *XPSAF5130*	**Safety modules for Emergency stop and limit switch monitoring**	Integrated in module	3	∿ and ⎓ 24 V	**XPSAF5130**	8.818 (0.250)
 *XPSAF5130P*		Removable from module	3	∿ and ⎓ 24 V	**XPSAF5130P**	8.818 (0.250)

Wiring diagrams

XPSAF

Module XPSAF associated with an Emergency stop button with 2 N.C. contacts



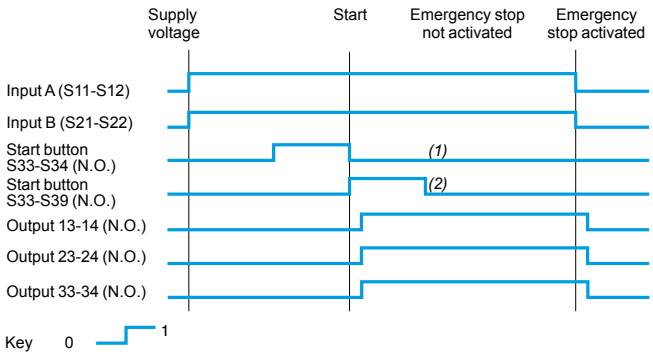
(1) With start button monitoring.
(2) Without start button monitoring.
ESC = External start conditions.

3

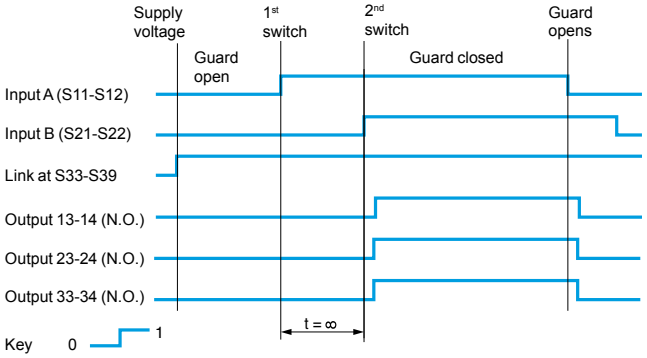
XPSAF

Functional diagrams

Emergency stop function

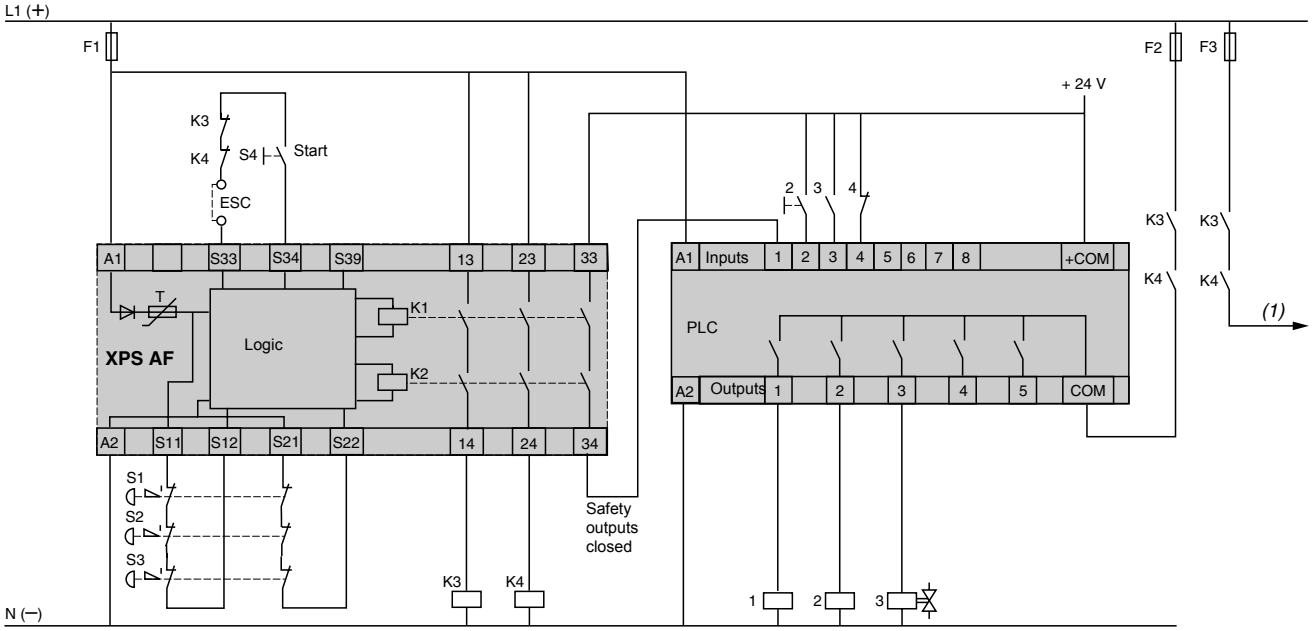


Guard function with automatic start



(1) With start button monitoring.
(2) Without start button monitoring.

Module XPSAF with connection of multiple Emergency stop buttons, combined with a PLC



(1) Other circuits controlled by the XPSAF module.
ESC = External start conditions.

Safety relays

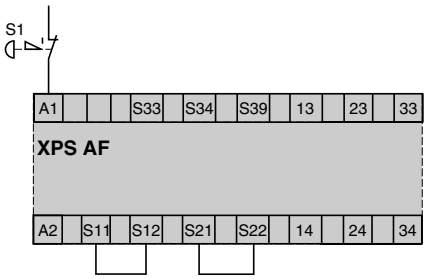
Preventa™ safety relay modules type XPSAF

For Emergency stop and switch monitoring

XPSAF

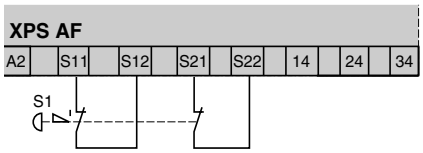
Emergency stop monitoring function configuration

1-channel wiring

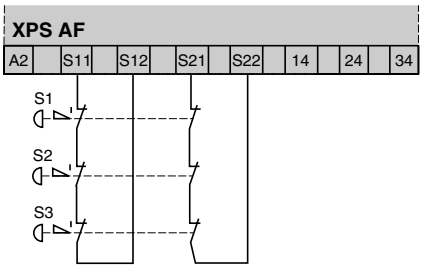


Emergency stop button with a single N.C. contact.
Not all anomalies are detected: a short-circuit on the Emergency stop push button is not detected.

2-channel wiring

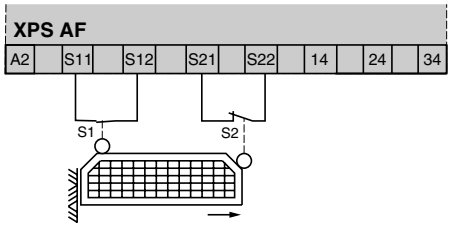


Emergency stop button with 2 N.C. contacts (recommended application).
The 2 input channels are supplied at different potentials. A short-circuit between the 2 inputs is detected.

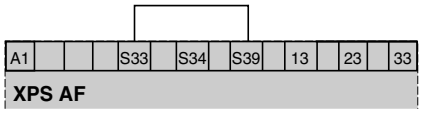


Connection of multiple Emergency stop buttons with 2 N.C. contacts (recommended application).
The 2 input channels are supplied at different potentials. A short-circuit between the 2 inputs is detected.

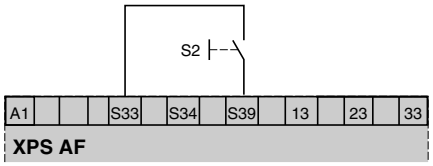
Monitoring of a movable guard associated with 2 switches with 1 contact each in combined mode (switch 1 with N.O. contact, switch 2 with N.C. contact)



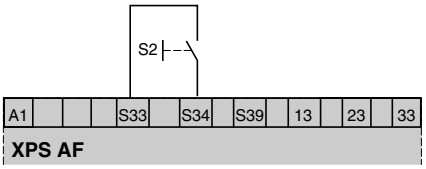
Configuration with automatic or manual start



Automatic start.

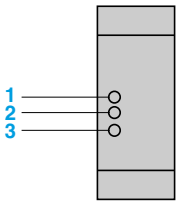


Without start button monitoring, manual reset.



Function: push-release.
With start button monitoring, manual reset.

LED details



1 Supply voltage A1-A2 internal electronic, fuse status.
2 Relay K1 energized.
3 Relay K2 energized.

Safety relays

Preventa™ safety relay modules type XPSAFL

For Emergency stop, switch and light curtain monitoring

Operating principle

Safety relay modules XPSAFL are used for:

- Monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1.
- Electrical monitoring of switches activated by protection devices conforming to standard EN 1088/ISO 14119, devices such as safety interlocks or safety limit switches.

They can also be used for monitoring type 4 light curtains conforming to EN/IEC 61496-1 which have solid-state safety outputs with test function (for example, light curtains type XUSL, see Section 5).

Housed in a compact enclosure, the modules have 3 safety outputs.
Preventa™ safety relay modules XPSAFL●●●●P incorporate removable terminal blocks, thus optimizing machine maintenance.
To aid diagnostics, the modules have 3 LEDs on the front cover which provide information on the monitoring circuit status.
The Start button monitoring function is configurable depending on the wiring.

Specifications

Module type				**XPSAFL5130**	**XPSAFL5130P**
Maximum achievable safety level				PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061	
Reliability data (1)	Mean Time To dangerous Failure (MTTFd)		**Years**	172.1	
	Diagnostic Coverage (DC)		**%**	> 99	
	Probability of dangerous Failure per Hour (PFHd)		**1/h**	5.61 x 10^{-9}	
Conformity to standards				EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/ISO 13850, EN 50082-2, EN/IEC 61496-1 (type 4)	
Product certifications				UL, CSA, BG	
Supply	Voltage		**V**	∿ and ⎓ 24	
	Voltage limits			- 15…+ 10%	
	Frequency		**Hz**	50/60	
Power consumption			**VA**	≤ 5	
Module inputs fuse protection				Internal, electronic	
Start button monitoring				No (configurable by terminal connections)	
Control unit voltage and current				⎓ 24 V/30 mA approx. (at nominal supply voltage)	
Maximum wiring resistance RL			Ω	90	
Synchronization time between inputs A and B				Unlimited	
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			3 N.O. (13-14, 23-24, 33-34)	
	Breaking capacity in AC-15		**VA**	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms	
	Max. thermal current (Ithe)		**A**	6	
	Max. total thermal current		**A**	18	
	Output fuse protection		**A**	4 gG or 6 fast acting, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	
	Minimum current		**mA**	10	
	Minimum voltage		**V**	17	
Electrical life				See page 3/12	
Response time on input opening			**ms**	≤ 20	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)			**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				3	
Operating temperature			**°F (°C)**	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			**°F (°C)**	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection conforming to IEC/EN 60529		Terminals		IP 20	
		Enclosure		IP 40	
Connection		Type		Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14…2.5 mm^2)	Solid or flexible cable: 24-14 AWG (0.2…2.5 mm^2)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm^2)	With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm^2)	Solid cable: 24-18 AWG (0.2…1 mm^2), flexible cable: 24-16 AWG (0.2…1.5 mm^2)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm^2)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm^2)	

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Principle: page 3/36 | Specifications: page 3/36 | References: page 3/37 | Wiring diagrams: page 3/38 | Dimensions: page 3/112

Safety relays

Preventa™ safety relay modules type XPSAFL

For Emergency stop, switch and light curtain monitoring

References

	Description	Type of terminal block connection	Number of safety circuits	Supply	Reference	Weight oz (kg)
 *XPSAFL5130*	**Safety modules for Emergency stop, switch and light curtain monitoring**	Integrated in module	3	∿ and ⎓ 24 V	**XPSAFL5130**	8.818 (0.250)
 *XPSAFL5130P*		Removable from module	3	∿ and ⎓ 24 V	**XPSAFL5130P**	8.818 (0.250)

3

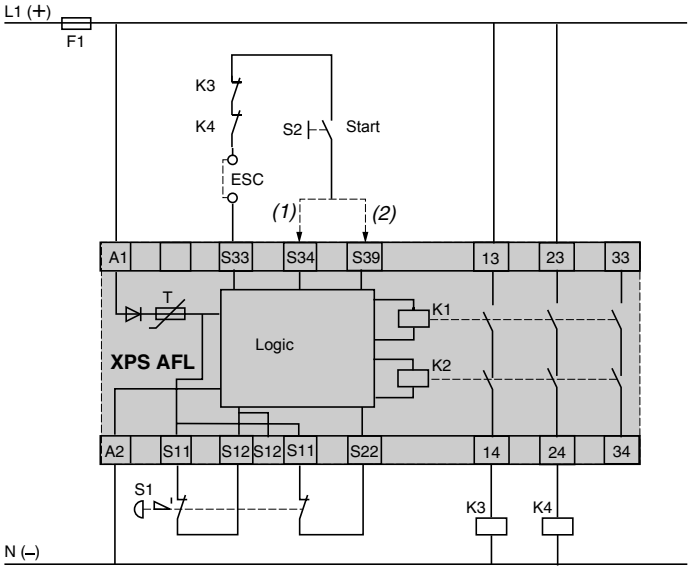
Safety relays

Preventa™ safety relay modules type XPSAFL

For Emergency stop, switch and light curtain monitoring

XPSAFL

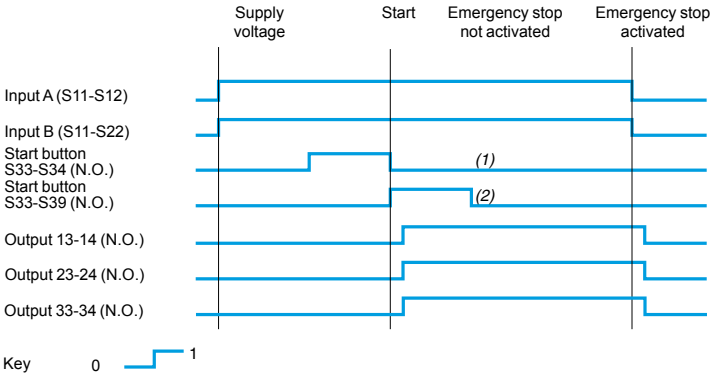
Module XPSAFL associated with an Emergency stop button with 2 N.C. contacts



(1) With start button monitoring.
(2) Without start button monitoring.
ESC: External start conditions.

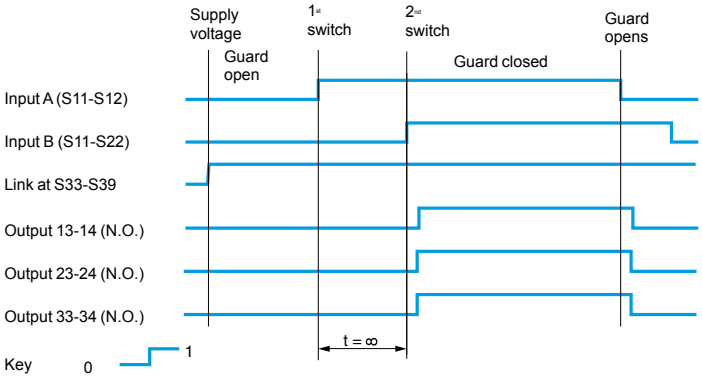
Functional diagrams

Emergency stop function



(1) With start button monitoring.
(2) Without start button monitoring.

Guard function with automatic start



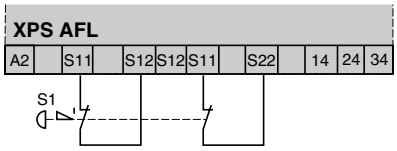
XPSAFL

Emergency stop monitoring function configuration

1-channel wiring
Emergency stop button with a single N.C. contact

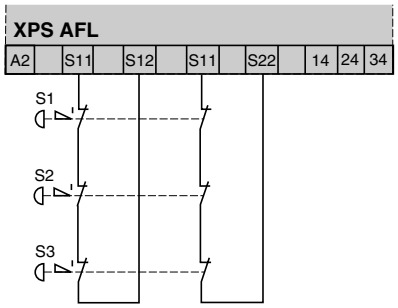
A short-circuit on the Emergency stop push button is not detected.

2-channel wiring
Emergency stop button with 2 N.C. contacts



A short-circuit between the 2 inputs is not detected.

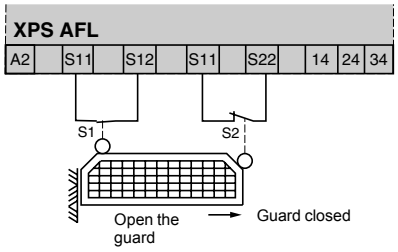
2-channel wiring
Connection of multiple Emergency stop buttons



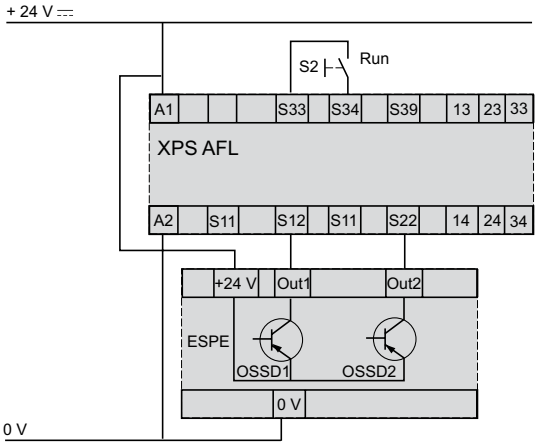
A short-circuit between the 2 inputs is not detected.

Monitoring of a movable guard associated with 2 switches with 1 contact each in combined mode (switch 1 with N.O. contact, switch 2 with N.C. contact)

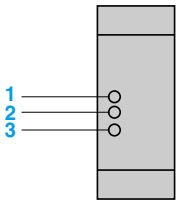
Without short-circuit detection



Monitoring of electro-sensitive protection equipment (ESPE)



LED details



1 Supply voltage A1-A2, fuse status.
2 Relay K1 energized.
3 Relay K2 energized.

Safety relays

Preventa™ safety relay modules type XPSAR

For Emergency stop, switch or light curtain monitoring

Operating principle

Safety relay modules XPSAR are designed for the following safety applications:
- Monitoring Emergency stop circuits conforming to EN/ISO 13850 and EN/IEC 60204-1.
- Electrical monitoring of switches activated by protection devices conforming to standard EN 1088/ISO 14119.
- Monitoring type 4 light curtains conforming to EN/IEC 61496-1 which have solid-state safety outputs with test function, for example, light curtains type XUSL.

In addition to 7 safety outputs, modules XPSAR incorporate 2 relay signalling outputs and 4 solid-state signalling outputs for signalling to the process PLC.

Safety modules XPSAR●●●●●●P incorporate removable terminal blocks, thus optimizing machine maintenance. To aid diagnostics, the modules have 4 LEDs on the front cover which provide information on the monitoring circuit status. The Start button monitoring function is configurable depending on the wiring.

Specifications

Module type				**XPSAR3●1144**	**XPSAR3●1144P**
Maximum achievable safety level				PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061	
Reliability data (1)	Mean Time To dangerous Failure (MTTFd)		**Years**	277.8	
	Diagnostic Coverage (DC)		**%**	> 99	
	Probability of dangerous Failure per Hour (PFHd)		**1/h**	2.22 x 10^{-9}	
Conformity to standards				EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	
Product certifications				UL, CSA, BG	
Supply	Voltage		**V**	∿ and ⎓ 24, ∿ 115, ∿ 230	
	Voltage limits	⎓ 24 V	**%**	- 15…+ 10	
		∿ 24 V	**%**	- 15…+ 10	
		∿ 115 V	**%**	- 15…+ 15	
		∿ 230 V	**%**	- 15…+ 10	
	Frequency		**Hz**	50/60	
Power consumption				⎓ 24 V version: < 4 W, ∿24 V version: < 7 VA, 115/230 V version: < 9 VA	
Module inputs fuse protection				Internal, electronic	
Start button monitoring				Yes/No (configurable by terminal connections)	
Control unit voltage and current (between terminals S11-S52 and S21-S22). 24 V, 115 V and 230 V version			**V**	⎓ 24 (20 mA approx.) (at nominal supply voltage)	
Maximum wiring resistance RL (between terminals S11-S52 and S21-S22)			Ω	50	
Synchronization time between inputs A and B Automatic start, terminals S33, S34 linked			**ms**	100	
Safety outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			7 N.O. (13-14/23-24/33-34/43-44/53-54/63-64/73-74)	
	Number and type of additional outputs			4 solid-state (Y31-Y32, Y31-Y64, Y31-Y74, Y31-Y35)	
	Number and type of auxiliary contacts			2 N.C. (81-82/91-92)	
	Breaking capacity in AC-15		**VA**	B300 (inrush: 3600, maintained: 360)	
	Breaking capacity in DC-13			24 V/2 A, L/R = 50 ms	
	Breaking capacity of solid-state outputs			24 V/20mA	
	Max. thermal current (Ithe)		**A**	10	
	Max. total thermal current		**A**	40	
	Output fuse protection		**A**	6 gG or 10 fast acting, conforming to EN/IEC 947-5-1, DIN VDE0660 part 200	
	Minimum current		**mA**	170	
	Minimum voltage		**V**	17	
Electrical life				See page 3/12	
Response time on input opening			**ms**	< 20	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)			**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				4	
Operating temperature			**°F (°C)**	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			**°F (°C)**	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection conforming to IEC 529				Terminals: IP 20, enclosure: IP 40	
Connection	Type			Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14…2.5 mm^2)	Solid or flexible cable: 24-14 AWG (0.2…2.5 mm^2)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm^2)	With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm^2)	Solid cable: 24-18 AWG (0.2…1 mm^2), flexible cable: 24-16 AWG (0.2…1.5 mm^2)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm^2)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm^2)	

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Principle: page 3/40 | Specifications: page 3/40 | References: page 3/41 | Wiring diagrams: page 3/42 | Dimensions: page 3/112

Safety relays

Preventa™ safety relay modules type XPSAR

For Emergency stop, switch or light curtain monitoring

XPSAR3●1144

References

Description	Type of terminal block connection	Number of safety circuits	Additional outputs/ solid-state outputs to PLC	Supply	Reference	Weight
				V		oz (kg)
Safety modules for Emergency stop, switch or light curtain monitoring	Integrated in module	7	2 / 4	∼ 24 ⎓ 24	**XPSAR311144**	10.582 (0.300)
				∼ 115 ⎓ 24	**XPSAR351144**	14.110 (0.400)
				∼ 230 ⎓ 24	**XPSAR371144**	14.110 (0.400)
	Removable from module	7	2 / 4	∼ 24 ⎓ 24	**XPSAR311144P**	10.582 (0.300)
				∼ 115 ⎓ 24	**XPSAR351144P**	14.110 (0.400)
				∼ 230 ⎓ 24	**XPSAR371144P**	14.110 (0.400)

Safety relays

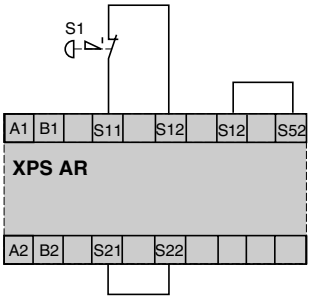
Preventa™ safety relay modules type XPSAR

For Emergency stop, switch or light curtain monitoring

XPSAR

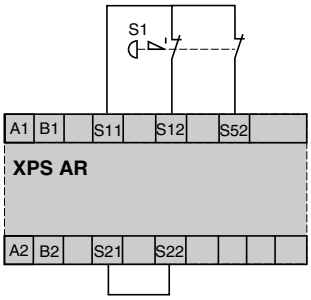
Emergency stop monitoring function configuration

1-channel wiring
Emergency stop button with a single N.C. contact

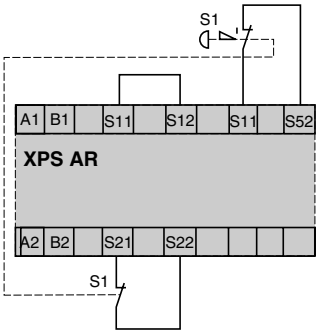


Not all faults are detected:
a short-circuit on the Emergency stop push button is not detected

2-channel wiring
Emergency stop button with 2 N.C. contacts, without short-circuit detection

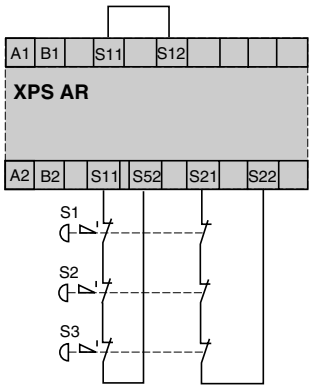


Emergency stop button with 2 N.C. contacts, with short-circuit detection (recommended application)



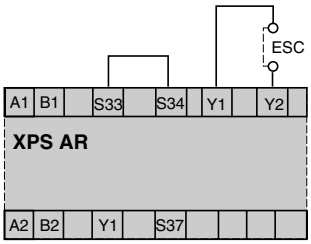
The 2 input channels are supplied at different potentials.
A short-circuit between the 2 inputs is detected

Connection of multiple Emergency stop buttons with 2 N.C. contacts (recommended application)

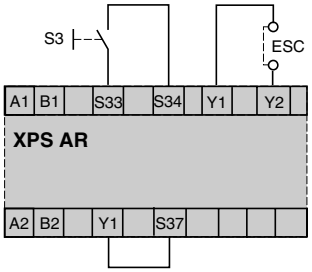


Start configurations

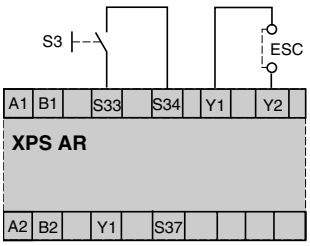
Automatic start



With start button monitoring



Without start button monitoring

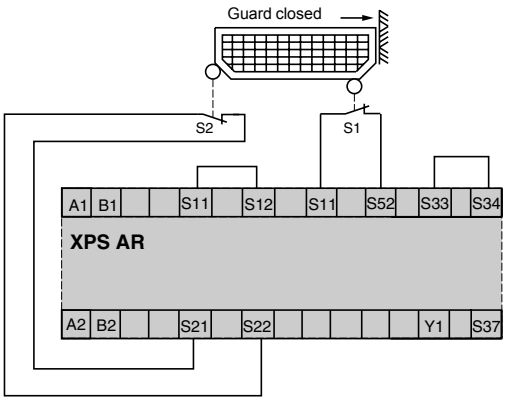


Principle: page 3/40 | Specifications: page 3/40 | References: page 3/41 | Wiring diagrams: page 3/42 | Dimensions: page 3/112

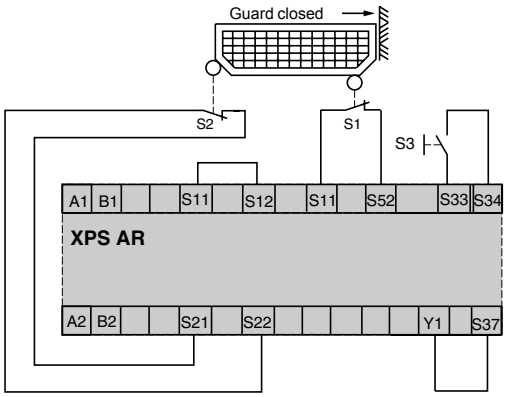
XPSAR

Monitoring of a movable guard associated with 2 switches with 1 contact each in combined mode (switch 1 with N.O. contact, switch 2 with N.C. contact)

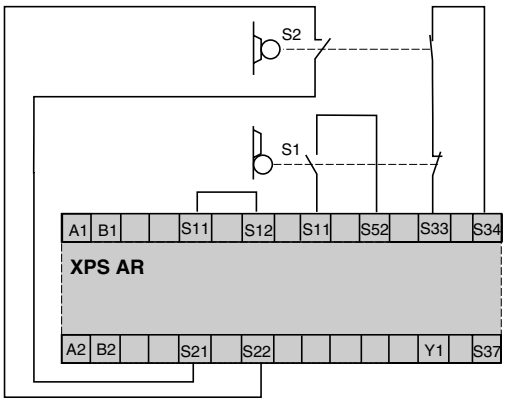
Automatic start, without synchronization time monitoring



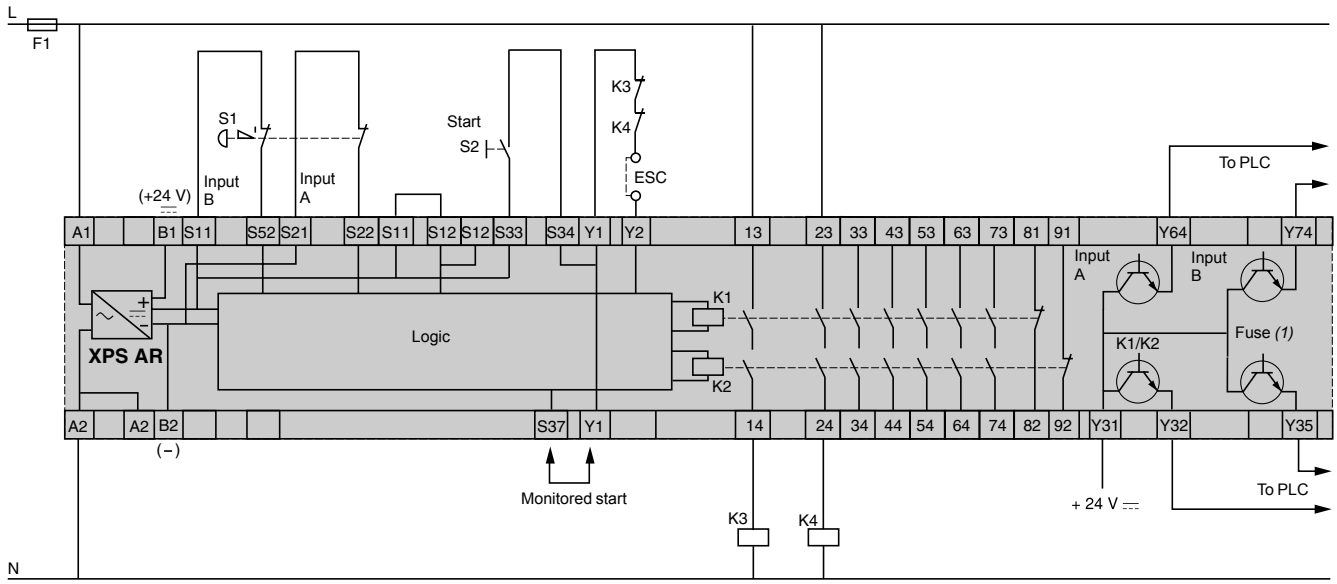
Manual start by start button



Monitoring of a movable guard associated with 2 switches in combined mode and automatic start
(shown with guard open)



Module XPSAR associated with an Emergency stop button with 2 N.C. contacts



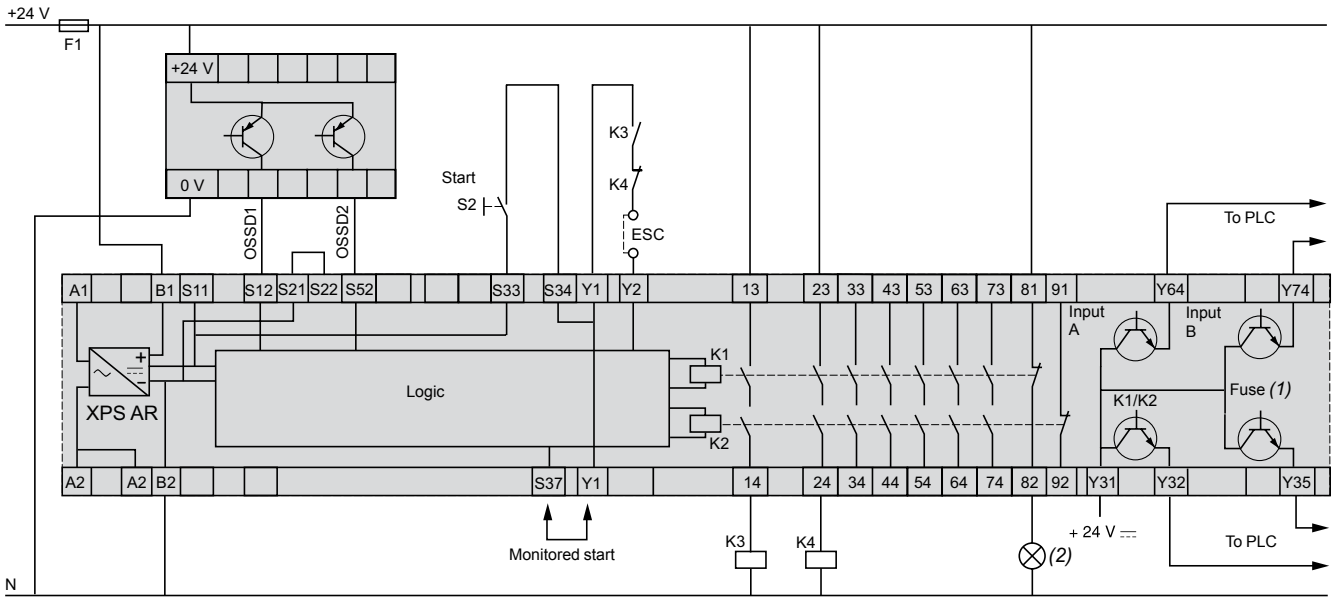
Supply connection according to voltage:
~ across terminals A1/A2, or ⎓ 24 V across terminals B1/B2

ESC: External start conditions
(1) Operating status of internal electronic fuse

3

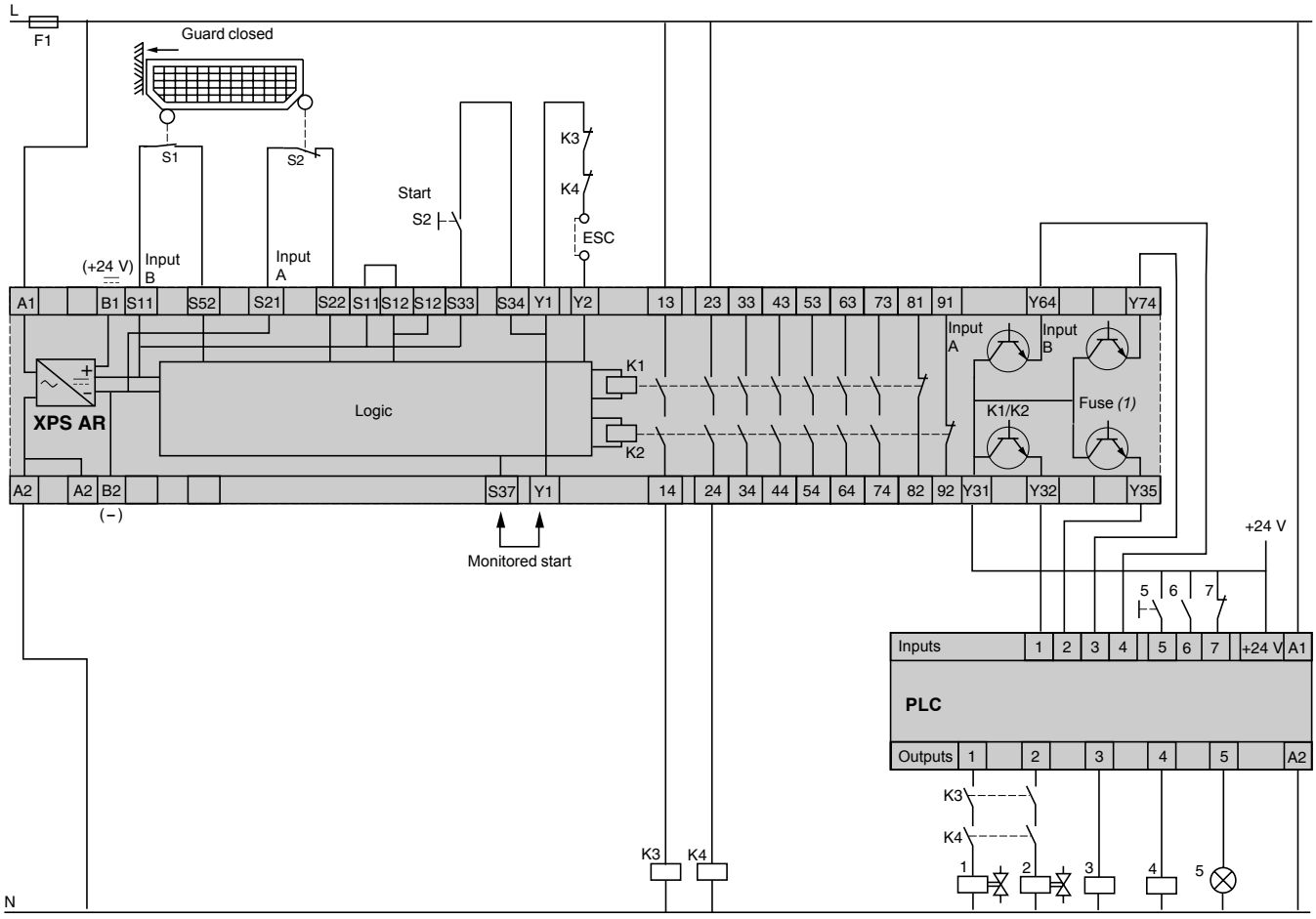
XPSAR

Module XPSAR for monitoring electro-sensitive protection equipment (ESPE)



ESC: External start conditions
(1) Operating status of internal electronic fuse
(2) ESPE indicator light deactivated

Example of safety circuit combining module XPSAR for switch monitoring and a PLC

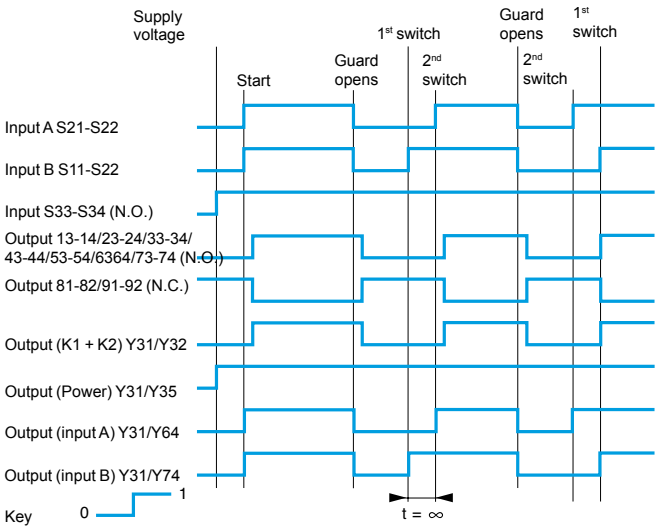


ESC: External start conditions
(1) Operating status of internal electronic fuse

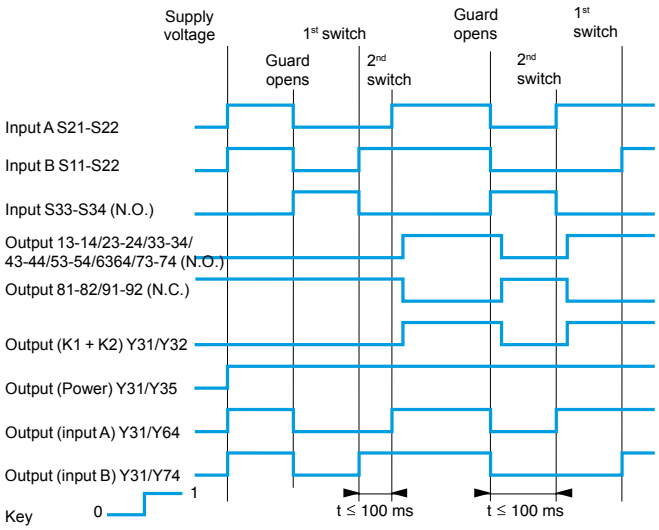
Principle: page 3/40 | Specifications: page 3/40 | References: page 3/41 | Wiring diagrams: page 3/42 | Dimensions: page 3/112

Functional diagrams of module XPSAR

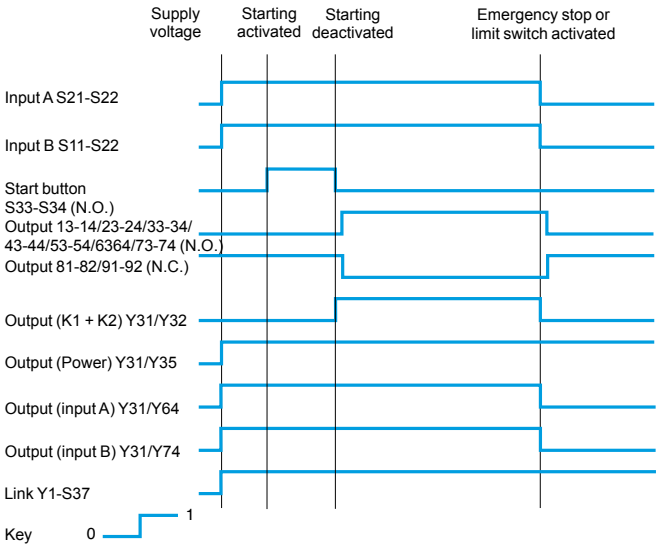
Limit switch monitoring function with automatic start



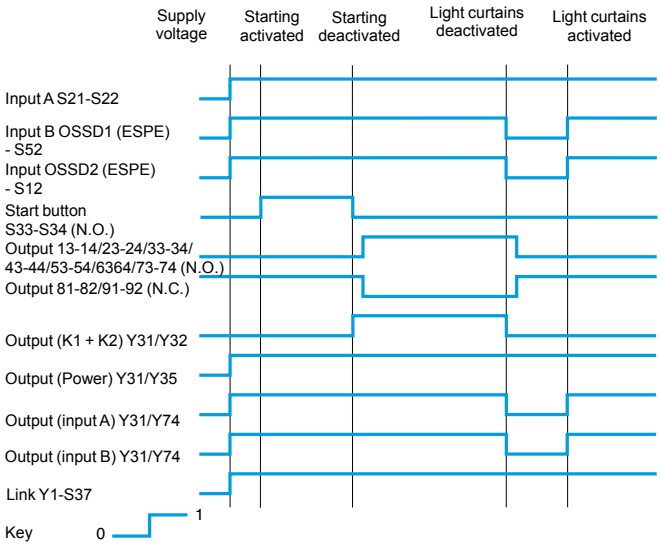
Limit switch monitoring function with automatic start and synchronization time monitoring



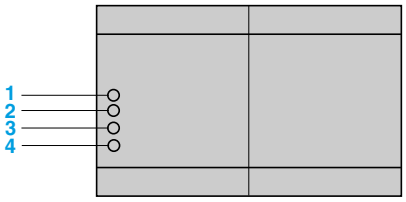
Emergency stop monitoring or limit switch monitoring function with monitored start



Light curtain monitoring (ESPE) function, curtains with solid-state outputs, and monitored start



LED details



1 Supply voltage A1-A2, internal electronic fuse status
2 Input S22 (A)
3 Input S52 (B)
4 K1/K2 status (N.O. safety outputs closed)

Safety relays

Preventa™ safety relay modules type XPSAK

For Emergency stop, switch, sensing mat/edges or light curtain monitoring

Operating principle

Safety relay modules XPSAK are are used for:
- Monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1.
- Electrical monitoring of switches activated by protection devices, with optional selection of synchronization time between signals.
- Monitoring 4-wire sensing mats or edges.
- Monitoring type 4 light curtains conforming to EN/IEC 61496-1 which have solid-state safety outputs with test function, for example, light curtains type XUSL.

Housed in a compact enclosure, the modules have 3 safety outputs, a relay signalling output and 4 solid-state signalling outputs for signalling to the process PLC.
Preventa™ safety relay modules XPSAK●●●●P incorporate removable terminal blocks, thus optimizing machine maintenance.
To aid diagnostics, the modules have 4 LEDs on the front cover which provide information on the monitoring circuit status.
The Start button monitoring function is configurable depending on the wiring.

Specifications

Module type				**XPSAK3●1144**	**XPSAK3●1144P**
Maximum achievable safety level				PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061	
Reliability data (1)	Mean Time To dangerous Failure (MTTFd)		**Years**	154.5	
	Diagnostic Coverage (DC)		**%**	> 99	
	Probability of dangerous Failure per Hour (PFHd)		**1/h**	7.39 x 10^{-9}	
Conformity to standards				EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/ISO 13850, EN/IEC 60947-1 + A11	
Product certifications				UL, CSA, BG	
Supply	Voltage		**V**	∿ and ⎓ 24, ∿ 48, ∿ 110 and ⎓ 24, ∿ 120 and ⎓ 24, ∿ 230 and ⎓ 24	
	Voltage limits			- 15…+ 10%	
	Frequency		**Hz**	50/60	
Power consumption	24 V version		**VA**	≤ 5	
	110/120/230 V versions			≤ 6	
Module inputs fuse protection				Internal, electronic	
Start button monitoring				Yes/No (configurable by terminal connections)	
Control unit voltage and current between terminals S21-S22, S31-S32				⎓ 24 V/30 mA approx. (at nominal supply voltage)	
Maximum wiring resistance RL between terminals S21-S22, S31-S32			Ω	28	
Synchronization time between inputs A and B (terminals S21-S22, S31-S32)			**s**	Automatic start: 2 or 4 depending on wiring Manual start (start button between S33 and S34): unlimited	
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			3 N.O. (13-14, 23-24, 33-34)	
	Number and type of additional circuits			1 N.C. (41-42) + 4 solid-state	
	Breaking capacity in AC-15		**VA**	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms	
	Breaking capacity of solid-state outputs			24 V/20 mA, 48 V/10 mA	
	Max. thermal current (Ithe)		**A**	6	
	Max. total thermal current		**A**	18	
	Output fuse protection		**A**	4 gG or 6 fast acting, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	
	Minimum current		**mA**	10	
	Minimum voltage		**V**	17	
Electrical life				See page 3/12	
Response time on input opening			**ms**	≤ 40	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp)			**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				4	
Operating temperature			**°F (°C)**	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			**°F (°C)**	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection	Conforming to IEC 60529	Terminals		IP 20	
		Enclosure		IP 40	
Connections		Type		Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14…2.5 mm^2)	Solid or flexible cable: 24-14 AWG (0.2…2.5 mm^2)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm^2)	With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm^2)	Solid cable: 24-18 AWG (0.2…1 mm^2), flexible cable: 24-16 AWG (0.2…1.5 mm^2)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm^2)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm^2)	

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Safety relays

Preventa™ safety relay modules type XPSAK

For Emergency stop, switch, sensing mat/edges or light curtain monitoring

References

XPSAK3●1144

XPSAK3●1144P

Description	Type of terminal block connection	Number of safety circuits	Outputs: Additional / Solid-state for PLC	Supply	Reference	Weight oz (kg)
Safety modules for Emergency stop, switch, sensing mat/edges or light curtain monitoring	Integrated in module	3	1 / 4	∼ 24 V ⎓ 24 V	**XPSAK311144**	10.582 (0.300)
				∼ 120 V ⎓ 24 V	**XPSAK351144**	14.110 (0.400)
				∼ 230 V ⎓ 24 V	**XPSAK371144**	14.110 (0.400)
	Removable from module	3	1 / 4	∼ 24 V ⎓ 24 V	**XPSAK311144P**	10.582 (0.300)
				∼ 120 V ⎓ 24 V	**XPSAK351144P**	14.110 (0.400)
				∼ 230 V ⎓ 24 V	**XPSAK371144P**	14.110 (0.400)

3

Safety relays

Preventa™ safety relay modules type XPSAK

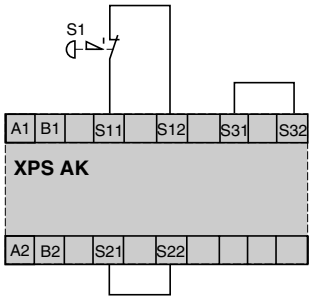
For Emergency stop, switch, sensing mat/edges or light curtain monitoring

XPSAK

Emergency stop monitoring function configuration

1-channel wiring

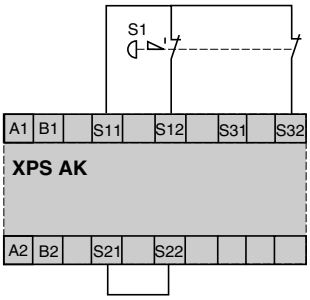
Emergency stop button with a single N.C. contact



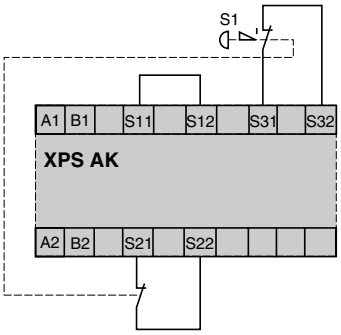
Not all anomalies are detected: a short-circuit on the Emergency stop push button is not detected.

2-channel wiring

Emergency stop button with 2 N.C. contacts, without short-circuit detection

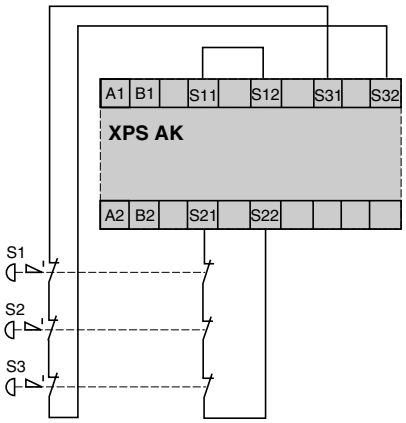


Emergency stop button with 2 N.C. contacts, with short-circuit detection (recommended application)



The 2 input channels are supplied at different potentials. A short-circuit between the 2 inputs is detected.

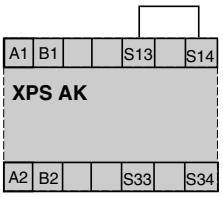
Connection of multiple Emergency stop buttons with 2 N.C. contacts (recommended application).



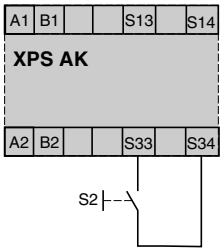
The 2 input channels are supplied at different potentials. A short-circuit between the 2 inputs is detected.

Start configurations

Automatic start

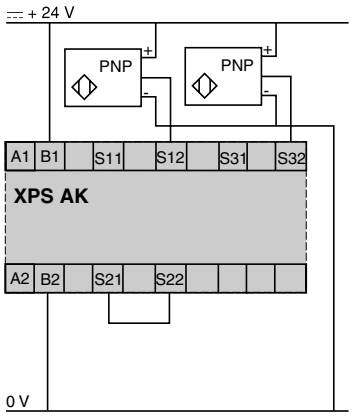


With start button monitoring

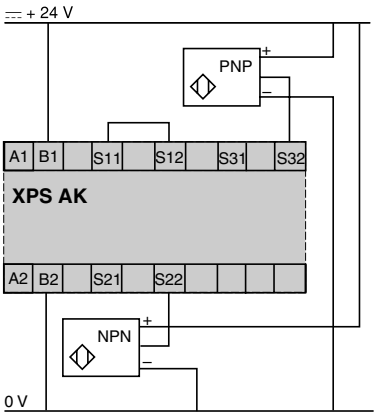


Proximity sensor monitoring

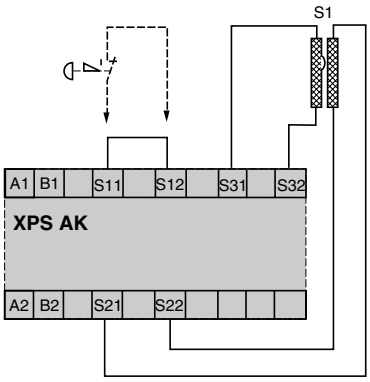
Proximity sensors with PNP outputs
Without short-circuit detection



Proximity sensors with NPN and PNP outputs
With short-circuit detection



Sensing mat or edges monitoring



Safety relays

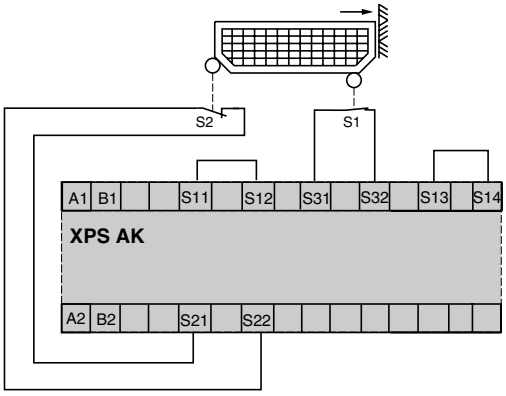
Preventa™ safety relay modules type XPSAK

For Emergency stop, switch, sensing mat/edges or light curtain monitoring

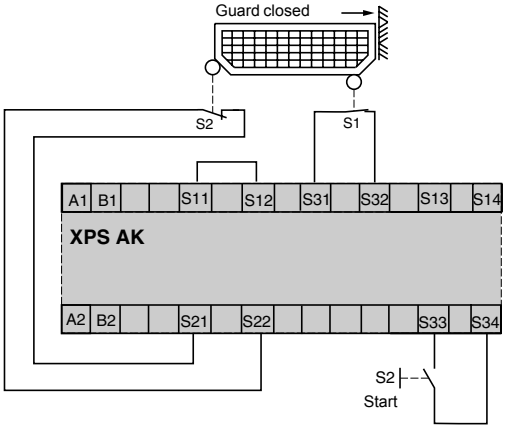
XPSAK

Monitoring of a movable guard associated with 2 switches with 1 contact each in combined mode (switch 1 with N.O. contact, switch 2 with N.C. contact)

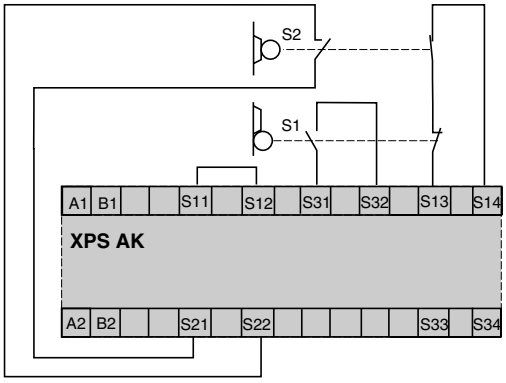
Automatic start, without synchronization time monitoring



Manual start by Start button

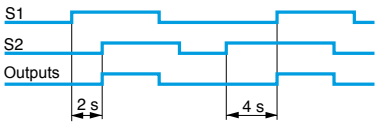


Monitoring of a movable guard associated with 2 switches and automatic start
(shown with guard open)

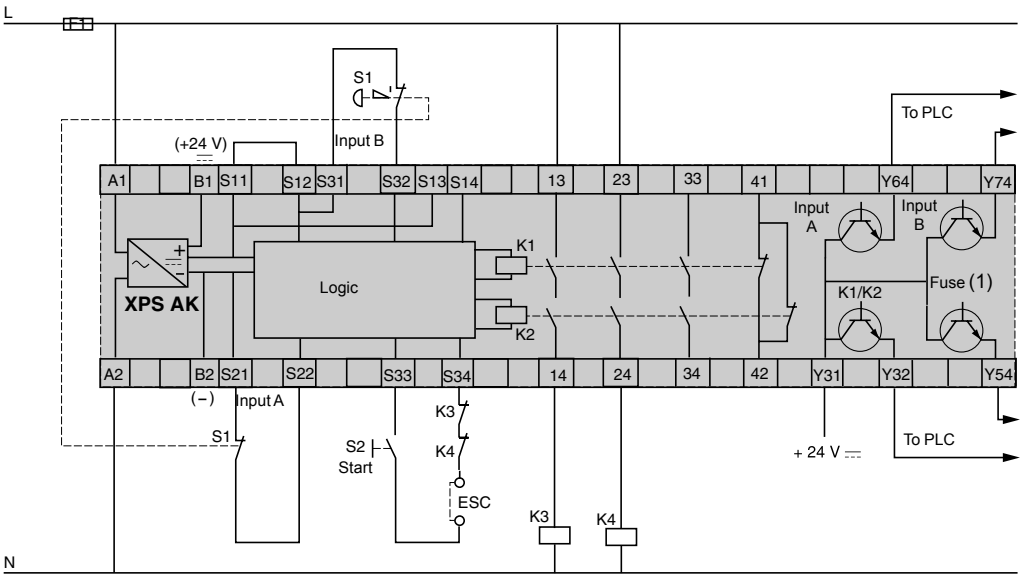


For synchronization monitoring of the inputs, S13 and S14 must be wired per the diagram to the left (if S13 and S14 are jumpered, the result would be automatic start without synchronization monitoring). The synchronization time is determined by the first limit switch that is activated.
If S1 is actuated before S2, then the synchronization time is two seconds on closing.
If S2 is actuated before S1, then the synchronization time is four seconds on closing.
There is no synchronization on opening the door or guard.

Functional diagram of outputs



Module XPSAK associated with an Emergency stop button with 2 N.C. contacts



Supply connection according to voltage: ∿ across terminals A1/A2, or ⎓ 24 V across terminals B1/B2.

(1) Operating status of internal electronic fuse.
ESC: External start conditions.

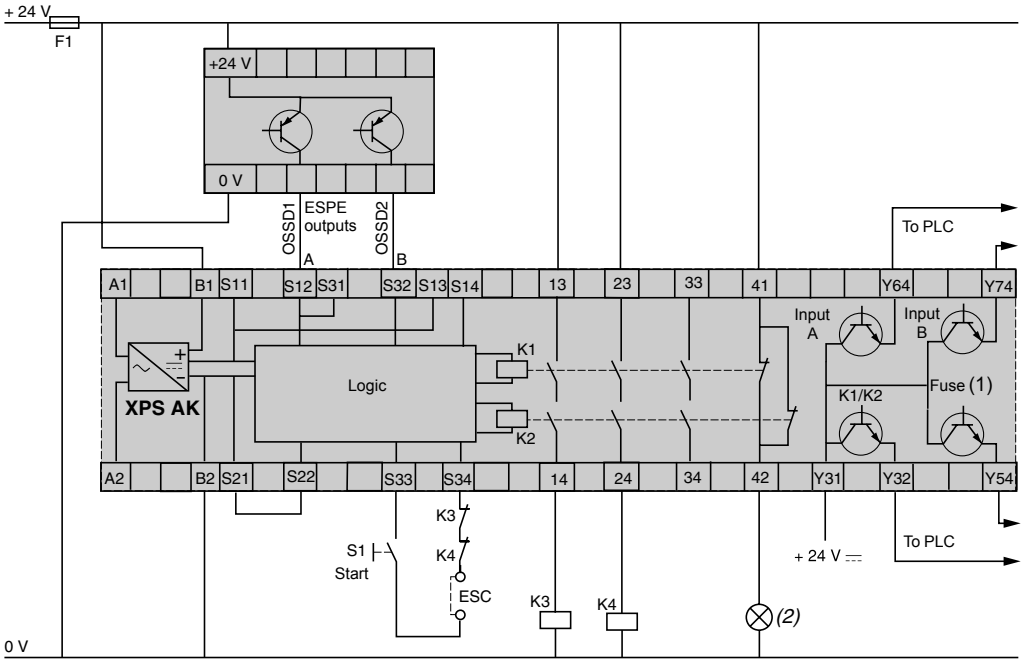
Safety relays

Preventa™ safety relay modules type XPSAK

For Emergency stop, switch, sensing mat/edges or light curtain monitoring

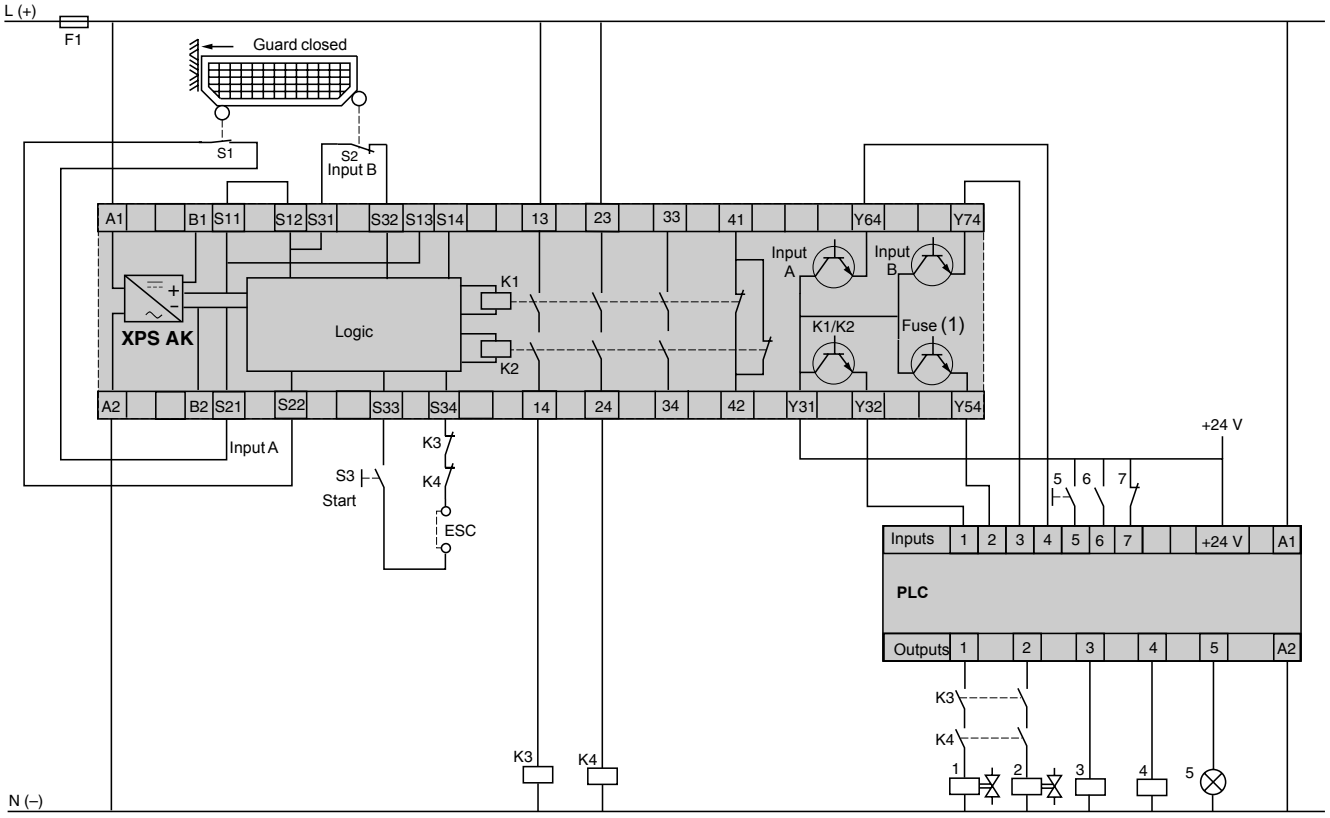
XPSAK

Module XPSAK for monitoring electro-sensitive protection equipment (ESPE)



(1) Operating status of internal electronic fuse.
(2) ESPE indicator light deactivated.
ESC: External start conditions.

Example of safety circuit combining module XPSAK for limit switch monitoring and a PLC



(1) Operating status of internal electronic fuse.
ESC: External start conditions.

Safety relays

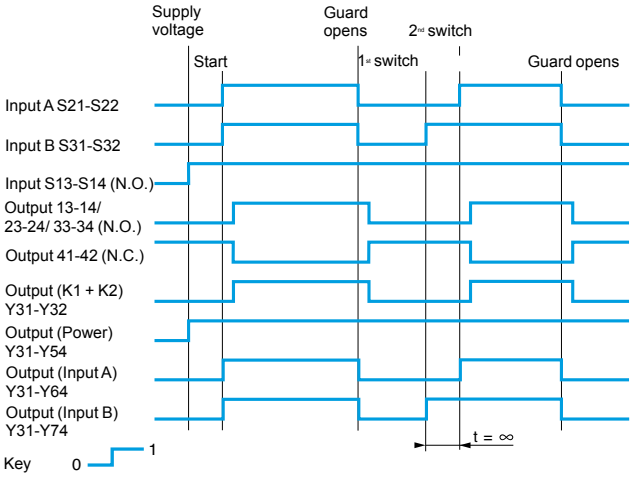
Preventa™ safety relay modules type XPSAK

For Emergency stop, switch, sensing mat/edges or light curtain monitoring

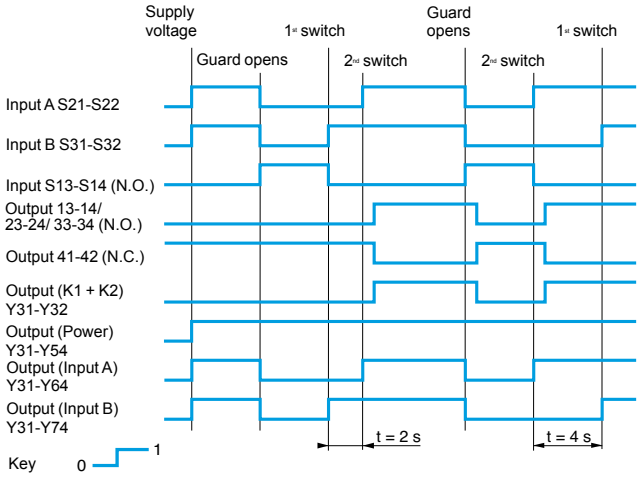
XPSAK

Functional diagrams

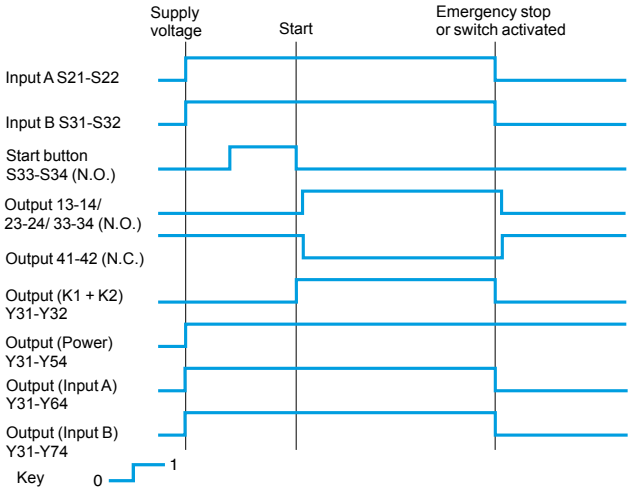
Switch monitoring function with automatic start



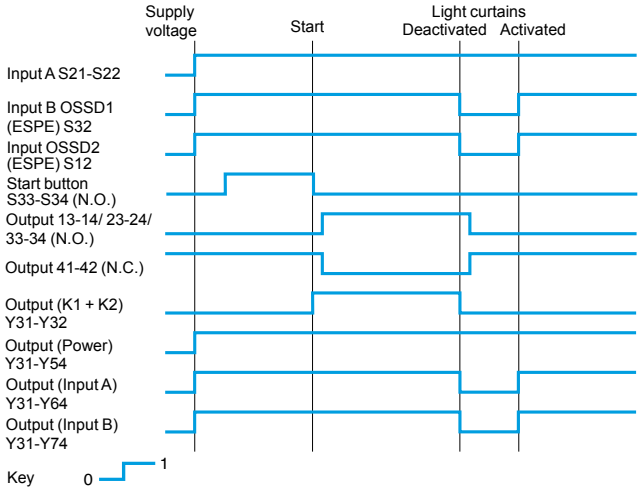
Switch monitoring function with automatic start and synchronization time monitoring



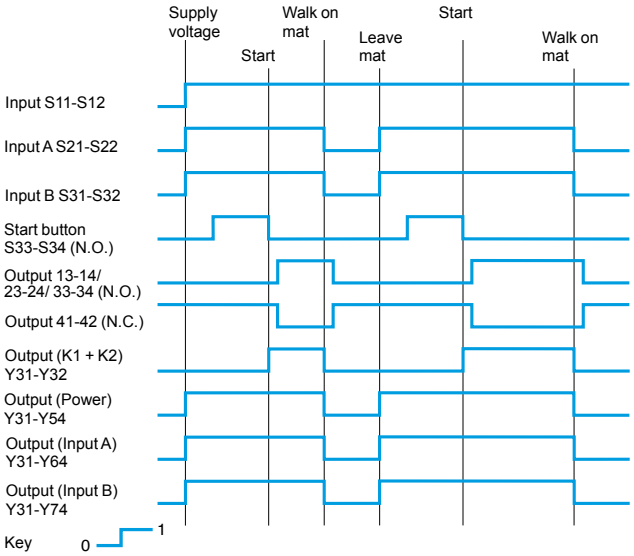
Emergency stop monitoring or switch monitoring function



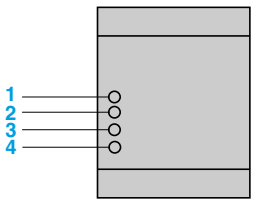
Light curtain monitoring (ESPE) function, curtains with solid-state outputs



Sensing mat or edge monitoring function, with monitored start



LED details



1 Supply voltage A1-A2, fuse status.
2 Input S22 (A).
3 Input S32 (B).
4 K1/K2 status (N.O. safety outputs closed).

Principle: page 3/46
Specifications: page 3/46
References: page 3/47
Wiring diagrams: page 3/48
Dimensions: page 3/112

Safety relays

Preventa™ safety relay modules types XPSBAE, XPSBCE, XPSBF

For electrical monitoring of two-hand control stations

Operating principle

Two-hand control stations are designed to provide protection against hand injury. They require machine operators to keep their hands clear of the hazardous movement zone.

The use of two-hand control is an individual protective measure, which can protect only one operator. Separate two-hand control stations must be provided for each operator in a multiple-worker environment.

Safety relay modules XPSBAE, XPSBCE and XPSBF for two-hand control stations comply with the requirements of European standard EN 574/ISO 13851 for two-hand control systems.

The control stations must be designed and installed such that they cannot be activated involuntarily or easily rendered inoperative. Depending on the application, the requirements of type C standards specific to the machinery involved must be met (additional personal protection methods may have to be considered).

To initiate a hazardous movement, both operators (two-hand control pushbuttons) must be activated within an interval ≤ 0.5 s (synchronous activation). If one of the two pushbuttons is released during a hazardous operation, the control sequence is cancelled. Resumption of the hazardous operation is possible only if both pushbuttons are returned to their initial position and reactivated within the required time interval.

The control sequence does not occur if:

- Both two-hand control push buttons are pressed during a time period greater than 0.5 seconds,
- A short-circuit is present in a push button contact,
- The feedback loop is not closed at start-up.

The safety distance between the control units and the hazardous zone must be sufficient that when only one operator is released, the hazardous zone cannot be reached before the hazardous movement has been completed or stopped.

XPSBAE

This module is designed for use on lighter duty applications where a two-hand control function is desired, but where the Performance Level required (PLr) is PLa, b, or c and the two-hand control requirements meet Type III A (per EN 574/ISO 13851). **This module is not to be used for applications, such as presses, which require a Type III C module or where the application is not PLa, b, or c.** For press applications, for applications in PLd or e, or if application calls for a Type III C module, use XPSBCE or XPSBF module.

XPSBCE and XPSBF

These modules can be used on applications, such as presses, which require a Type III C module. The XPSBCE and XPSBF can be used for a two-hand control application, including presses and similar equipment.

Safety relays

Preventa™ safety relay modules types XPSBAE, XPSBCE

For electrical monitoring of two-hand control stations

Specifications

Module type			XPSBAE●●●●P	XPSBAE●●●●C	XPSBCE●●●●P	XPSBCE●●●●C
Maximum achievable safety level			PL c/Category 1 conforming to EN/ ISO 13849-1, SILCL1 conforming to EN/ IEC 62061		PL e/Category 4 conforming to EN/ ISO 13849-1,SILCL 3 conforming to EN/ IEC 62061	
Reliability data (1)	Mean Time To dangerous Failure ($MTTF_d$)	**Years**	55		37	
	Diagnostic Coverage (DC)	**%**	–		> 99	
	Probability of dangerous Failure per Hour (PFH_d)	**1/h**	2.1×10^{-6}		3×10^{-8}	
Conformity to standards			EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN 574 type III A/ISO 13851		EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN 574 type III C/ISO 13851	
Product certifications			UL, CSA, TÜV		UL, CSA, BG	
Supply	Voltage	**V**	24 ⎓, 115/230 ∿		24 ⎓, 24 ∿, 115 ∿, 230 ∿	
	Voltage limits		- 15 to + 10% (24 V ⎓), - 15 to + 10% (115/230 V ∿)		- 15 to + 10% (24 V ⎓, 24 V ∿), - 15 to + 15% (115 V ∿), - 15 to + 10% (230 V ∿)	
	Frequency	**Hz**	50/60			
Power consumption		**VA**	24 V ⎓ 0.7 W/2 VA 115/230 V ∿ 3 VA		< 4	
Module inputs fuse protection			Internal, electronic			
Inputs			S1: 1 N.C. + N.O., S2: 1 N.C. + N.O.			
Two-hand control type Conforming to EN 574			III A		III C	
Synchronization time		**s**	0.5 maximum			
Control unit voltage	24 V ⎓ version	**V**	24		24	
	24 V ∿, 115 V, 230 V version	**V**	24		24	
Calculation of wiring resistance RL (for XPSBCE only) between terminals S11-S13, S21-S23		Ω	–		⎓ $RL = \frac{Ue}{Un} \times 160-127$ ∿ $RL = \frac{Ue}{Un} \times 160-135$ Ue = true voltage applied to terminals A1-A2 Un = nominal supply voltage	
Outputs	Voltage reference		Relay hard contacts			
	Number and type of safety circuits		1 N.O. (11-14)		2 N.O. (13-14, 23-24)	
	Number and type of additional circuits		1 N.C. (11-12)		1 N.C. (31-32)	
	Breaking capacity in AC-15	**VA**	C300: inrush 1800, maintained 180		B300: inrush 3600, maintained 360	
	Breaking capacity in DC-13		24 V/1.5 A to L/R = 50 ms			
	Max. thermal current (Ithe)	**A**	5		6	
	Output fuse protection, using fuses conforming to IEC/EN 60947-5-1, VDE 0660 part 200	**A**	4 gG		6 gG	
	Minimum current	**mA**	10			
	Minimum voltage	**V**	17			
Electrical life			See page 3/12			
Response time		**ms**	< 20		< 50	
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)			
Rated impulse withstand voltage (Uimp)		**kV**	4 (overvoltage category III, conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)			
LED display			2		3	
Operating temperature		**°F (°C)**	- 13 to + 131 (- 25 to + 55)		- 13 to + 131 (- 25 to + 55)	
Storage temperature		**°F (°C)**	- 13 to + 167 (- 25 to + 75)		- 13 to + 167 (- 25 to + 75)	
Degree of protection conforming to IEC/EN 60529	Terminals		IP 20			
	Enclosure		IP 40			
Wiring diagrams	Type	Terminals	Captive screw clamp terminals	Spring terminals	Captive screw clamp terminals	Spring terminals
		Terminal block	Removable from module		Removable from module	
	1-wire connection	Without cable end	Solid or flexible cable: 26-14 AWG (0.2 to 2.5 mm^2)		Solid or flexible cable: 24-14 AWG (0.2 to 2.5 mm^2)	
		With wire end	Without bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm^2)			
		With cable end	With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm^2)	With bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm^2)	With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm^2)	With bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm^2)
	2-wire connection	Without cable end	Solid: 26-18 AWG (0.2 to 1.0 mm^2) Stranded: 26-16 AWG (0.2 to 1.5 mm^2)	–	Solid or flexible cable: 24-18 AWG (0.2 to 1.0 mm^2)	–
		With cable end	Without bezel, flexible cable: 24-18 AWG (0.25 to 1.0 mm^2)	–	Without bezel, flexible cable: 24-18 AWG (0.25 to 1.0 mm^2)	–
		With cable end	Double, with bezel, flexible cable: 20-16 AWG (0.5 to 1.5 mm^2)	Double, with bezel, flexible cable: 20-18 AWG (0.5 to 1.0 mm^2)	Double, with bezel, flexible cable: 20-16 AWG (0.5 to 1.5 mm^2)	Double, with bezel, flexible cable: 20-18 AWG (0.5 to 1.0 mm^2)

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Principle: page 3/52 | Specifications: page 3/53 | References: page 3/55 | Wiring diagrams: page 3/56 | Dimensions: page 3/112

Safety relays

Preventa™ safety relay modules type XPSBF

For electrical monitoring of two-hand control stations

Specifications

Module type				XPSBF1132	XPSBF1132P
Maximum achievable safety level				PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061	
Reliability data (1)	Mean Time To dangerous Failure ($MTTF_d$)		**Years**	50.1	
	Diagnostic Coverage (DC)		**%**	> 99	
	Probability of dangerous Failure per Hour (PFH_d)		**1/h**	1.3×10^{-8}	
Conformity to standards				EN 60204-1, EN 60947-1, EN 60947-5-1, EN 574 type III C/ISO 13851	
Product certifications				UL, CSA, TÜV	
Supply		Voltage	**V**	24 ⎓	
		Voltage limits		- 20 to + 20%	
Power consumption			**W**	< 2.5	
Module inputs fuse protection				Internal, electronic	
Inputs				S1: 1 N.C. + N.O., S2: 1 N.C. + N.O.	
Two-hand control type				III C conforming to EN 574	
Synchronization time			**s**	0.5 maximum	
Control unit voltage			**V**	24 V/8 mA	
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			2 N.O. (13-14, 23-24)	
	Number and type of additional circuits			2 solid-state (type 24 V to 20 mA)	
	Breaking capacity in AC-15		**VA**	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A to L/R = 50 ms	
	Max. thermal current (Ithe)		**A**	4.2	
	Max. total thermal current		**A**	8.4	
	Output fuse protection, using fuses conforming to IEC/EN 60947-5-1, VDE 0660 part 200		**A**	4 gG or 6 fast acting	
	Minimum current		**mA**	10	
	Minimum voltage		**V**	17	
Electrical life				See page 3/12	
Response time			**ms**	< 20	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp)			**kV**	4 (overvoltage category III, conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				3	
Operating temperature			**°F (°C)**	+ 14 to + 131 (- 10 to + 55)	
Storage temperature			**°F (°C)**	-13 to +185 (- 25 to + 85)	
Degree of protection conforming to IEC/EN 60529		Terminals		IP 20	
		Enclosure		IP 40	
Connection	Type	Terminals		Captive screw clamp terminals	Captive screw clamp terminals
		Terminal block		Integrated in module	Removable from module
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14 to 2.5 mm^2)	Solid or flexible cable: 24-14 AWG (0.2 to 2.5 mm^2)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm^2)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm^2)	With bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm^2)
	2-wire connection	Without cable end		Solid or flexible cable: 26-20 AWG (0.14 to 0.75 mm^2)	Solid cable: 24-18 AWG (0.2 to 1 mm^2), flexible cable: 24-16 AWG (0.2 to 1.5 mm^2)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25 to 1 mm^2)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5 to 1.5 mm^2)	

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Safety relays

Preventa™ safety relay modules types XPSBAE, XPSBCE, XPSBF

For electrical monitoring of two-hand control stations

XPSBAE●●●●P

XPSBAE●●●●C

XPSBCE●●●●P

XPSBCE●●●●C

XPSBF1132

Selection

Requirements of standard EN 574/ISO 13851	Type I	Type II	Type III A	Type III B	Type III C
Use of both hands (simultaneous action)					
Link between input and output signals					
Output signal inhibited					
Prevention of accidental operation					
Tamper-proof					
Output signal reinitialized					
Synchronous action (specified time limit)					
Use of proven components (Category 1 conforming to EN/ISO 13849-1)			XPSBAE		
Redundancy with partial error detection (Category 3 conforming to EN/ISO 13849-1)				XPSBCE XPSBF	
Redundancy + Self-monitoring (Category 4 conforming to EN/ISO 13849-1)					XPSBCE XPSBF
Two-hand control station	XY2SB●●				

Standard EN 574/ ISO 13851 defines the selection of two-hand controls according to the control system category. The following table details the 3 types of two-hand control conforming to EN 574/ISO 13851. For each type, it lists the operating characteristics and minimum requirements.

Conforming to standard EN/ISO 13849-1

Meets the requirements of standard EN 574/ISO 13851

References

Description	Type conforming to standard EN 574	Connection	Number of safety circuits	Additional outputs	Supply	Reference	Weight oz (kg)
Safety relay modules for electrical monitoring of two-hand control stations	III A	Captive screw clamp terminals Terminal block removable from module	1 N.O.	1 N.C.	∿ and 24 V ⎓	**XPSBAE5120P**	3.527 (0.100)
					∿ 115/230V	**XPSBAE3920P**	3.527 (0.100)
		Spring terminals Terminal block removable from module	1 N.O.	1 N.C.	∿ and 24 V ⎓	**XPSBAE5120C**	3.527 (0.100)
					∿ 115/230V	**XPSBAE3920C**	3.527 (0.100)
	III C	Captive screw clamp terminals Terminal block removable from module	2 N.O.	1 N.C. relay	∿ and 24 V ⎓	**XPSBCE3110P**	9.594 (0.272)
					∿ 115/120 V	**XPSBCE3410P**	11.358 (0.322)
					∿ 230 V	**XPSBCE3710P**	11.358 (0.322)
		Spring terminals Terminal block removable from module	2 N.O.	1 N.C. relay	∿ and 24 V ⎓	**XPSBCE3110C**	9.594 (0.272)
					∿ 115 /120 V	**XPSBCE3410C**	11.358 (0.322)
					∿ 230 V	**XPSBCE3710C**	11.358 (0.322)
		Captive screw clamp terminals Terminal block removable from module	2 N.O.	2 solid-state	⎓ 24 V	**XPSBF1132**	5.291 (0.150)
			2 N.O.	2 solid-state	⎓ 24 V	**XPSBF1132P**	5.291 (0.150)

Principle: page 3/52 | Specifications: page 3/53 | References: page 3/55 | Wiring diagrams: page 3/56 | Dimensions: page 3/112

Safety relays

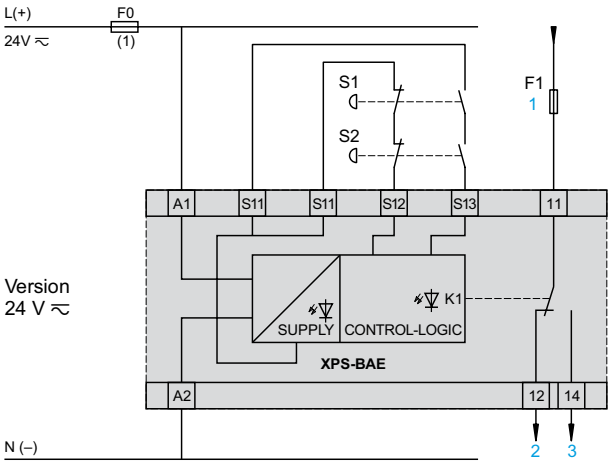
Preventa™ safety relay modules type XPSBAE

For electrical monitoring of two-hand control stations

XPSBAE

Module XPSBAE associated with a two-hand control station

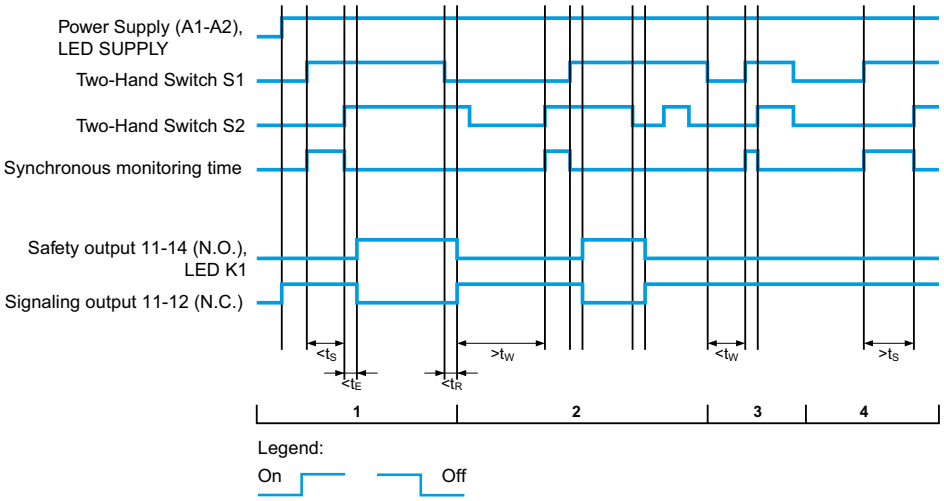
Type III A conforming to EN 574/ISO 13851



1 See technical data for fuse sizes
2 Signaling output 11-12
3 Safety output 11-14

S1 and S2: pushbuttons. Must not be used for applications (presses) which require a type III C module (XPSBCE or XPSBF).

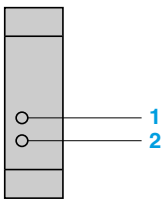
Functional diagram of module XPSBAE



1 Enable for synchronous operation
2 No re-enable if operation is interrupted
3 No enable as recovery time t_W is too short
4 No enable as synchronous monitoring time t_S is too long

t_R Response time
t_E ON delay
t_W Recovery time
t_S Synchronous monitoring time

LED details (XPSBAE)



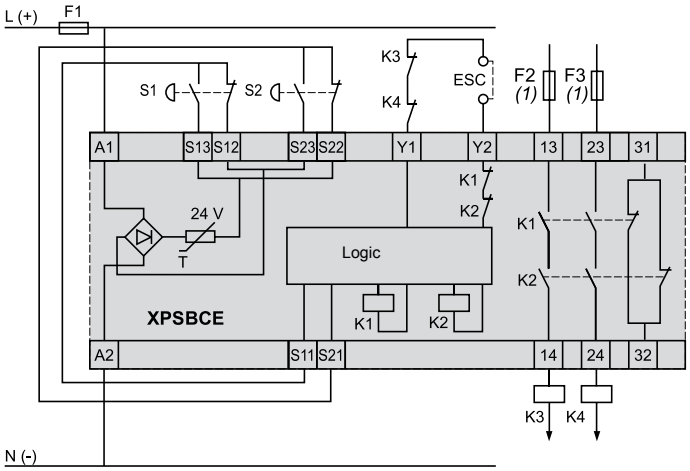
1 Supply voltage A1-A2.
2 K1 status (N.O. safety output 11-14 closed).

XPSBCE

Module XPSBCE associated with a two-hand control station

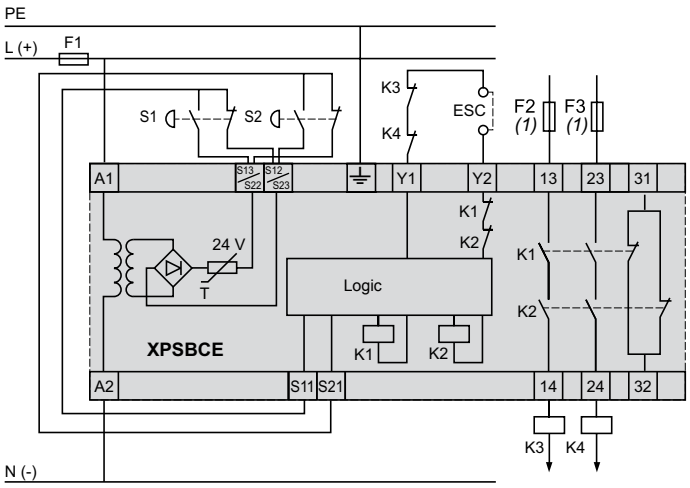
Type III C conforming to EN 574/ISO 13851

~ and 24 V ⎓



S1, S2: Two-hand control station pushbuttons
ESC: External start conditions
(1) Maximum fuse rating: see page 3/53.

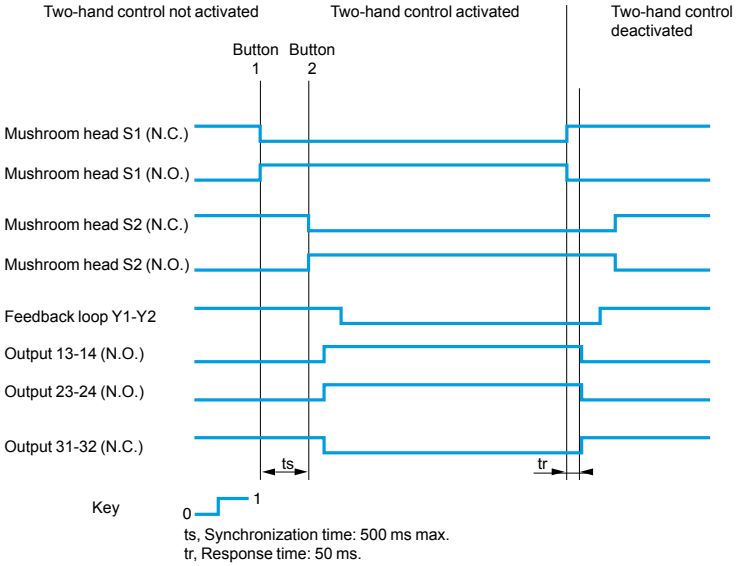
115 ~ and 230 V



S1, S2: Two-hand control station pushbuttons
ESC: External start conditions
(1) Maximum fuse rating: see page 3/53.

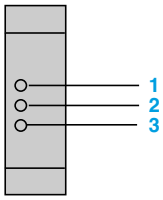
XPSBCE (continued)

Functional diagram of module XPSBCE



ts, Synchronization time: 500 ms max.
tr, Response time: 50 ms.

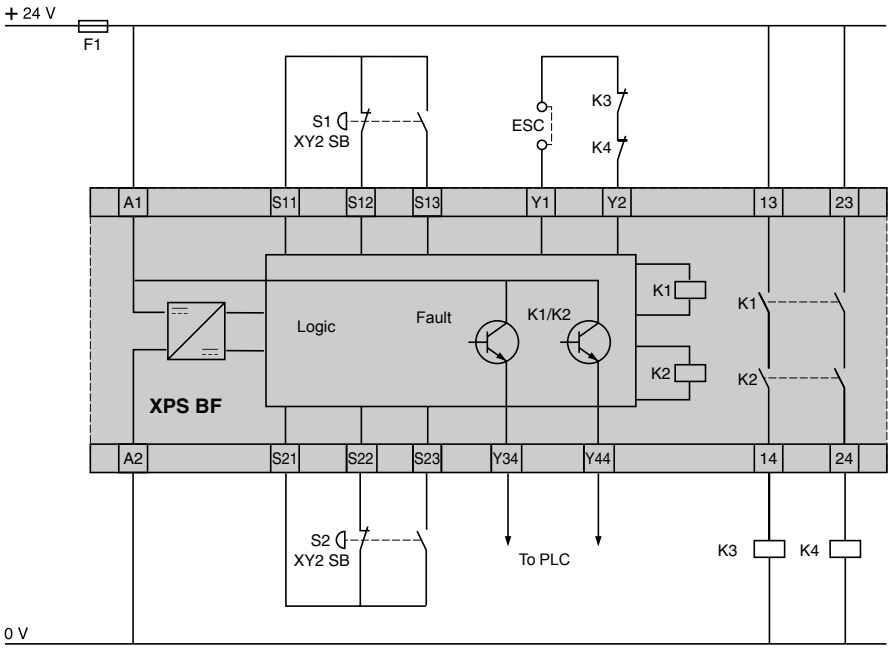
LED details (XPSBCE)



1 Supply voltage A1-A2.
2 K1 status (N.O. safety outputs closed).
3 K2 status (N.O. safety outputs closed).

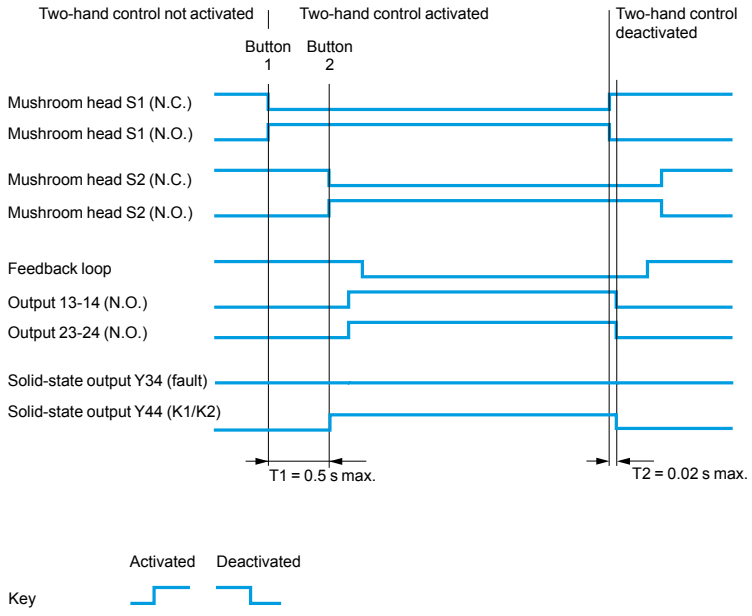
XPSBF

Module XPSBF associated with a two-hand control station

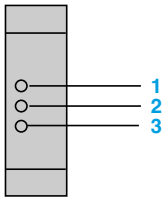


ESC: External start conditions.
Y1-Y2: feedback loop

Functional diagram of module XPSBF



LED details (XPSBF)



1 Supply voltage A1-A2 (fuse status).
2 Fault signalling.
3 K1-K2 status (N.O. safety outputs closed).

Safety relays

Preventa™ safety relay modules type XPSCM and single-beam photoelectric sensors type XU2S

With a test input associated with a built-in “muting” function

Operating principle

XPSCM safety relay modules, when combined with XU2S single-beam photoelectric sensors (periodically tested), form a category 2 light curtain conforming to standards IEC/EN 61496 parts 1 and 2 and EN 60825-1.
The connection of 1–4 pairs of XU2S photoelectric sensors makes it possible to create a protected space up to 47.2 in. (1200 mm) high, conforming to EN 999/ ISO 13855, and 26.2 ft (8 m) long.

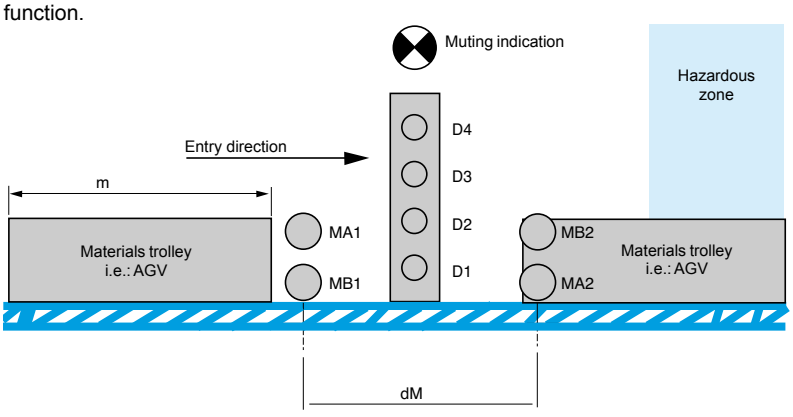
The built-in “muting” function allows the automatic passage of parts for machining or loaded pallets, without interrupting the transportation movement within the zone protected by the electro-sensitive protection equipment (ESPE).
When the system is switched on by the start command, and the light protection is not interrupted, the main circuit is closed by the two safety relays of the XPSCM module.

An interruption of the protection field causes the safety outputs to open instantaneously, and the process PLC receives a stop command. The LED on the XPSCM front panel changes from green to red. The Open state is maintained until the module is restarted using the start button.

The “muting” function allows the light protection to be inhibited (muted). This function allows a trolley transporting materials to pass through without triggering the main circuit. The Muting function cannot be activated by energizing the inhibition devices unless the safety outputs have been switched on beforehand.

To trigger the “muting” function, the inhibition devices (muting sensors) must be activated within the 3-second interval. This synchronization time for the two inhibition inputs can be deactivated by connecting two configuration terminals. The muting cycle has a maximum duration of 60 seconds. During this period, materials can be transported through the protection field without deactivating the safety outputs. The 60 second limit value of the muting cycle may be made infinite by connecting two configuration terminals.

During the muting operation process, a light indicating the muting state is controlled by the XPSCM module. The indicator light comes on when a muting signal is generated, and indicates the inhibition of the protection function. An indicator light error (short-circuit, open-circuit) will be recognized, and will deactivate the Muting function.



D1, D2, D3, D4: monitoring photoelectric sensors
MA1, MB1, MA2, MB2: muting photoelectric sensors
m = trolley length
dM = distance between MA1/MB1 and MA2/MB2

Conditions to be observed for the “muting” function

- “Muting” sensors must be of the XU2 M18PP340 thru-beam or XU9 M18PP340 polarized reflex type, or mechanical limit switches with contacts.
- *dM* ≤ *m* to obtain continuous validation of the “muting” function.
- Avoid the intrusion of persons during the muting phase. This phase is indicated by an indicator light connected to the muting indicator output of the XPSCM module.
- A materials transportation trolley (i.e.: AGV) must generate the muting signal before it enters the protection field, and discontinue the muting signal on exiting once it has cleared all the sensors of the protection field.

Safety relays

Preventa™ safety relay modules type XPSCM and single-beam photoelectric sensors type XU2S

With a test input associated with a built-in “muting” function

Specifications of safety modules

Module type			XPSCM1144	XPSCM1144P
Maximum achievable safety level *(1)*			PL c/Category 2 conforming to EN/ISO 13849-1, SILCL 1 conforming to EN/IEC 62061	
Reliability data	Mean Time To dangerous failure ($MTTF_d$)	**Years**	16.6	
	Diagnostic Coverage (DC)	**%**	95.5	
	Probability of dangerous Failure per Hour (PFH_d)	**1/h**	3.12×10^{-7}	
Conformity to standards			EN/IEC 61496-1, EN/IEC 61496-2, EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1,	
Product certifications			UL, CSA, IFA	
Ambient air temperature		**°F (°C)**	Operation: +14 to +131 (-10 to +55). Storage: –13 to +185 (–25 to +85)	
Degree of protection conforming to IEC 529			Terminals: IP 20, enclosure: IP 40	
Supply voltage		**V**	⎓ 24, voltage limits: ±20%	
Maximum power consumption		**W**	< 15, with thru-beam photoelectric sensors and muting signaling	
Module fuse protection			Internal, electronic	
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 and 2)	
Rated impulse withstand voltage (Uimp)		**kV**	4 (overvoltage category 3, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 and 2)	
Inputs for sensors	Number of inputs to be monitored		4 (terminals Z1, Z2, Z3, Z4)	
	Input voltage	**V**	⎓ 24	
	Supply voltage of sensors	**V**	⎓ 24 (terminal U+/U-)	
	Supply current of sensors	**mA**	< 200	
Inputs for the Muting function	Number of muting inputs		2 (terminals MA, MB)	
	Input voltage	**V**	⎓ 24 (terminal U+/U-)	
	Maximum current	**mA**	< 200	
	Synchronization time for the activation of the MA/MB muting signal	**s**	3 (±20%) for activation of the MA/MB “muting” signal	
	Muting maximum duration	**s**	60 (–10 to +30%)	
Single-beam thru-beam photoelectric sensors for input monitoring Z1-Z2-Z3-Z4 -sensors authorized for the protection field (max. 4)			XU2S18PP340●●● (infrared)	
-muting sensors			XU2 M18PP340●●● or XU9 M18PP340●●● photoelectric sensors or XC limit switches	
-sensor supply resistivity		Ω	10 max.	
Safety outputs -number and type			2 N.O. (terminals 13-14, 23-24), hard contacts	
-solid-state output breaking capacity			4 N.O. 24 V/20 mA, (Y33-Y34, Y33-Y44, Y33-Y54, Y33-Y64)	
-breaking capacity in AC-15		**VA**	C300: inrush 1800, maintained 180	
-breaking capacity in DC-13			24 V/1.5 A, L/R = 50 ms	
-maximum thermal current (Ithe)		**A**	5.6	
-sum of maximum thermal current		**A**	11	
-minimum current (volt-free contact)		**mA**	10	
-minimum voltage (volt-free contact)		**V**	17	
-short-circuit protection		**A**	4 gG or 6 fast-acting fuse cartridge, conforming to EN/IEC 60947-5-1 and DIN VDE 0660 part 200	
Muting signaling sensors for incandescent lamp			Number 1 (terminal H1), maximum power: 6.5 W/⎓ 24 V, minimum power: 4 W/⎓ 24 V	
Response time on input change of state		**ms**	< 25	
Electrical life			See page 3/12.	
Display			4 LEDs	
Connection	Type		Captive screw clamp terminals	Captive screw clamp terminals, separate, removable terminal block
1-wire connection	Without cable ends		Solid or flexible cable: 26-14 AWG ($0.14 – 2.5\ mm^2$)	Solid or flexible cable: 24-14 AWG ($0.2 – 2.5\ mm^2$)
	With cable ends, without bezel		Flexible cable: 24-14 AWG ($0.25 – 2.5\ mm^2$)	Flexible cable: 24-14 AWG ($0.25 – 2.5\ mm^2$)
	With cable ends, with bezel		Flexible cable: 24-16 AWG ($0.25 – 1.5\ mm^2$)	Flexible cable: 24-14 AWG ($0.25 – 2.5\ mm^2$)
2-wire connection	Without cable ends		Solid or flexible cable: 26-18 AWG ($0.14 – 0.75\ mm^2$)	Solid cable: 24-18 AWG ($0.2 – 1.0\ mm^2$), Flexible cable: 24-16 AWG ($0.2 – 1.5\ mm^2$)
	With cable ends, without bezel		Flexible cable: 24-18 AWG ($0.25 – 1.0\ mm^2$)	Flexible cable: 24-18 AWG ($0.25 – 1.0\ mm^2$)
	With cable ends, double with bezel		Flexible cable: 22-14 AWG ($0.5 – 1.5\ mm^2$)	Flexible cable: 22-14 AWG ($0.5 – 1.5\ mm^2$)

(1) Using an appropriate and correctly connected control system.

Safety relays

Preventa™ safety relay modules type XPSCM and single-beam photoelectric sensors type XU2S

With a test input associated with a built-in “muting” function

Specifications of photoelectric sensors

Conformity to standards			IEC 61496-1 and IEC 61496-2 (Type 2 ESPE)
Maximum safety level *(1)*			PL=c/category 2 conforming to EN/ISO 13849-1
Reliability data	Probability of dangerous Failure per Hour (PFH_d)	**1/h**	PFH_d=4.6E^{-7} conforming to EN/IEC 61508 PFH_d=5.5E^{-7} conforming to EN/IEC 61508, with “muting” function
Ambient air temperature		**°F (°C)**	Operation: –13 to +131 (–25 to +55) (infrared transmission sensors), Storage: –40 to +158 (–40 to +70)
Vibration resistance			7 gn (10–55 Hz), conforming to EN/IEC 60068-2-6
Shock resistance			30 gn, 3 axes: 3 times, conforming to EN/IEC 60068-2-27
Degree of protection			IP 67 conforming to EN/IEC 60529
Connection	Pre-cabled		PVC cable, diameter 0.20 in. (5 mm), 16.4 ft (5 m) long wire: 4 x 22 AWG (0.34 mm²) for thru-beam transmitter
	Connector		M12 male connector, 4-pin (suitable jumper cables and female connectors M12, 4-contact. See the "Machine Cabling" section.)
Materials			Case: nickel-plated brass (infrared transmission sensors). Lenses: PMMA
Nominal sensing distance		**ft (m)**	26.2 (8) (infrared transmission sensors)
Rated supply voltage		**V**	⎓ 12–24 (with protection against reverse polarity)
Voltage limits		**V**	⎓ 10–30 V (including ripple)
Switching capacity (sealed)		**mA**	≤ 100 mA (with overload and short-circuit protection)
Voltage drop, closed state		**V**	≤ 1.5
Current power consumption, no-load		**mA**	≤ 35
Maximum switching frequency		**Hz**	500
Delays		**ms**	Response: ≤ 1; recovery: ≤ 1

(1) Using an appropriate and correctly connected control system.

***XPS**CM1144●*

Safety modules

Description	Type of terminal block connection	Number of safety circuits	Additional outputs	Supply	References	Weight oz (kg)
Safety modules for monitoring single-beam photoelectric sensors, with a test input associated with a built-in “muting” function	Integrated in module	2	4	⎓ 24 V	**XPSCM1144**	12.35 (0.350)
	Separate, can be removed from module	2	4	⎓ 24 V	**XPSCM1144P**	12.35 (0.350)

Safety relays

Preventa™ safety relay modules type XPSCM and single-beam photoelectric sensors type XU2S

With a test input associated with a built-in "muting" function

XU2S18●P340L5

XU2S18●P340WL5

XU2S18KP340L5T

XU2S18KP340WL5T

XU2S18PP340DR

XU2S18PP340WL5R

Single-beam photoelectric sensors with a test input

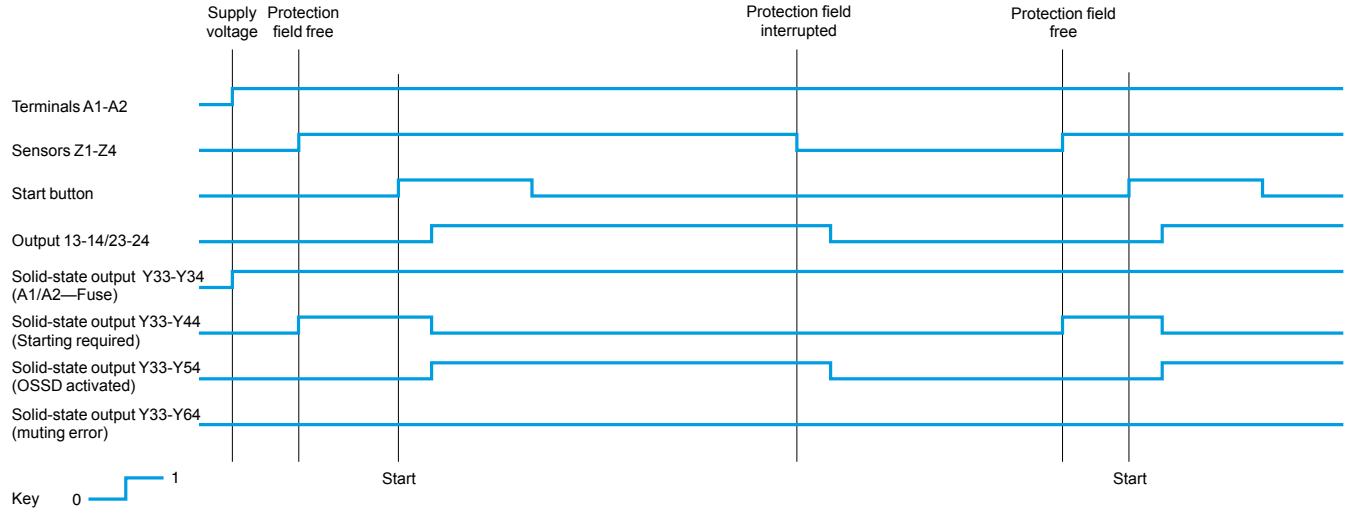
Description	Transmission type	Line of sight	Connection	References	Weight oz (kg)
PNP thru-beam pair (transmitter + receiver) Light or dark programmable switching	Infrared Sensing distance: 26.2 ft (8 m)	Along case axis	Pre-cabled 16.4 ft (5 m)	**XU2S18PP340L5**	17.11 (0.485)
			M12 connector	**XU2S18PP340D**	5.47 (0.155)
		90° to case axis	Pre-cabled 16.4 ft (5 m)	**XU2S18PP340WL5**	17.11 (0.485)
			M12 connector	**XU2S18PP340WD**	5.47 (0.155)
Thru-beam transmitter alone (for XPSCM1144●)	Infrared	Along case axis	Pre-cabled 16.4 ft (5 m)	**XU2S18KP340L5T**	8.29 (0.235)
			M12 connector	**XU2S18KP340DT**	2.65 (0.075)
		90° to case axis	Pre-cabled 16.4 ft (5 m)	**XU2S18KP340WL5T**	8.29 (0.235)
			M12 connector	**XU2S18KP340WDT**	5.47 (0.155)
PNP thru-beam receiver alone (for XPSCM1144●)	Infrared	Along case axis	Pre-cabled 16.4 ft (5 m)	**XU2S18PP340L5R**	8.82 (0.250)
			M12 connector	**XU2S18PP340DR**	2.82 (0.080)
		90° to case axis	Pre-cabled 16.4 ft (5 m)	**XU2S18PP340WL5R**	8.82 (0.250)
			M12 connector	**XU2S18PP340WDR**	2.82 (0.080)

Safety relays

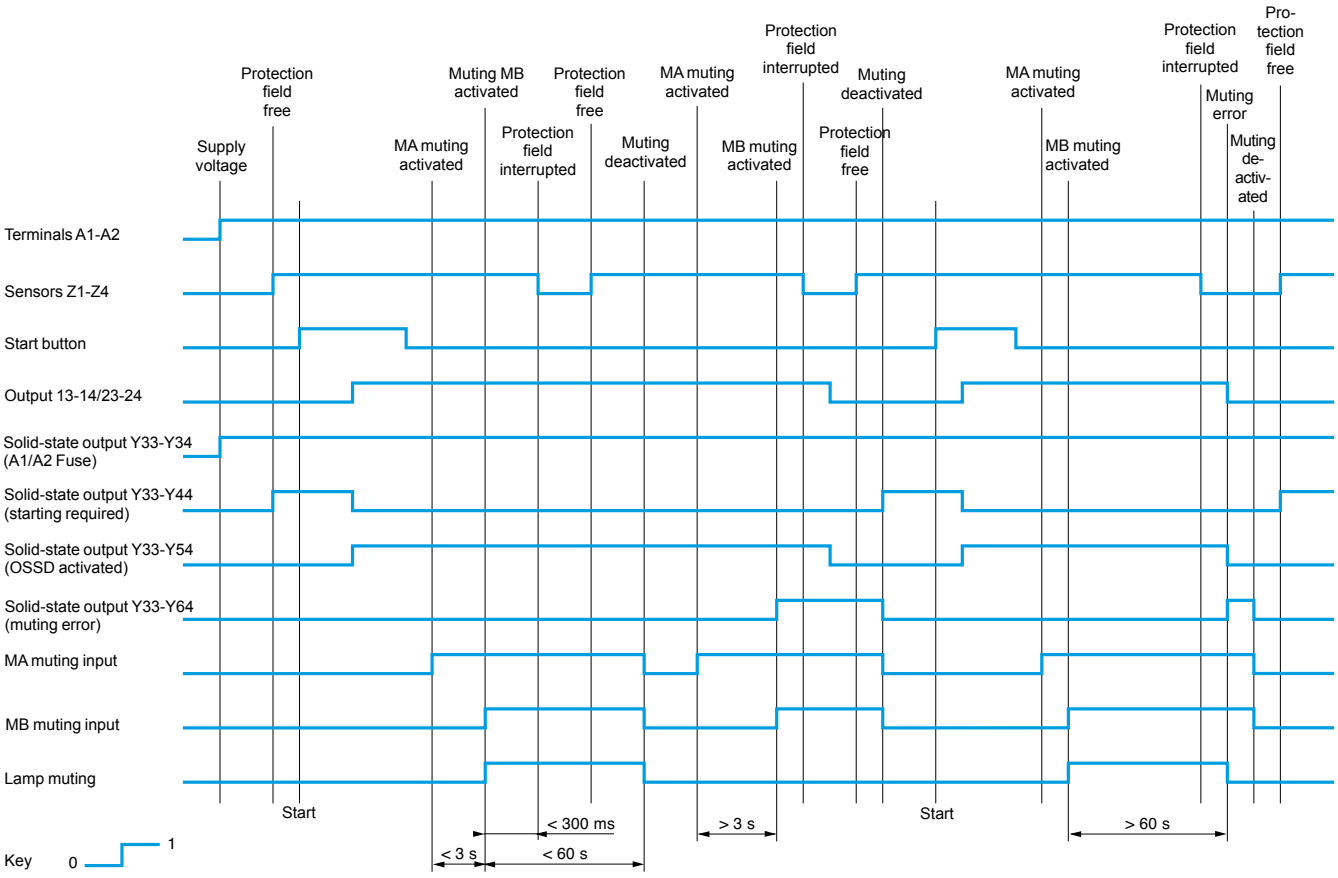
Preventa™ safety relay modules type XPSCM and single-beam photoelectric sensors type XU2S

With a test input associated with a built-in “muting” function

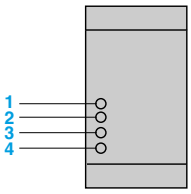
Functional diagram of XPSCM module



Functional diagram of the XPSCM module with “muting” function



Key to LEDs



1 A1-A2 supply voltage, electronic internal fuse status (Green)
2 Signaling for restarting (Yellow)
3 Safety output closed (Green)
4 Safety output open (Red)

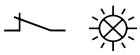
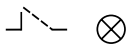
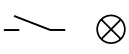
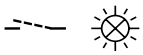
Principle: page 3/60
Specifications: page 3/61
References: page 3/62
Dimensions: page 3/65, 3/112
Wiring diagrams: page 3/65

Safety relays

Preventa™ safety relay modules type XPSCM and single-beam photoelectric sensors type XU2S

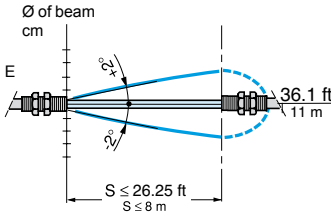
With a test input associated with a built-in “muting” function

Operation

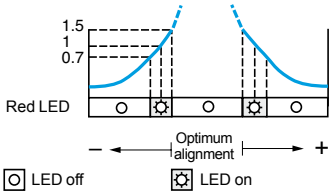
	Light switching		Dark switching	
	No object in beam	Object in beam	No object in beam	Object in beam
Output state (PNP) indicator, yellow LED (illuminated when sensor output is on)				

Curves

Infrared detection curve

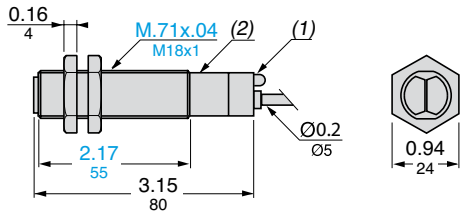


Functional check



Dimensions

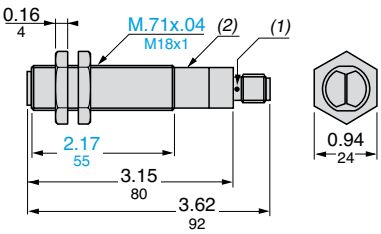
XU2S18PP340L5, XU2S18PP340L5L



(1) LED

(2) Potentiometer

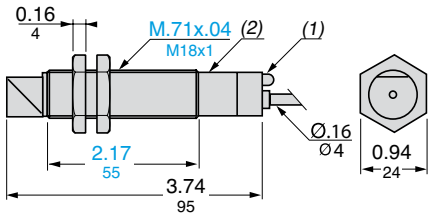
XU2S18PP340D



Mounting nut tightening torque: 17.7 lb-ft (24 N•m)

Connector tightening torque: 1.5 lb-ft (2 N•m)

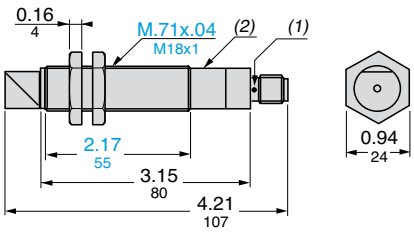
XU2S18PP340WL5



(1) LED

(2) Potentiometer

XU2S18PP340WD



Dual Dimensions: Inches / Millimeters

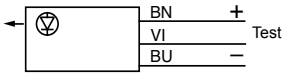
Mounting nut tightening torque: 17.7 lb-ft (24 N•m)

Connector tightening torque: 1.5 lb-ft (2 N•m)

Wiring diagrams (3-wire ⎓)

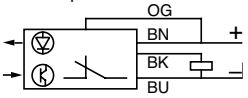
Cable connection

Transmitter



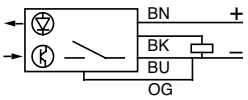
Receiver

Light switching (no object present). PNP output



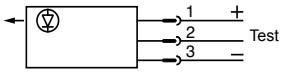
Receiver

Dark switching (no object present). PNP output



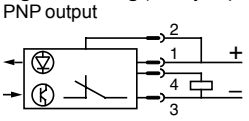
Plug-in connector

Transmitter



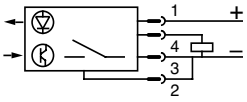
Receiver

Light switching (no object present). PNP output



Receiver

Dark switching (no object present). PNP output



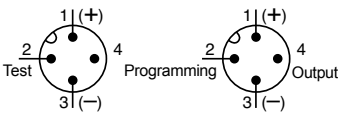
Cable connections

(–)	BU	(Blue)
(+)	BN	(Brown)
(OUT)	BK	(Black) (receiver)
(Prog.)	OG	(Orange) (receiver)
(Test)	VI	(Violet) (transmitter)

Connector diagrams

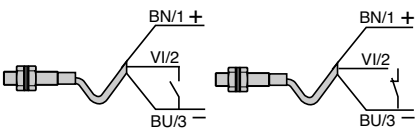
Sensor connector pin view

Transmitter Receiver



Beam break test (for transmitter only)

Beam made Beam broken



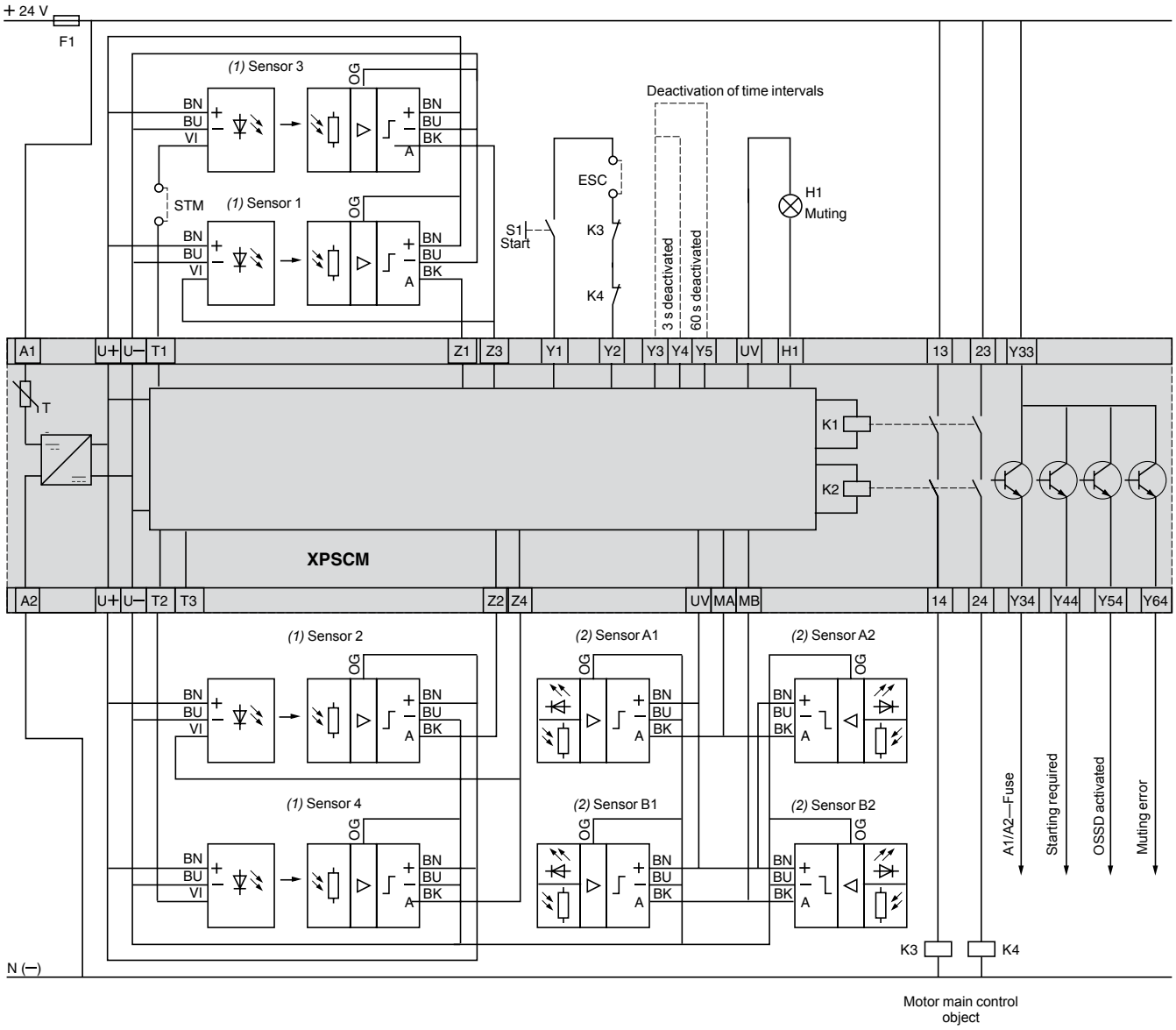
Principle: page 3/60 | Specifications: page 3/61 | References: page 3/62 | Dimensions: page 3/65, 3/112 | Wiring diagrams: page 3/65

3

Wiring diagrams (continued)

Connection of XPSCM module with 4 pairs of XU2S single-beam sensors

(Connection of 1 to 4 pairs of XU2 S single-beam sensors to XPS CM, see page 3/67)



XU2S sensors can be programmed for light switching or dark switching (dark switching with sensors 1 and 3 and light switching with sensors 2 and 4, for example).
ESC: external start conditions
Y1-Y2: feedback loop.
STM: for stopping time measurement.

(1) Protection field sensors

(2) Muting sensors

Safety relays

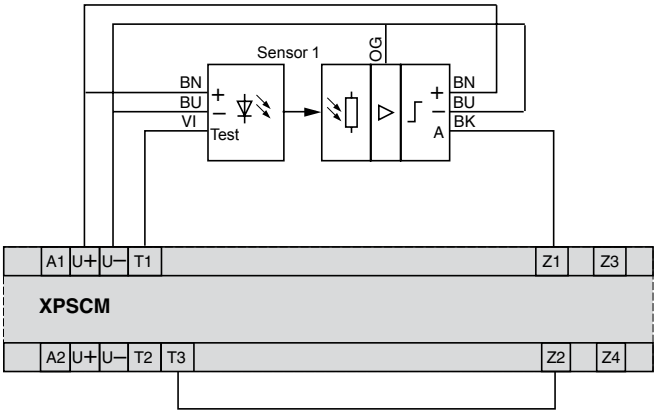
Preventa™ safety relay modules type XPSCM and single-beam photoelectric sensors type XU2S

With a test input associated with a built-in “muting” function

Wiring diagrams (continued)

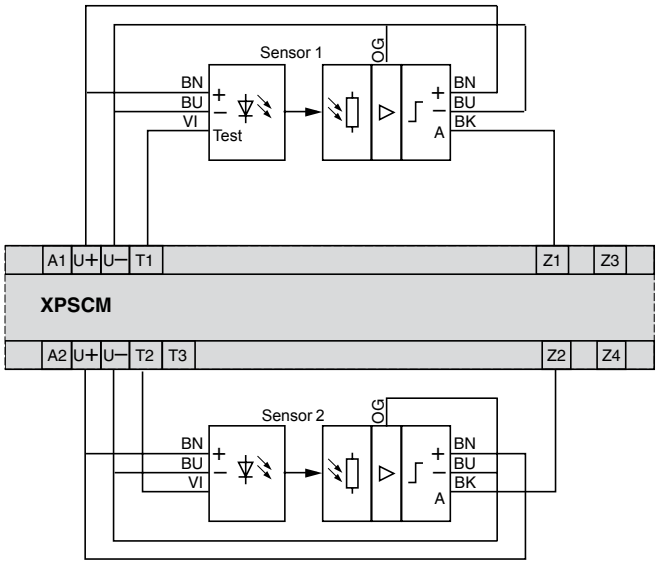
Connection of XPSCM module with 1 pair of XU2S sensors

(dark switching)



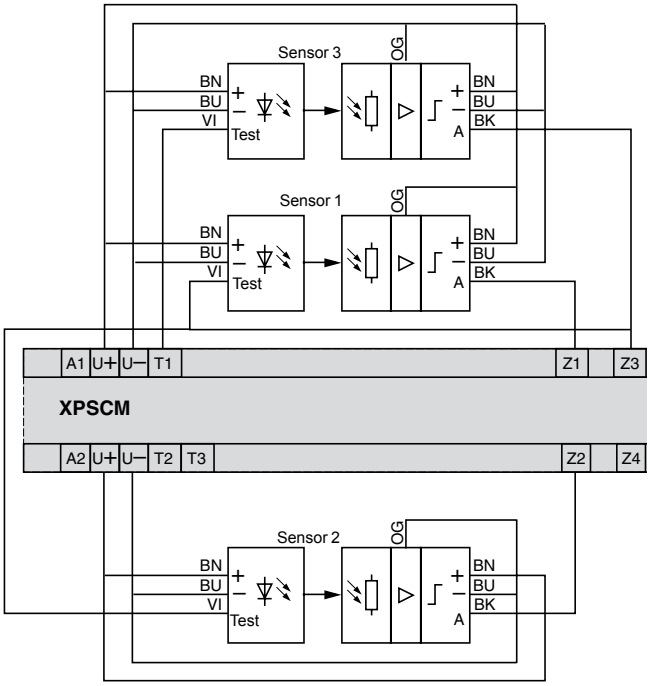
Connection of XPSCM module with 2 pairs of XU2S sensors

(dark switching)



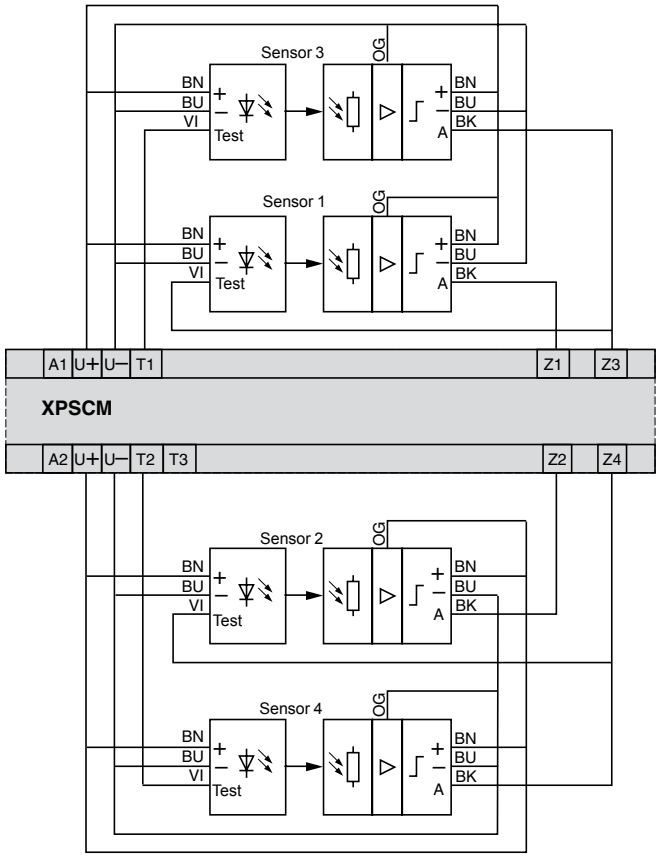
Connection of XPSCM module with 3 pairs of XU2S sensors

(2 for dark switching, 1 for light switching)



Connection of XPSCM module with 4 pairs of XU2S sensors

(2 for dark switching, 2 for light switching)



Safety relays

Preventa™ safety relay modules type XPSLCD

For monitoring 2 to 4 light curtains type 2 and type 4

Operating principle

The safety monitoring module XPSLCD1141 enables independent monitoring of 2 to 4 light curtains type 2 and type 4.
Each output of the light curtain is separately connected to the inputs of the safety monitoring module, which either authorises or prevents activation of its two safety outputs.
The module manages starting and EMD/MPCE functions and therefore, the light curtains connected to it must be configured for automatic start and the EDM/MPCE function deactivated. The safety monitoring module XPSLCD1141 provides the supply and also manages, in addition to its own auxiliary outputs (1 PNP and 1 NPN), the auxiliary outputs of the light curtains.
At the slightest intrusion through one or more light beams of any of the light curtains, the outputs of the safety monitoring module open. This also applies in the event of any internal fault or output relay(s) fault (subject to the EDM/MPCE configuration on the module).
The light curtain system conforms to the standard EN/IEC 61496-1 (type 4).
The Preventa™ safety monitoring module XPSLCD1141 incorporates removable terminal blocks, thus optimizing machine maintenance.
To aid diagnostics, the safety monitoring module has 9 LEDs and a 2-digit display on the front cover which provide information on the monitoring circuit status.

Environmental specifications

Safety monitoring module type			**XPSLCD1141**
Maximum achievable safety level (1)			PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061
Conformity to standards			EN/IEC 61496-1, EN/IEC 61496-2, EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1
Certifications			CE, TÜV, CSA, UL
Ambient air temperature		**°F (°C)**	Operation: 0…+ 55; storage: - 25…+ 75
Relative humidity			95% maximum, without condensation
Degree of protection			IP 20
Shock and vibration resistance	Conforming to EN/IEC 61496-1		Shock resistance: 10 gn, impulse 16 ms. Vibration resistance: 5…55 Hz max. on all 3 axes
Materials			ABS thermoplastic enclosure
Mounting			35 mm rail

Electrical specifications

Power supply		**V**	⎓ 24 ± 10%
Current		**A**	10 max.
Response time		**ms**	< 1
Safety outputs			2 solid-state PNP outputs (N.O.), 625 mA on ⎓ 24 V
Alarm or auxiliary output			1 solid-state PNP (N.O.), 500 mA on ⎓ 24 V, and 1 solid-state NPN (N.O.),100 mA on ⎓ 24 V, output
Monitoring activation of output switching devices (EDM/MPCE)		**mA**	50 ± 20% on ⎓ 24 V
Signalling			9 LEDs plus 2-digit display
Functions			-Auto/Manual, manual 1st cycle, -Monitoring of external switching devices (EDM: External Devices Monitoring), -Restart request indicator light, -Display of operating modes and alarm by 9 LEDs and 2-digit display. Selection of Auto/Manual, blanking relay monitoring, floating/blanking and blanking + floating/ blanking relay monitoring using configuration switches behind front cover of module. -Independent monitoring of 2 to 4 light curtains.
Monitoring of external switching devices (EDM = External Devices Monitoring)			Monitoring of the function (open or closed) as well as the response time of the power components. Selectable by using configuration switches.
Start input		**mA**	50 at 24 V
Connection	Type		Captive screw clamp terminals, removable terminal block
1-wire connection	Without cable end		Solid cable: 14 AWG (1.63 mm²)
	Without cable end		Flexible cable: 26-16 AWG (0.14...1.5 mm²)
	With cable end		Without bezel, flexible cable: 26-16 AWG (0.14…1.5 mm²)
2-wire connection	Without cable end		Solid cable: 26-16 AWG (0.14...1.5 mm²)
	Without cable end		Flexible cable: 26-16 AWG (0.14...1.5 mm²)

(1) Using an appropriate and correctly connected control system.

Safety relays

Preventa™ safety relay modules type XPSLCD

For monitoring 2 to 4 light curtains type 2 and type 4

Reference

XPSLCD1141

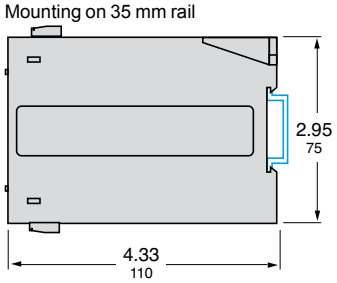
Description	Type of terminal block connection	Number of safety circuits	Additional outputs	Supply	Reference	Weight
				V		oz (kg)
Safety module for monitoring 2 to 4 light curtains type 2 and type 4	Removable from module	2 PNP	5 (4 PNP + 1 PNP or NPN)	⎓ 24 V	**XPSLCD1141**	26.455 (0.750)

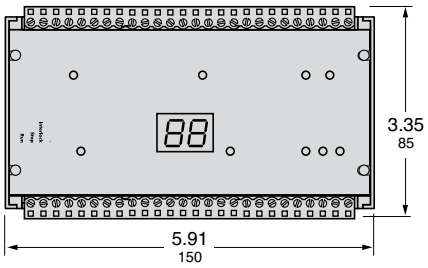
Dimensions

Safety monitoring module

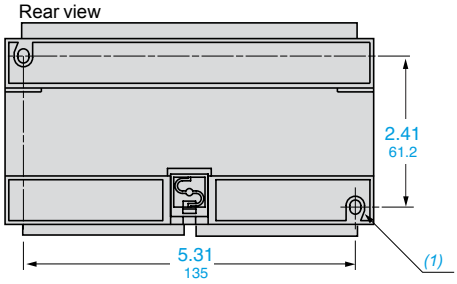
XPSLCD1141

Mounting on 35 mm rail





Rear view

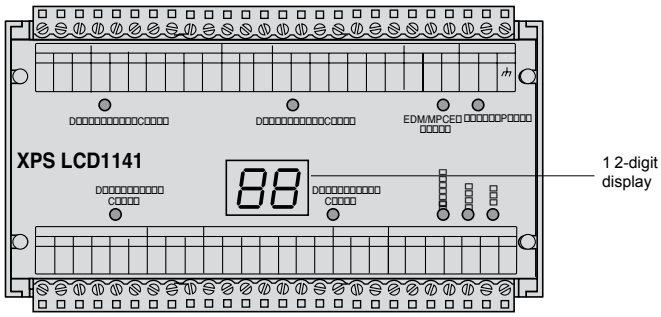


(1) 2 elongated holes Ø 4 x 5.7.

Dual Dimensions: INCHES Millimeters

LED details

The safety monitoring module XPSLCD has 9 LEDs and a 2-digit display on the front cover.



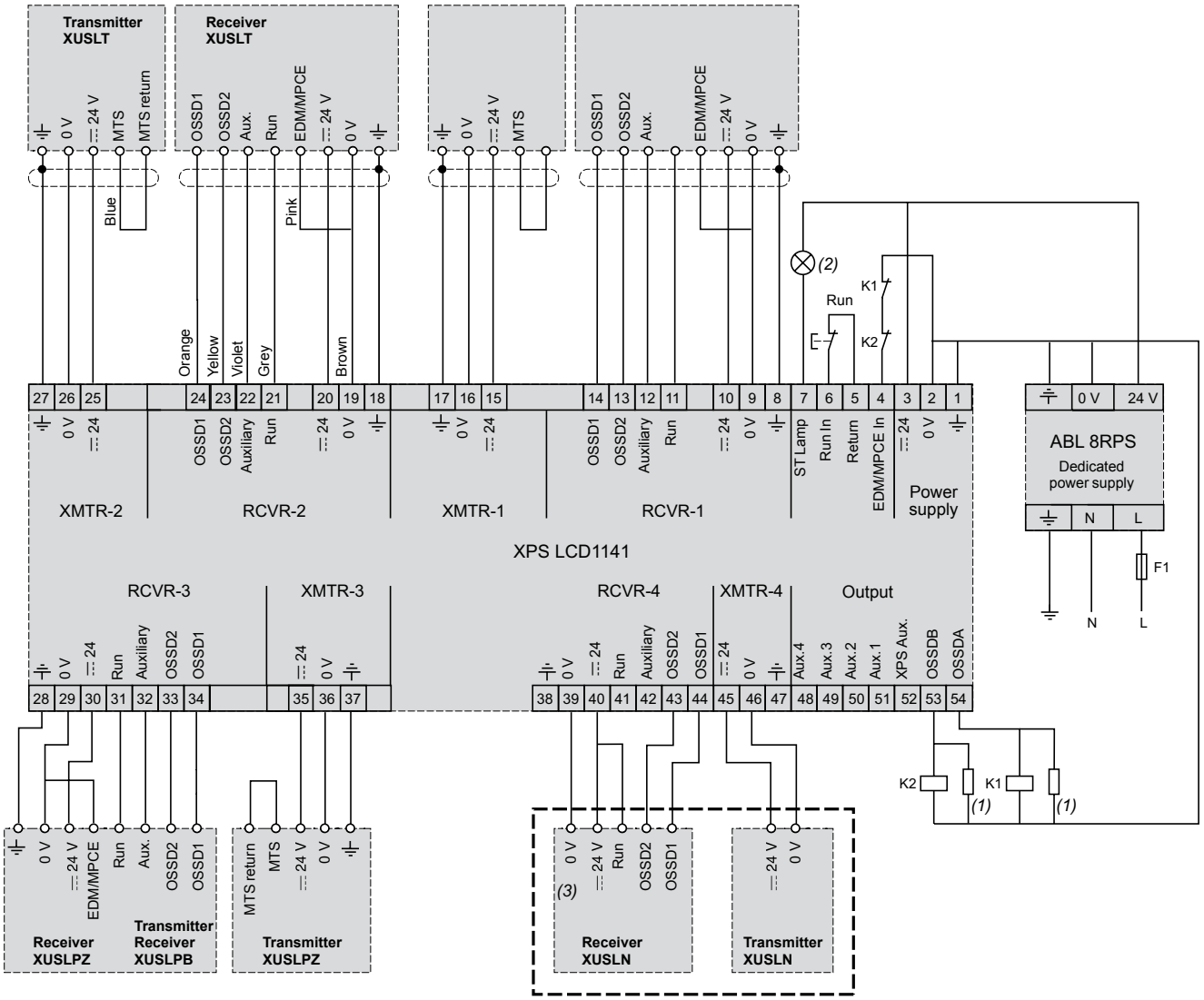
Safety relays

Preventa™ safety relay modules type XPSLCD

For monitoring 2 to 4 light curtains type 2 and type 4

Connection via the safety monitoring module XPSLCD1141

Example: configuration with light curtains XUSLT, XUSLP and XUSLN



(1) Arc suppressor.
(2) Restart request indicator light.
(3) When module XPSLCD1141 is used with a type 2 light curtain (example: XUSLN), the entire protection system is downgraded to category 2.

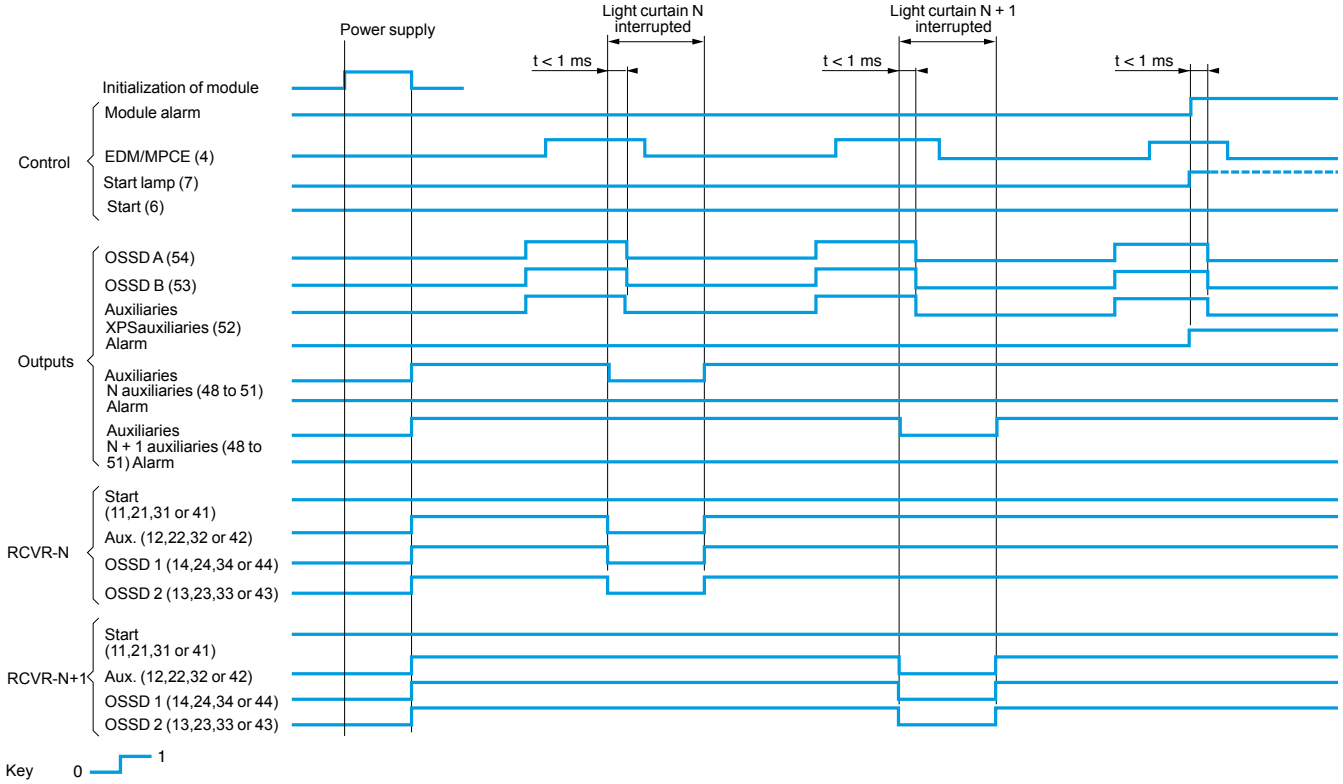
Safety relays

Preventa™ safety relay modules type XPSLCD

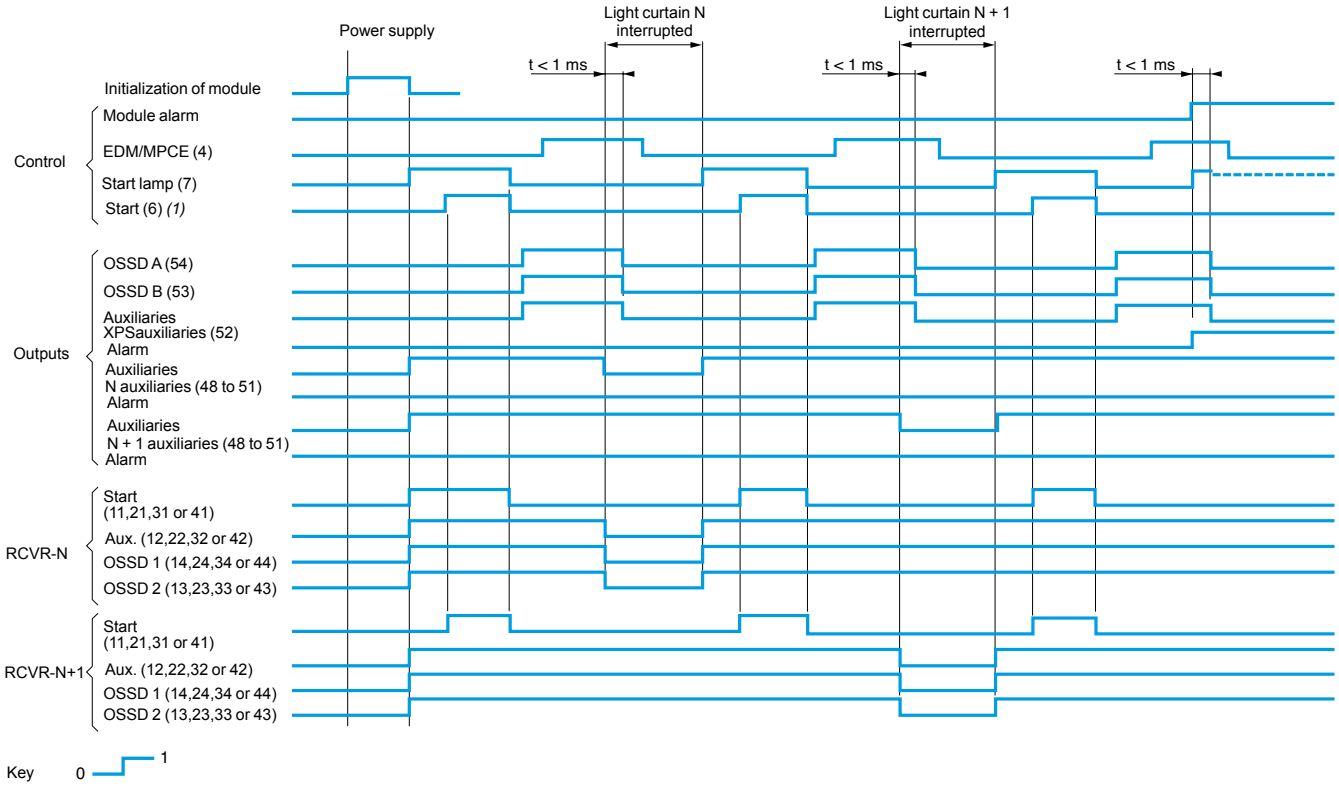
For monitoring 2 to 4 light curtains type 2 and type 4

Functional diagram of module XPSLCD1141

Automatic start and restart mode



Manual start and restart mode



(1) Start button.

Safety relays

Preventa™ safety monitoring module XPSLCM

For “muting” function of type 2 and type 4 light curtains

Operating principle

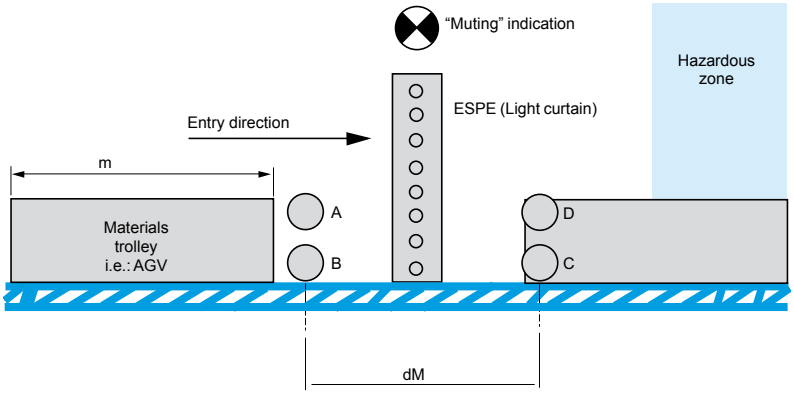
Safety monitoring modules XPSLCM are used with type 4 light curtains conforming to EN/IEC 61496-1 to provide a system inhibiting the light curtain protection, i.e. “muting”. This function enables the automatic passage of parts for machining or loaded pallets, without interrupting the transportation movement within the zone protected by the electro-sensitive protection equipment (ESPE) system. In addition to the electro-sensitive protection and safety relay modules XPSLCM, the system consists of 4 to 8 inhibition sensors, 2 indicator lights and a key switch to reset the system to the initial state in the event of a sequence error.

When the system is switched on by the start command and the light curtain protection not interrupted, the main circuit is closed by the safety outputs of the XPSLCM modules (solid-state safety outputs). In addition to safety outputs, the modules incorporate signalling outputs for sending system status information to the PLC. Either 5 or 14 LEDs and a 2-digit display, mounted on the front cover of the module, provide information on the safety circuit status.

An interruption of the protection field monitored by the electro-sensitive protection equipment causes instantaneous opening of the safety outputs; the process PLC receives a stop command and the LED display mounted on the front cover indicates the change of state of the safety circuits. The “open” state is maintained until the module is restarted using the Start button.

The “muting” function cannot be activated by supplying the inhibition sensors unless the safety outputs have been switched on beforehand. To trigger the “muting” function, the inhibition devices must be activated within the 3 second time interval. During the activated “muting” phase, materials can be transported through the protection field without deactivating the safety outputs. In the event of intrusion into the hazardous zone, a person cannot activate the inhibition sensors in the same way and the system stops.

During the muting operation process, a light indicating the muting state is controlled by the XPSLCM module. The indicator light comes on when a muting signal is generated, and indicates the inhibition of the protection function. An indicator light error (short-circuit, open-circuit) will be recognized, and will deactivate the Muting function.



ESPE: electro-sensitive protection equipment (light curtain).
A, B, D, C: “muting” sensors.
m: trolley length and dM = distance between A, B and D, C.

Conditions to be observed for the “muting” function

- The “muting” sensors must either be thru-beam type XUB 0BPSNL2 + XUB 0BKSNL2T, polarized reflex type XUB 0BPSNL2 + XUC Z50 or mechanical limit switches with contacts.
- dM ≤ m to obtain continuous validation of the “muting” function.
- Avoid the intrusion of persons during the “muting” phase. This phase is indicated by the indicator light connected to the “muting” indicator output of the XPSLCM module.
- A materials trolley must provide the “muting” signal before entering the protection field and cease it once it has cleared all the sensors of the protection field on exiting.

Safety relays

Preventa™ safety monitoring module XPSLCM

For “muting” function of type 2 and type 4 light curtains

Specifications

Module type			XPSLCM1150
Maximum achievable safety level *(1)*			PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061
Conformity to standards			EN/IEC 61496-1, EN/IEC 61496-2, EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1
Certifications			CE, TÜV, CSA, UL
Ambient air temperature	For operation	**°F (°C)**	0…+ 55
	For storage	**°F (°C)**	- 25…+ 75
Degree of protection conforming to IEC 529	Terminals		IP 20
	Enclosure		IP 20
Power supply	Voltage	**V**	⎓ 24
	Voltage limits		- 10…+ 10%
Maximum power consumption		**W**	< 150
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 and 2)
Rated impulse withstand voltage (Uimp)		**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 and 2)
Number of light curtains monitored			1 or 2 transmitter-receiver pairs
Inputs for “muting” sensors	Number of inputs to be monitored		2 to 4 per “muting” function
	Supply voltage of sensors	**V**	24
	Output current of each sensor	**mA**	< 20
Type of “muting” sensors			Thru-beam, polarised reflex or sensors with relay hard contacts
Synchronization time of “muting” sensors		**s**	3 or unlimited
Maximum “muting” time		**min**	2 or unlimited
Safety outputs			
- number and type			2 PNP (terminals 1 and 2), 0.625 A at 24 V
- max. thermal current (Ithe)	1 output	**A**	–
	2 outputs	**A**	2 x 0.108
	3 outputs	**A**	–
	3 contacts	**A**	–
Auxiliary outputs 1 PNP (terminal 5) + 1 NPN (terminal 6)	Breaking capacity of solid-state PNP outputs	**mA**	24 V/500
	Breaking capacity of solid-state NPN outputs	**mA**	24 V/100
“Muting” indicator light power		**W**	1 to 7 max.
Response time on input change of state		**ms**	1
Signalling			14 LEDs plus 2-digit display
Connection	Type		Captive screw clamp terminals, removable terminal block
1-wire connection	Without cable end		Solid cable: 14 AWG (1.63 mm²)
	Without cable end		Flexible cable: 26-16 AWG (0.14...1.5 mm²)
	With cable end		Without bezel, flexible cable: 26-16 AWG (0.14…1.5 mm²)
2-wire connection	Without cable end		Solid cable: 26-16 AWG (0.14...1.5 mm²)
	Without cable end		Flexible cable: 26-16 AWG (0.14...1.5 mm²)

(1) Using an appropriate and correctly connected control system.

Safety relays

Preventa™ safety monitoring module XPSLCM

For “muting” function of type 2 and type 4 light curtains

XPSLCM1150

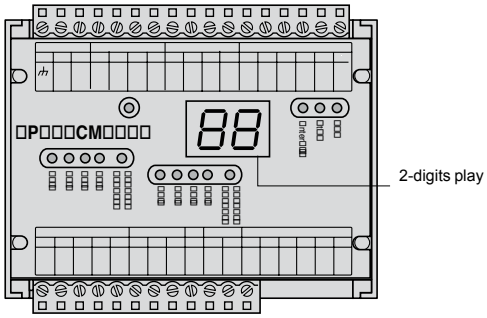
References

Safety module

Description	Type of terminal block connection	Number of safety circuits	Auxiliary outputs	Supply	Reference	Weight
						oz (kg)
Safety module for “muting” function	Removable from module	2 PNP	1 PNP + 1 NPN	⎓ 24 V	**XPSLCM1150**	23.281 (0.660)

Spare parts

Description	Power	Reference	Weight
	W		oz (kg)
“Muting” indicator light kit	5	**XSZCM01**	0.423 (0.012)
Replacement bulbs for “muting” indicator light kit consisting of one lot of 10 replacement bulbs and 1 removal/insertion tool XBF-X13	1 to 7	**XSZCM02**	0.564 (0.016)



LED details

XPSLCM1150

To aid diagnostics, the safety monitoring module has 14 LEDs and a 2-digit display on the front cover which provide information on the monitoring circuit status.

Safety relays

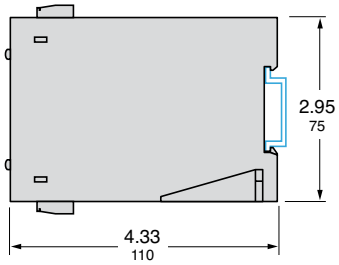
Preventa™ safety monitoring module XPSLCM

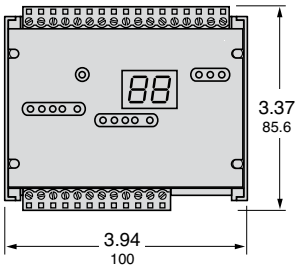
For “muting” function of type 2 and type 4 light curtains

Dimensions

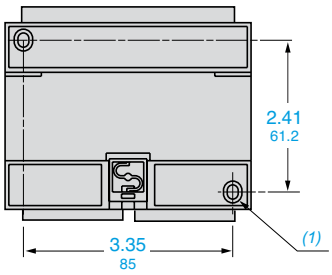
XPSLCM1150

Mounting on 35 mm rail



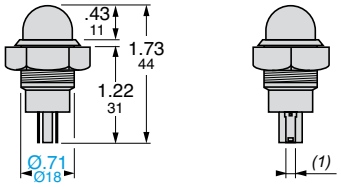


Rear view



(1) 2 elongated holes Ø 4 x 5.7

“Muting” indicator light kit XSZ CM01



Dual Dimensions: INCHES / Millimeters

(1) Faston connector 4.7.

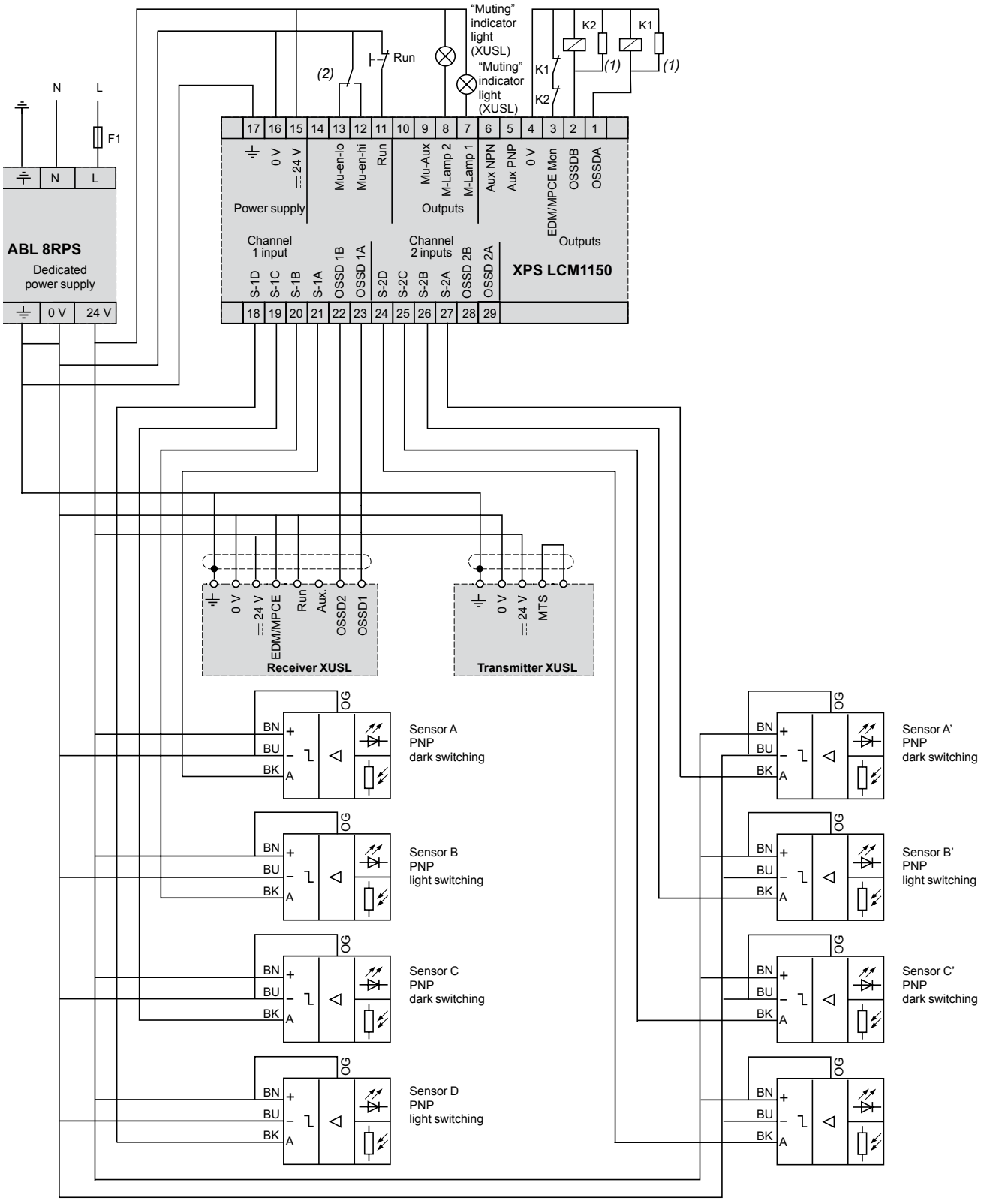
Safety relays

Preventa™ safety monitoring module XPSLCM

For “muting” function of type 2 and type 4 light curtains

Connection via the safety monitoring module XPSLCM1150

Example: configuration with light curtains XUSL



(1) Arc suppressor.
(2) Inhibition activation/deactivation key switch.

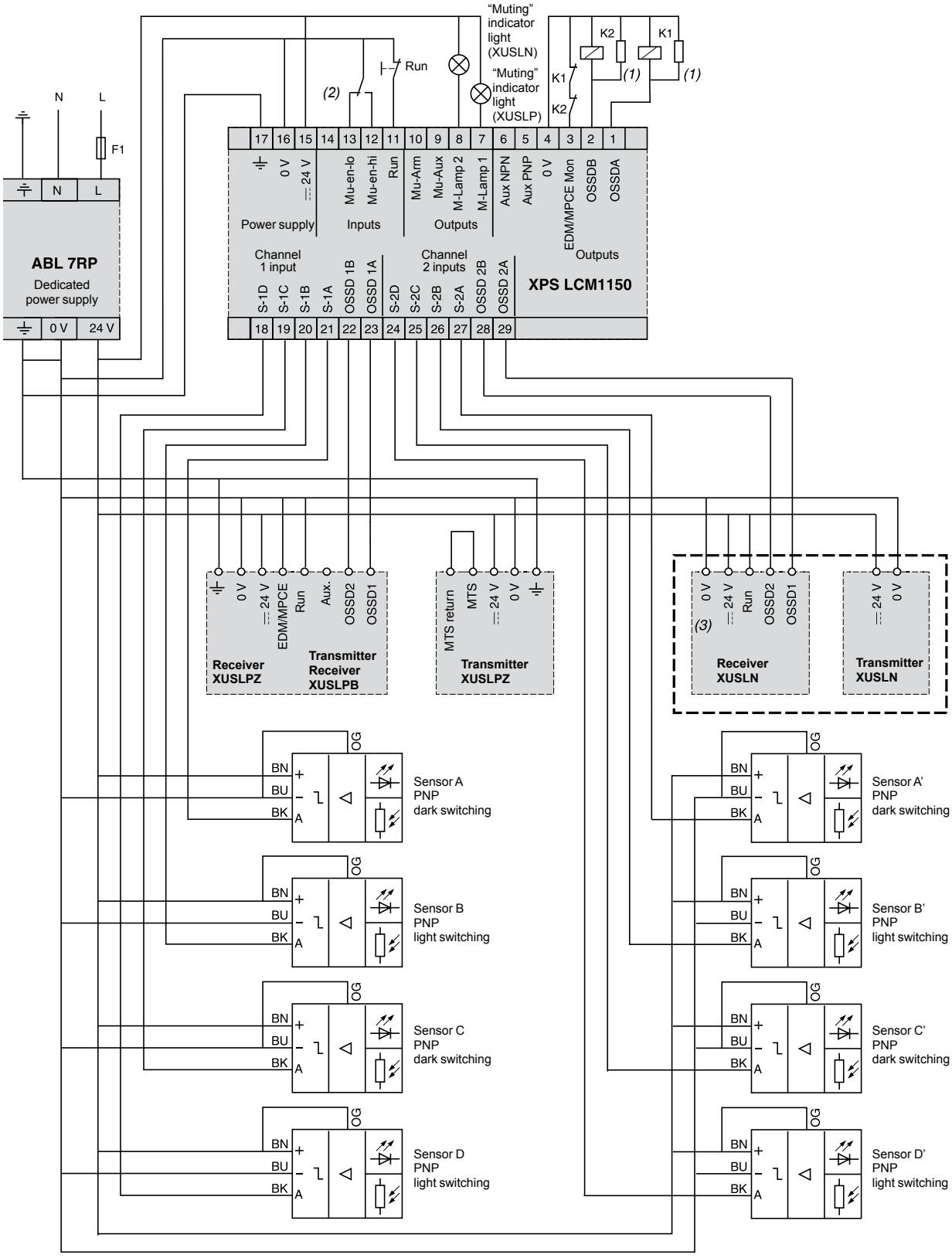
Safety relays

Preventa™ safety monitoring module XPSLCM

For “muting” function of type 2 and type 4 light curtains

Connection via the safety monitoring module XPSLCM1150

Example: configuration with 2 light curtains XUSLP and XUSLN



(1) Arc suppressor.
(2) Inhibition activation/deactivation key switch.
(3) When module XPSLCM1150 is used with a type 2 light curtain (example: XUSLN), the entire protection system is downgraded to category 2.

Principle: page 3/72 | Specifications: page 3/73 | References: page 3/74 | Dimensions: page 3/75 | Wiring diagrams: page 3/76

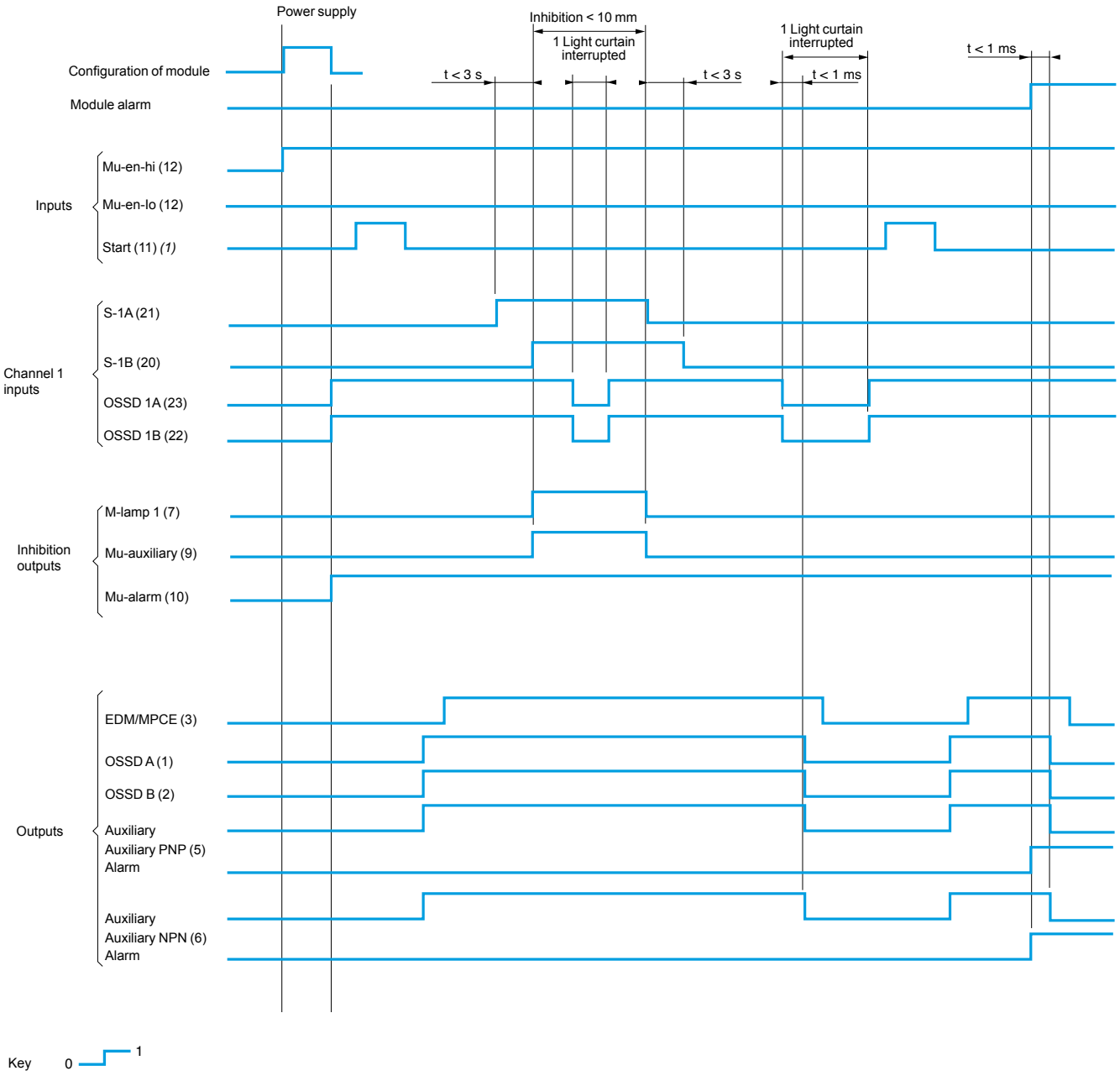
Safety relays

Preventa™ safety monitoring module XPSLCM

For “muting” function of type 2 and type 4 light curtains

Functional diagram of safety monitoring module XPSLCM1150

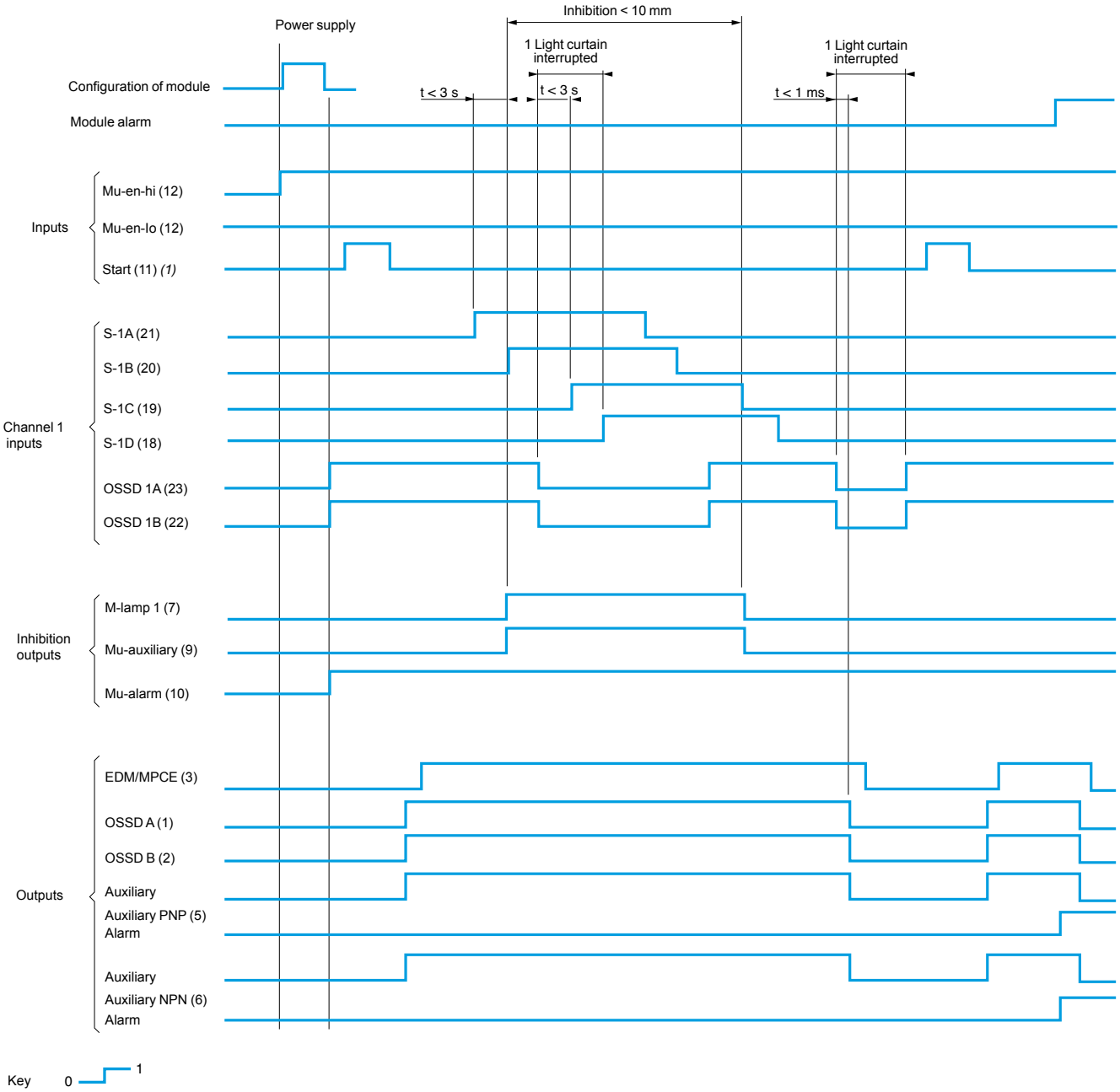
“Start/restart interlock” mode with 2 sensors



(1) Press Start button.

Functional diagram of safety monitoring module XPSLCM1150

“Start/restart interlock” mode with 4 sensors



(1) Press Start button.

Safety relays

Preventa™ safety relay modules types XPSECME, XPSECPE

For increasing the number of safety contacts

Operating principle

Safety relay modules XPSECME and XPSECPE, for increasing the number of safety contacts, are available as additions to Preventa XPS base modules (Emergency stop, limit switch, two-hand control, etc.). They are used to increase the number of safety output contacts of the base modules.

Specifications

Module type				XPSECME●●●●P	XPSECME●●●●C	XPSECPE●●●●P	XPSECPE●●●●C
Maximum achievable safety level				PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061 (when connected to the appropriate module)			
Reliability data *(1)*	Mean Time To dangerous Failure ($MTTF_d$)		**Years**	45		30	
	Diagnostic Coverage (DC)		**%**	60 to 90		99	
	Probability of dangerous Failure per Hour (PFH_d)		**1/h**	2.00×10^{-7}		3.00×10^{-9}	
Conformity to standards				EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1			
Product certifications				UL, CSA, BG		UL, CSA, TÜV	
Supply	Voltage		**V**	∿ and 24 ⎓		∿ and 24 ⎓, 115 to 230 ∿	
	Voltage limits			- 15 to + 10%		-15 to +10%	
	Frequency		**Hz**	50/60			
Power consumption	24 V		**VA**	< 5		4	
	115 V/230 V		**VA**	–		6	
Module inputs fuse protection				Internal, electronic		Internal PTC	
Outputs	Voltage reference			Relay hard contacts			
	Number and type of safety circuits			4 N.O.		8 N.O.	
	Number and type of additional circuits			2 N.C.		1 N.C.	
	Breaking capacity in AC-15		**VA**	B300: inrush 3600, maintained 360			
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms		24 V/3 A - L/R = 50 ms	
	Max. thermal current (Ithe)		**A**	6			
	Max. total thermal current		**A**	12		24	
	Output fuse protection		**A**	6 gG			
	Minimum current (relay contact)		**mA**	10 (conforming to EN/IEC 60947-5-1, VDE 0660 part 200)			
	Minimum voltage (relay contact)		**V**	17		5	
Electrical life				See page 3/12			
Response time on input opening			**ms**	< 20		10	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)			
Rated impulse withstand voltage (Uimp)			**kV**	4 (overvoltage category III, conforming to IEC/EN 60947-1, DIN VDE 0110 parts 1 & 2)			
LED display				2		3	
Operating temperature			**°F (°C)**	- 13 to + 131 (- 25 to + 55)		- 13 to + 131 (- 25 to + 55)	
Storage temperature			**°F (°C)**	- 13 to + 167 (- 25 to + 75)		- 13 to + 158 (- 25 to + 70)	
Degree of protection conforming to IEC 60529	Terminals			IP 20			
	Enclosure			IP 40			
Connection	Type	Terminals		Captive screw clamp terminals	Spring terminals	Captive screw clamp terminals	Spring terminals
		Terminal block		Removable from module			
	1-wire connection	Without cable end		Solid or flexible cable: 24-14 AWG (0.2 to 2.5 mm^2)			
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm^2)			
				With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm^2)	With bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm^2)	With bezel, flexible cable: 24-16 AWG (0.25 to 1.5 mm^2)	With bezel, flexible cable: 24-14 AWG (0.25 to 2.5 mm^2)
	2-wire connection	Without cable end		Solid or flexible cable: 24-18 AWG (0.2 to 1 mm^2)	–	Solid or flexible cable: 24-18 AWG (0.2 to 1 mm^2)	–
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25 to 1 mm^2)	–	Without bezel, flexible cable: 24-18 AWG (0.25 to 1 mm^2)	–
				Double, with bezel, flexible cable: 20-16 AWG (0.5 to 1.5 mm^2)	Double, with bezel, flexible cable: 20-18 AWG (0.5 to 1 mm^2)	Double, with bezel, flexible cable: 20-16 AWG (0.5 to 1.5 mm^2)	Double, with bezel, flexible cable: 20-18 AWG (0.5 to 1 mm^2)

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Safety relays

Preventa™ safety relay modules types XPSECME, XPSECPE

For increasing the number of safety contacts

XPSECME5131P

XPSECME5131C

XPSECPE5131P

XPSECPE5131C

References

Description	Number of safety circuits	Additional outputs	Supply	Connection	Reference	Weight oz (kg)
Safety modules for increasing the number of safety contacts, for use with XPS base modules	4	2	∼ and 24 V ⎓	Captive screw clamp terminals Terminal block removable from module	**XPSECME5131P**	9.524 (0.270)
				Spring terminals Terminal block removable from module	**XPSECME5131C**	9.524 (0.270)
	8	1	∼ and 24 V ⎓	Captive screw clamp terminals Terminal block removable from module	**XPSECPE5131P**	19.401 (0.550)
				Spring terminals Terminal block removable from module	**XPSECPE5131C**	22.928 (0.650)
			115 to 230 V ∼	Captive screw clamp terminals Terminal block removable from module	**XPSECPE3910P**	22.928 (0.650)
				Spring terminals Terminal block removable from module	**XPSECPE3910C**	22.928 (0.650)

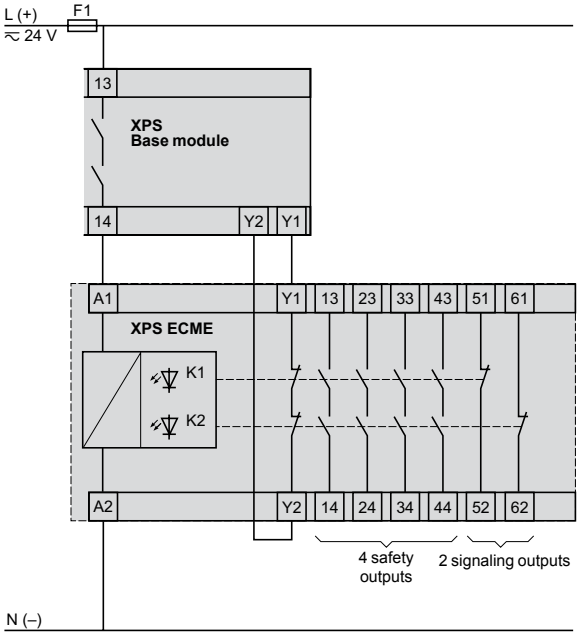
Safety relays

Preventa™ safety relay modules type XPSECME

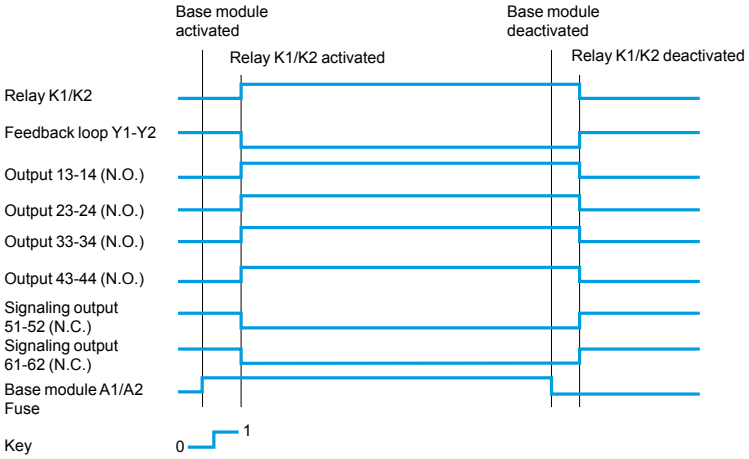
For increasing the number of safety contacts

XPSECME

Wiring diagram



Functional diagram



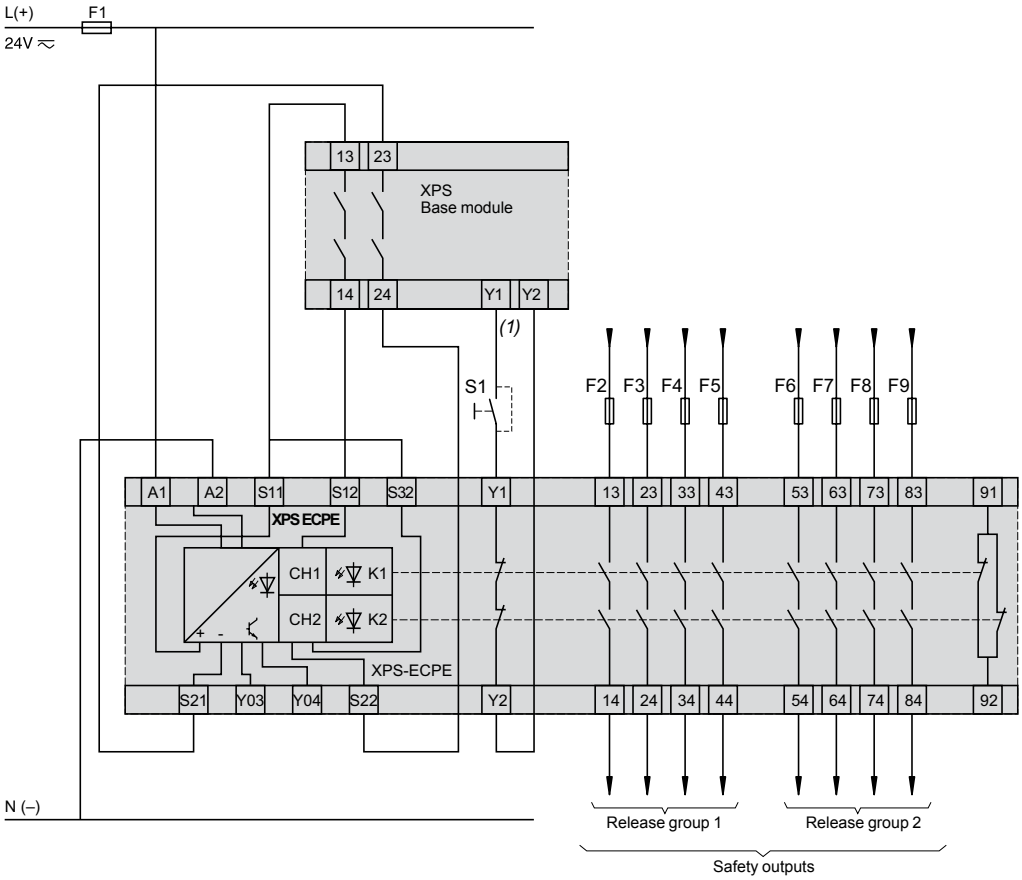
Safety relays

Preventa™ safety relay modules type XPSECPE

For increasing the number of safety contacts

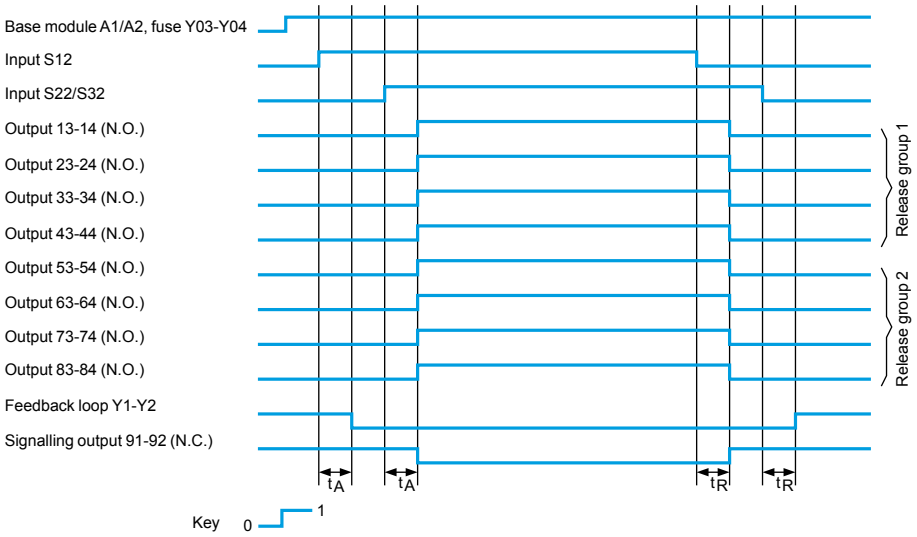
XPSECPE

Wiring diagram



S1: Start Button.
(1) Feedback loop.

Functional diagram



tA : response time (K1 and K2)
tR : release time

Safety relays

Preventa™ safety relay modules types XPSTSA, XPSTSW

For safety time delays

Operating principle

Safety relay modules XPSTSA and XPSTSW are used in applications requiring safety time delays:

- modules XPSTSA in applications with interlocking on high inertia machines with long rundown time (guards unlocked after safety time delay has elapsed),
- modules XPSTSW in applications with a safety switchover contact (jumpering contact in association with XPSVN modules for zero speed detection, solenoid valve monitoring, etc.).

The time delay of safety circuits can be set to 16 preset values, using 2 selectors located on the front cover of the modules.

To aid diagnostics, the modules have LEDs which provide information on the monitoring circuit status and 2 solid-state outputs for signalling to the process PLC.

In addition, their removable terminal blocks optimize machine maintenance.

Specifications

Module type				XPSTSA	XPSTSW
Maximum achievable safety level				PL d/Category 3 conforming to EN/ISO 13849-1, SILCL 2 conforming to EN/IEC 62061	
Reliability data (1)	Mean Time To dangerous Failure ($MTTF_d$)		**Years**	126	
	Diagnostic Coverage (DC)		**%**	60 to 90	
	Probability of dangerous Failure per Hour (PFH_d)		**1/h**	1.3 x 10^{-7}	
Conformity to standards				EN/IEC 60204-1, EN/IEC 60947-5-1	
Product certifications				UL, CSA, BG	
Supply	Voltage		**V**	∼ and ⎓ 24, ∼ 115, ∼ 230	
	Voltage limits			- 15…+ 15% (⎓ 24 V) - 20…+ 10% (∼ 24 V) - 15…+ 15% (115 V) - 15…+ 10% (230 V)	
	Frequency		**Hz**	50/60	
Power consumption	⎓ 24		**VA**	< 2.3	
	∼ 24 V			< 4.3	
	∼ 115			< 6.5	
	∼ 230 V			< 5.5	
Module inputs fuse protection				Internal, electronic	
Time delay			**s**	1…31 (16 positions)	–
Pulse time			**s**	–	0.1…3.1 (16 positions)
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			1 N.O. (17-18) + 2 N.C. (25-26, 35-36)	
	Number and type of additional circuits			2 solid-state (Y53-Y54, Y63-Y64)	
	Breaking capacity in AC-15		**VA**	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms	
	Breaking capacity of solid-state outputs			24 V/20 mA, 48 V/10 mA	
	Max. thermal current (Ithe)		**A**	6	
	Output fuse protection		**A**	4 gG (gl) or 6 fast acting, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	
	Minimum current		**mA**	10	
	Minimum voltage		**V**	17	
Electrical life				See page 3/12	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)			**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				4	
Operating temperature			**°F (°C)**	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			**°F (°C)**	- 13…+ 185 (- 25…+ 85)	
Degree of protection conforming to IEC 60529		Terminals		IP 20	
		Enclosure		IP 40	
Connection		Type		Captive screw clamp terminals, removable terminal block	
	1-wire connection	Without cable end		Solid or flexible cable: 24-14 AWG (0.2…2.5 mm^2)	
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)	
		With cable end		With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)	
	2-wire connection	Without cable end		Solid cable: 24-18 AWG (0.2…1 mm^2), flexible cable: 24-16 AWG (0.2…1.5 mm^2)	
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm^2)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm^2)	

(1) Using an appropriate and correctly connected control system.

Safety relays

Preventa™ safety relay modules types XPSTSA, XPSTSW

For safety time delays

References

XPSTSA●●●●P

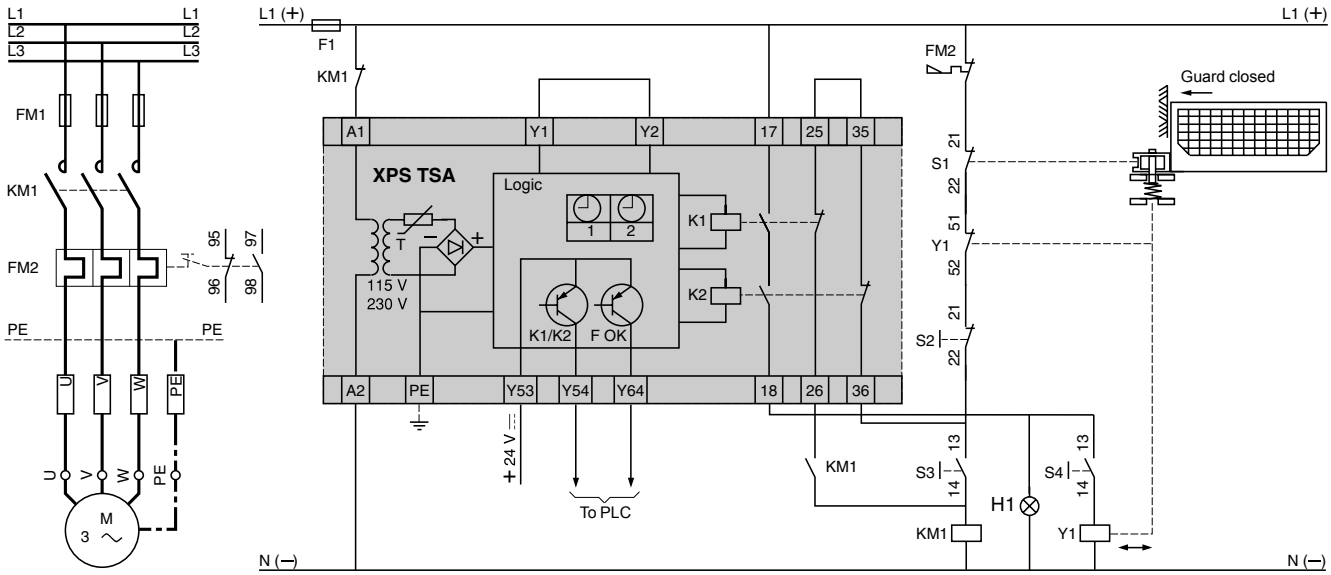
XPSTSW●●●●P

Description	Number of safety circuits	Number of additional outputs	Supply	Reference	Weight oz (kg)
Safety modules for applications with interlocking on high inertia machines	1 delayed	2 N.C. + 2 solid-state to PLC	∼ and ⎓ 24 V	**XPSTSA5142P**	8.818 (0.250)
			∼ 115 V	**XPSTSA3442P**	12.699 (0.360)
			∼ 230 V	**XPSTSA3742P**	12.699 (0.360)
Safety modules for applications with safety switchover contact	1 pulse type	2 N.C. + 2 solid-state to PLC	∼ and ⎓ 24 V	**XPSTSW5142P**	8.818 (0.250)
			∼ 115 V	**XPSTSW3442P**	12.699 (0.360)
			∼ 230 V	**XPSTSW3742P**	12.699 (0.360)

Wiring diagrams

XPSTSA

Delayed unlocking of a guard application

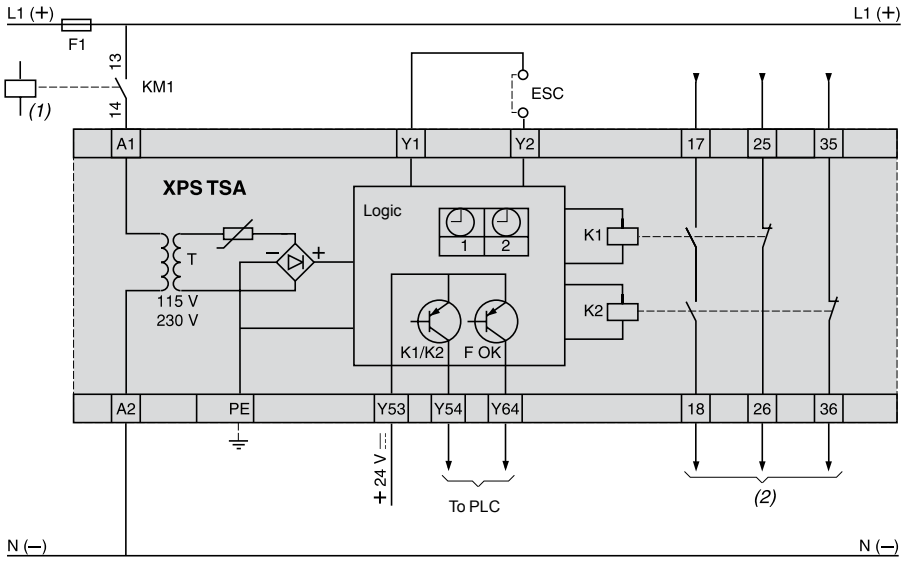


Contacts 95/96 and 97/98 are trip contacts for an overload relay.
S1 is one of the N.C. safety contacts in an XCSE switch
Y1 is the N.C. solenoid contact in the XCSE switch (wired in series with the S1)
S2 is the motor stop push button
S3 is the motor start push button, in parallel of KM1 contact
S4 is the push button to energize the XCSE solenoid to unlock the guard

3

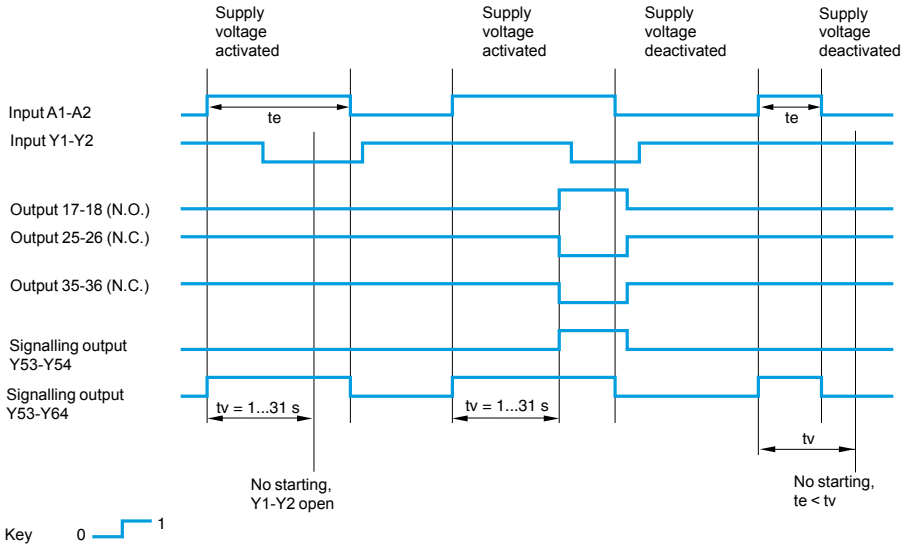
XPSTSA

Wiring diagram

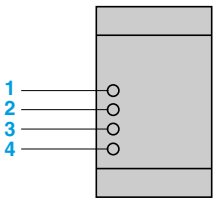


(1) Signal to be delayed.
(2) Relay hard contact outputs with on-delay.
ESC: External start conditions.

Functional diagram of module XPSTSA



LED details (XPSTSA, XPA TSW)



1 Supply voltage A1-A2 (fuse status).
2 Safety output closed.
3 Feedback loop Y1-Y2 status.
4 Time function active.

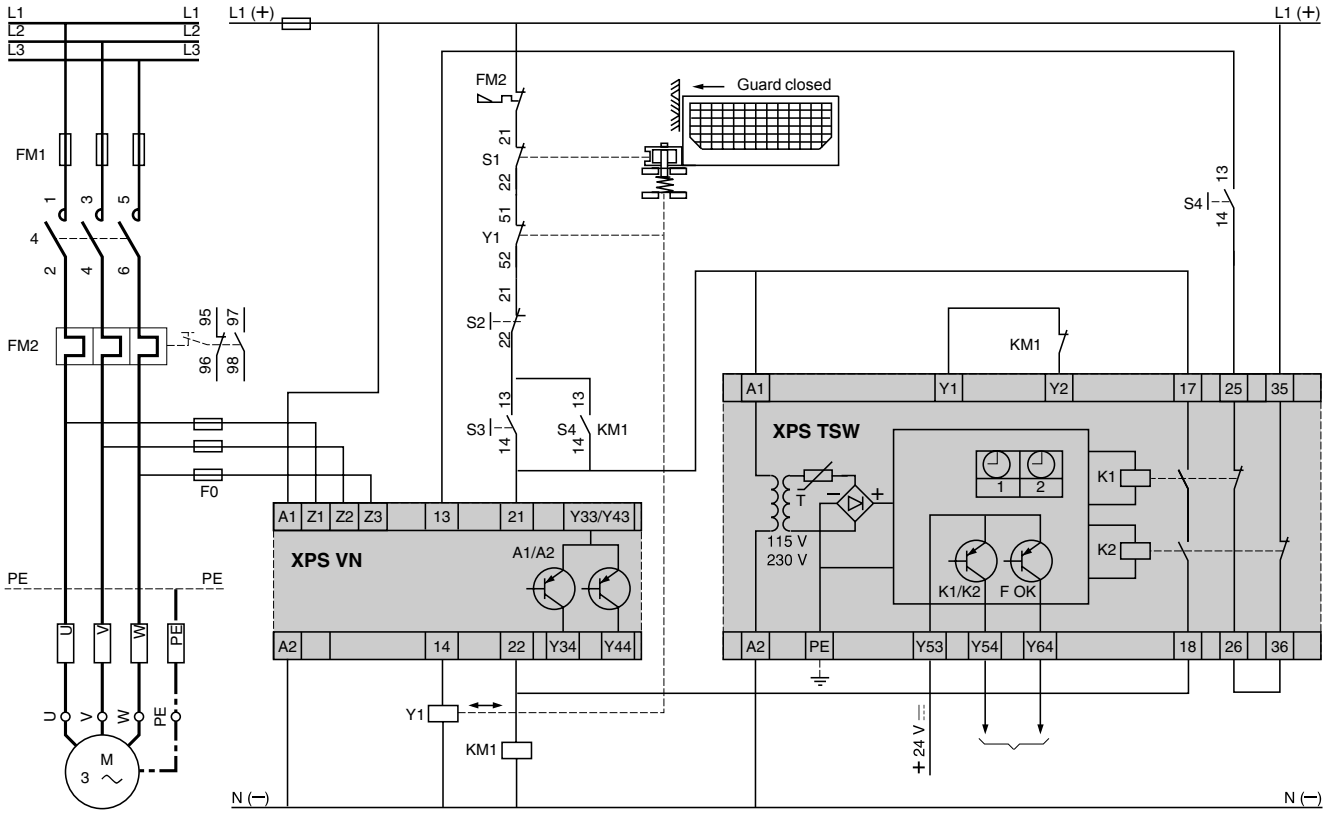
Safety relays

Preventa™ safety relay modules type XPSTSW

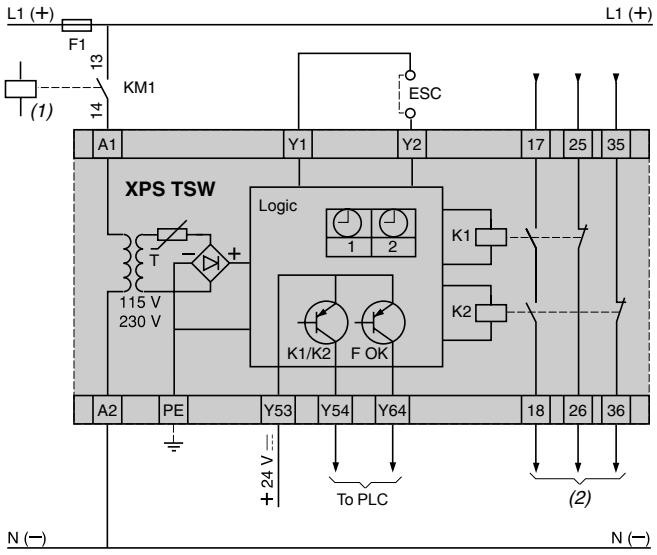
For safety time delays

XPSTSW

Guard unlocking application using zero speed detection

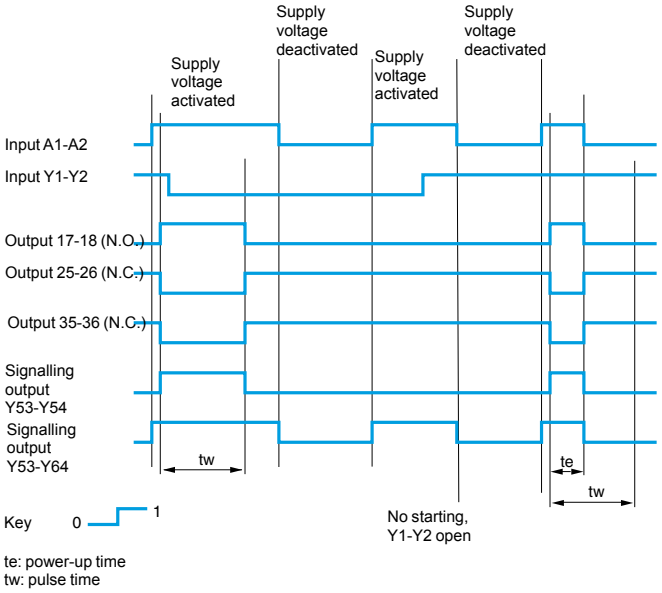


Wiring diagram



(1) Control signal.
(2) Relay hard contact outputs with pulse time delay.
ESC: External start conditions.
LED details: see page 3/86.

Functional diagram of module XPSTSW



te: power-up time
tw: pulse time

Safety relays

Preventa™ safety relay modules types XPSDMB, XPSDME

For non-contact safety interlock (coded magnetic) switch monitoring

Operating principle

Safety relay modules XPSDMB and XPSDME are specifically designed for monitoring coded magnetic safety switches. They incorporate two safety outputs and two solid-state outputs for signalling to the process PLC.
XPSDMB safety relay modules can monitor two independent sensors and modules XPSDME can monitor up to six independent sensors.
To monitor a higher number of magnetic switches using these safety modules, the magnetic switches can be connected in series, while meeting the requirements of category 3 of EN/ISO 13849-1.

Safety modules XPSDM●●●●●P incorporate removable terminal blocks, thus optimizing machine maintenance.

To aid diagnostics, the modules have LEDs on the front cover which provide information on the monitoring circuit status.

Specifications

Module type				**XPSDMB1132**	**XPSDME1132**	**XPSDMB1132P**	**XPSDME1132P**
Maximum achievable safety level				PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061			
Reliability data (1)	Mean Time To dangerous Failure ($MTTF_d$)		**Years**	83.1	82.4	83.1	82.4
	Diagnostic Coverage (DC)		**%**	> 99			
	Probability of dangerous Failure per Hour (PFH_d)		**1/h**	3.92×10^{-9}	3.97×10^{-9}	3.92×10^{-9}	3.97×10^{-9}
Conformity to standards				EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/IEC 60947-5-3, DIN V VDE 0801 (1990), DIN V VDE 0801 A1 (1994)			
Product certifications				UL, CSA, BIA			
Supply (Ue) conforming to IEC 38	Voltage		**V**	⎓ 24			
	Voltage limits	⎓ 24 V		- 20…+ 20%			
Power consumption			**W**	< 2.5	< 3.5	< 2.5	< 3.5
Module inputs fuse protection				Internal, electronic			
Maximum wiring resistance RL between the module and the coded magnetic switches			Ω	100			
Control unit voltage and current				28 V/8 mA			
Synchronization time between magnetic switch inputs			**s**	< 0.5			
Safety outputs	Voltage reference			Relay hard contacts			
	Number and type of safety circuits			2 N.O.			
	Number and type of solid-state outputs			2			
	Breaking capacity in AC-15		**VA**	C300: inrush 1800, sealed: 180			
	Breaking capacity in DC-13			24 V/1.5 A, L/R = 50 ms			
	Max. thermal current (Ithe)		**A**	6			
	Max. total thermal current		**A**	12			
	Output fuse protection		**A**	4 gG or 6 fast acting			
	Minimum current		**mA**	10			
	Minimum voltage		**V**	17			
Electrical life				See page 3/12			
Response time on input opening			**ms**	< 20			
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)			
Rated impulse withstand voltage (Uimp.)			**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)			
LED display				3	15	3	15
Ambient air temperature			**°F (°C)**	For operation: + 14…+ 131 (- 10…+ 55), for storage: - 13…+ 185 (- 25…+ 85)			
Degree of protection conforming to IEC 60529				Terminals: IP 20, enclosure: IP 40			
Connection	Type			Captive screw clamp terminals		Captive screw clamp terminals, removable terminal block	
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14… 2.5 mm^2)		Solid or flexible cable: 24-14 AWG (0.2…2.5 mm^2)	
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)			
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm^2)		With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm^2)	
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm^2)		Solid cable: 24-18 AWG (0.2…1 mm^2), flexible cable: 24-16 AWG (0.2…1.5 mm^2)	
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm^2)			
		With cable end		With bezel, flexible cable: 20-16 AWG (0.5… 1.5 mm^2)			

(1) Per EN/ISO 13849-1 and EN/IEC 62061

Safety relays

Preventa™ safety relay modules types XPSDMB, XPSDME

For non-contact safety interlock (coded magnetic) switch monitoring

XPSDMB1132●

XPSDME1132

References

Description	Type of terminal block connection	Number of safety circuits	Solid-state outputs for PLC	Supply V	Reference	Weight oz (kg)
Safety module for monitoring 2 coded magnetic switches	Integrated in module	2 N.O.	2	⎓ 24	**XPSDMB1132**	8.818 (0.250)
Safety module for monitoring 6 coded magnetic switches	Integrated in module	2 N.O.	2	⎓ 24	**XPSDME1132**	10.582 (0.300)
Safety module for monitoring 2 coded magnetic switches	Removable from module	2 N.O.	2	⎓ 24	**XPSDMB1132P**	8.818 (0.250)
Safety module for monitoring 6 coded magnetic switches	Removable from module	2 N.O.	2	⎓ 24	**XPSDME1132P**	10.582 (0.300)

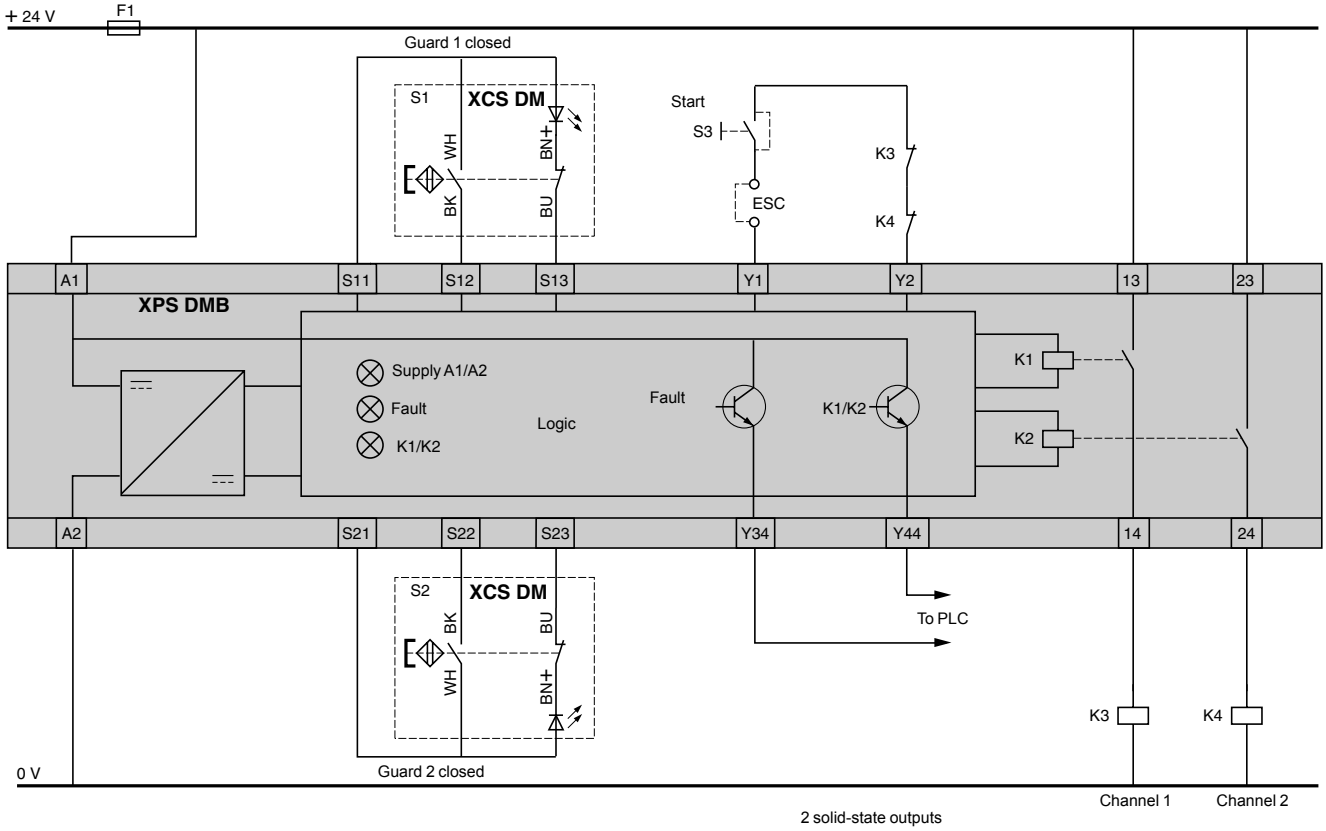
Safety relays

Preventa™ safety relay modules types XPSDMB, XPSDME

For non-contact safety interlock (coded magnetic) switch monitoring

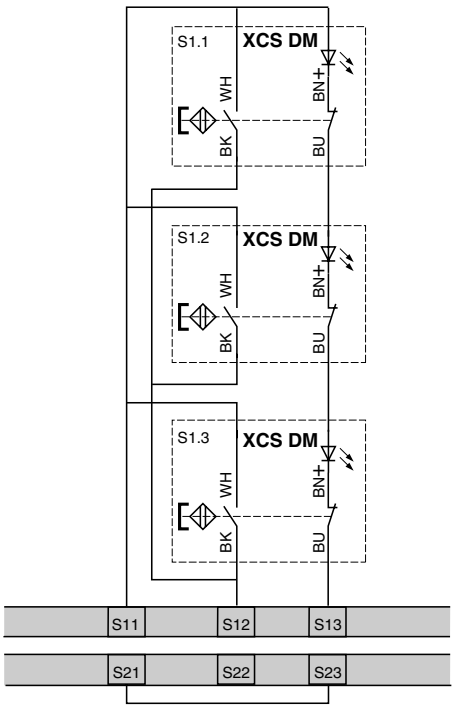
XPSDMB

Wiring to category 4 conforming to EN/ISO 13849-1. Example with 2-pole N.C. + N.O. (N.C. staggered) contact.



ESC: External start conditions.

Wiring to category 3 conforming to EN/ISO 13849-1. Example with 3 switches with 2-pole N.C. + N.O. (N.C. staggered) contacts.



Input: S11, S12, S13 or S21, S22, S23.
Unused inputs must be jumpered: i.e.: if only input S11, S12, S13 is used, then terminals S21 and S23 must be jumpered.
The order in which the inputs are wired or jumpered will not affect operation.

Principle: page 3/88 | Specifications: page 3/88 | References: page 3/89 | Wiring diagrams: page 3/90 | Dimensions: page 3/112

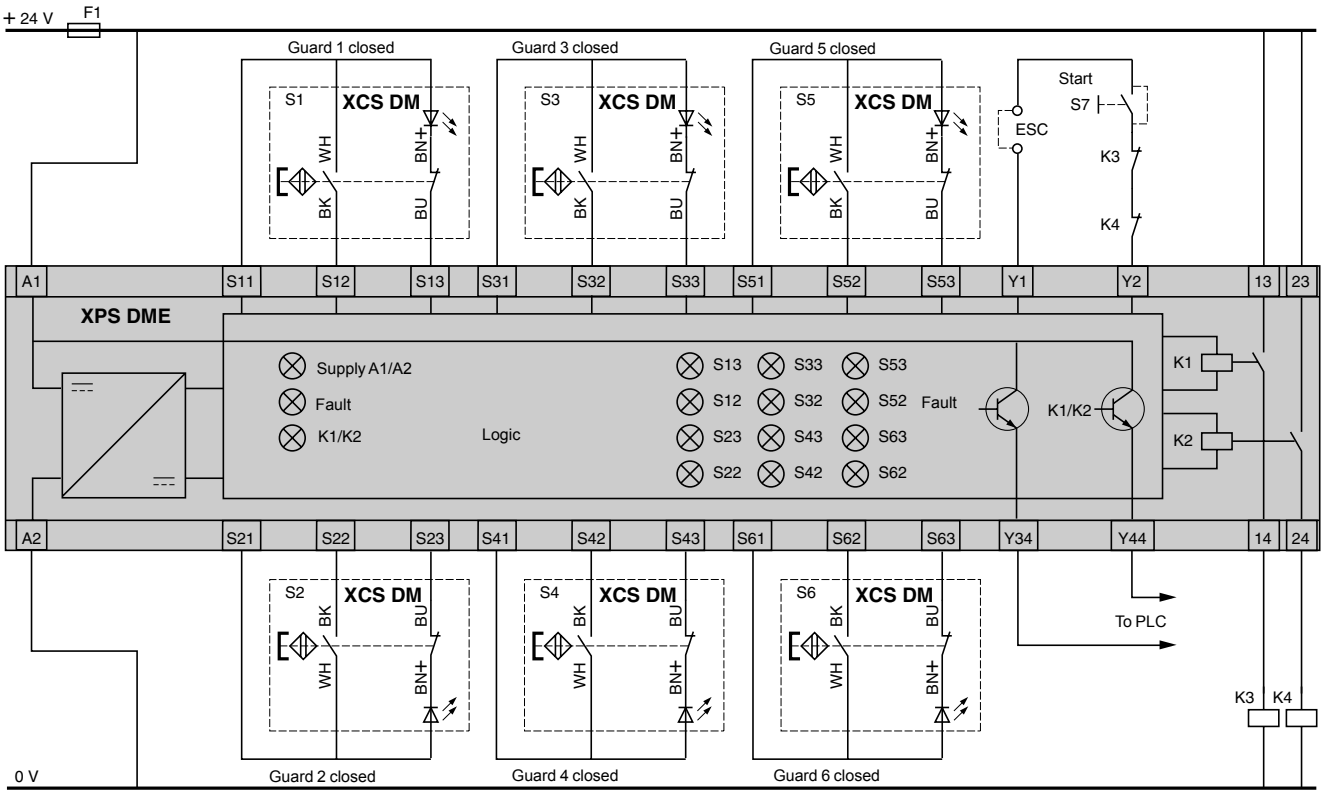
Safety relays

Preventa™ safety relay modules types XPSDMB, XPSDME

For non-contact safety interlock (coded magnetic) switch monitoring

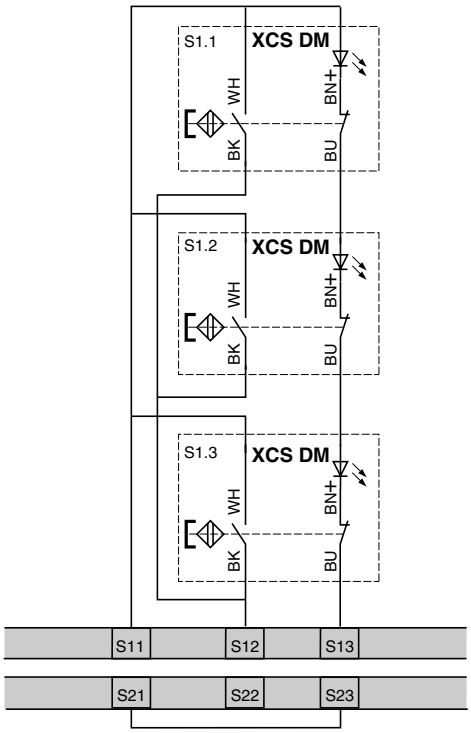
XPSDME

Wiring to category 4 conforming to EN/ISO 13849-1. Example with 2-pole N.C. + N.O. (N.C. staggered) contact



ESC: External start conditions.

Wiring to category 3 conforming to EN/ISO 13849-1. Example with 3 switches with 2-pole N.C. + N.O. (N.C. staggered) contacts.



Input: S11, S12, S13 or S21, S22, S23 or S31, S32, S33 or S41, S42, S43 or S51, S52, S53 or S61, S62, S63.
Unused inputs must be jumpered i.e.: if input S61, S62, S63 is not used, then terminals S61 and S63 must be jumpered.
Terminals to be jumpered if the input is not used are: S11 and S13, S21 and S23, S31 and S33, S41 and S43, S51 and S53, S61 and S63.

The order in which the inputs are wired will not affect device operation.

Principle: page 3/88 | Specifications: page 3/88 | References: page 3/89 | Wiring diagrams: page 3/90 | Dimensions: page 3/112

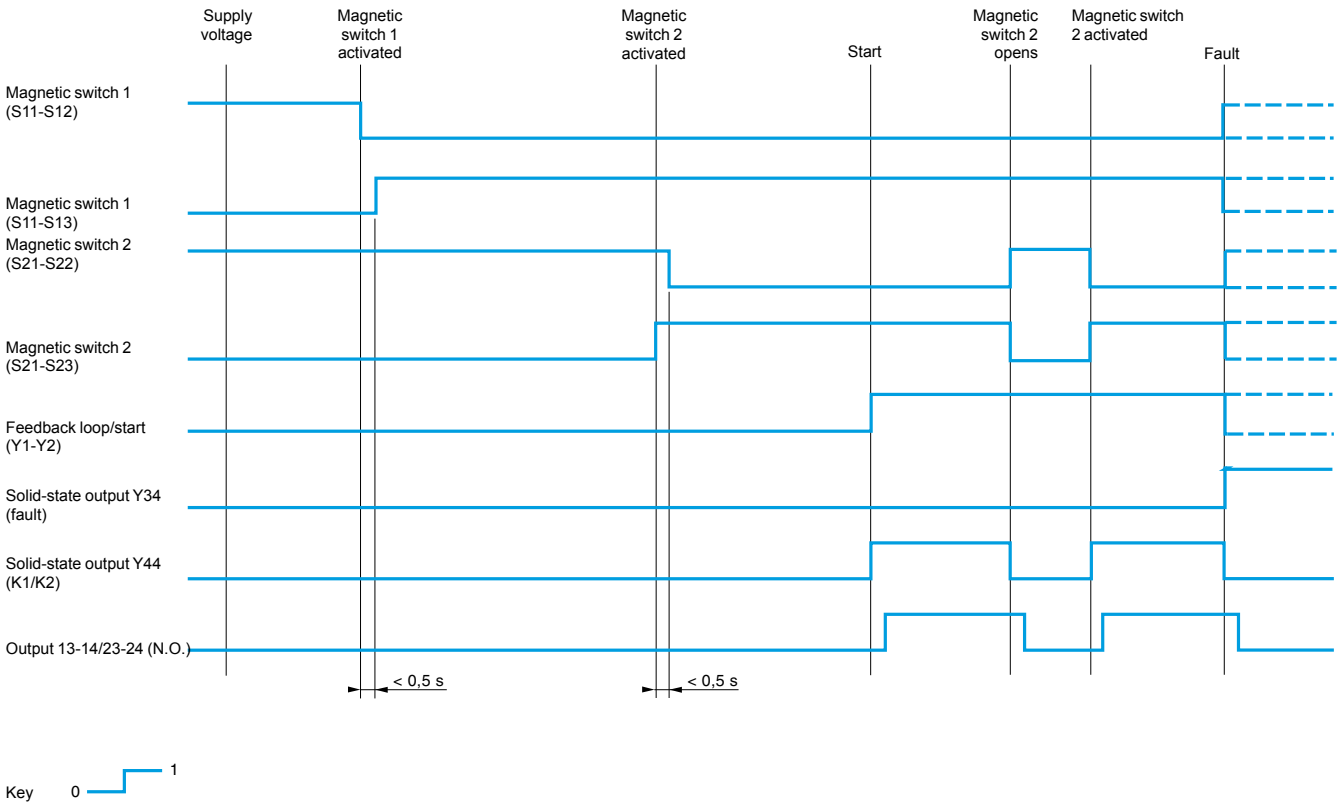
Safety relays

Preventa™ safety relay modules types XPSDMB, XPSDME

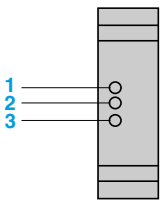
For non-contact safety interlock (coded magnetic) switch monitoring

XPSDMB

Functional diagram



LED details



1 Supply voltage A1-A2, internal electronic fuse status.
2 Fault signalling.
3 Safety outputs closed.

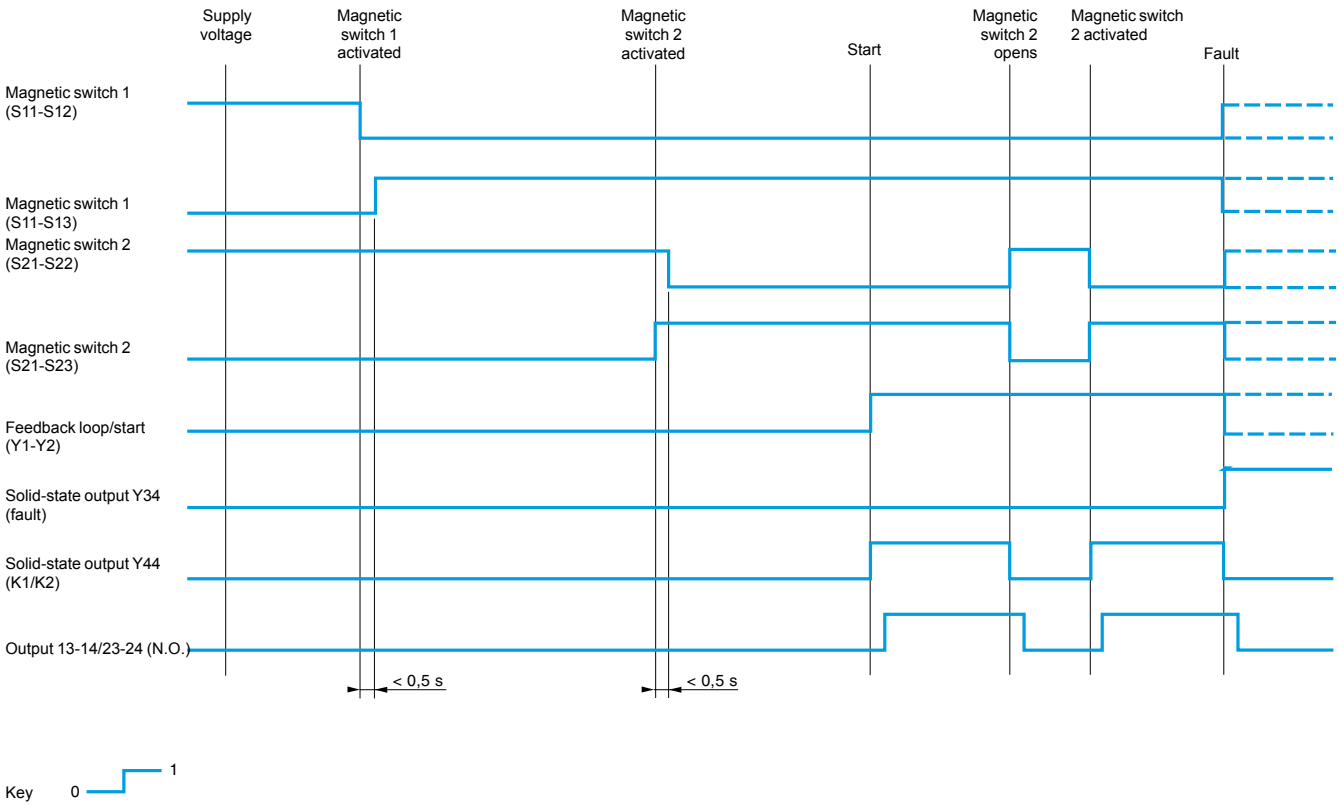
Safety relays

Preventa™ safety relay modules types XPSDMB, XPSDME

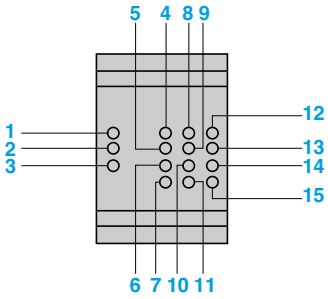
For non-contact safety interlock (coded magnetic) switch monitoring

XPSDME

Functional diagram



LED details



1 Supply voltage A1-A2, internal electronic fuse status.
2 Fault signalling.
3 Safety outputs closed.
4 Magnetic switch 1 activated.
5 Magnetic switch 1 deactivated.
6 Magnetic switch 2 activated.
7 Magnetic switch 2 deactivated.
8 Magnetic switch 3 activated.
9 Magnetic switch 3 deactivated.
10 Magnetic switch 4 activated.
11 Magnetic switch 4 deactivated.
12 Magnetic switch 5 activated.
13 Magnetic switch 5 deactivated.
14 Magnetic switch 6 activated.
15 Magnetic switch 6 deactivated.

Safety relays
Preventa™ safety relay modules type XPSVNE
For zero speed detection

Operating principle

Preventa™ safety relay modules type XPSVNE for zero speed detection are used to detect the stop condition of electric motors. Their most common applications include: providing the unlock signal for electrically interlocked sliding or removable machine guards, controlling rotation direction signals for reversing motors and engaging locking brakes after a motor has come to a standstill.

As electric motors run down, a remanent voltage is produced in the windings of the motor due to residual magnetism. This voltage is proportional to the speed of the motor and, therefore, decreases as the motor comes to a standstill.
This remanent voltage is measured in a redundant manner so as to detect the stop condition of the motor. The cabling between the motor windings and the inputs of the XPSVNE module is also monitored to prevent a cabling breakage or anomaly being seen as a stopped motor.
A transformer should not be used to connect the motor to terminals Z1, Z2 and Z3 since there is no monitoring of the connection with the motor winding via the resistance monitoring.

Modules XPSVNE are suitable for detecting the stop condition of all types of a.c. or d.c. motor driven machines which, when the motor runs down, produce a remanent voltage in the windings due to residual magnetism. These machines can be controlled by electronic devices, such as variable speed drives or d.c. injection brakes.
The input filters for standard XPSVNE modules are designed for a frequency of up to 60 Hz.
For motors operating at a frequency higher than 60 Hz, which therefore produce a high frequency remanent voltage, special modules XPSVNE●●●●HS should be used.

The XPSVNE is not compatible with Wound Rotor Motors. These motors are typically used in high HP (1000+) low speed applications, where the additional windings (required for these types of motors) pay for themselves. If power is removed from stator, but rotor is left energized, then transformer coupling between the two could create a small voltage across the stator. This could make the XPSVNE think the motor is still turning, which means the safety outputs would never energize or change state. These motors do not have residual magnetism in the rotor that can act as a source of flux for generator effect, in which case the XPSVNE may think the motor is at zero speed, and could energize the safety outputs while the motor is still running. Wound Rotor motors are not in common use today, and very rare.

The XPSVNE is not designed for use with single phase motors.

The XPSVNE is not designed to detect locked rotor conditions. Here the motor still has voltage applied to it, but in essence has zero speed. Generally, a locked rotor condition is not a safe state for machinery nor the operators. The XPSVN will sense voltage applied to the windings, and will not indicate the motor's "apparent" zero speed. The outputs of the XPSVN will not change state, the gates or guards will not be unlocked, and operators will not be allowed access to the unsafe area.

Modules XPSVNE have 2 potentiometers mounted on the front cover of the module which allow independent adjustment of the switching threshold for each input circuit. This allows adjustment for different types of motors and application requirements.

To aid diagnostics, modules XPSVNE have 4 LEDs and 2 solid-state outputs to provide information on the status of the zero speed detection circuit.

Safety relays

Preventa™ safety relay modules type XPSVNE

For zero speed detection

Specifications

Module type			XPSVNE
Maximum achievable safety level			PL d/Category 3 conforming to EN/ISO 13849-1, SILCL 2 conforming to EN/IEC 62061
Reliability data (1)	Mean Time To dangerous Failure ($MTTF_d$)	**Years**	124.1
	Diagnostic Coverage (DC)	**%**	> 99
	Probability of dangerous Failure per Hour (PFH_d)	**1/h**	9.26×10^{-9}
Conformity to standards			EN 60204-1, EN/IEC 60947-5-1, EN 50082-2
Product certifications			UL, CSA, BG
Supply	Voltage	**V**	⎓ 24 ∿ 115 ∿ 230
	Voltage limits		- 15…+ 10% (⎓ 24 V) - 15…+ 15% (∿ 115 V) - 15…+ 10% (∿ 230 V)
	Frequency	**Hz**	50/60 (115 V, 230 V)
Power consumption		**W**	≤ 3.5 (⎓ 24 V)
		VA	≤ 7.5 (∿115 V), ≤ 7 (∿ 230 V)
Frequency of motor power supply		**Hz**	≤ 60 Hz (XPSVN●●42), > 60 Hz (XPSVN●●42HS)
Inputs	Maximum voltage between terminals Z1 - Z2 - Z3	**V**	500 rms
	Detection threshold	**V**	0.01 - 0.1 (adjustable)
Outputs	Voltage reference		Hard contacts
	Number and type of safety circuits		1 N.O. (13-14), 1 N.C. (21-22)
	Number and type of additional circuits		2 solid-state
	Breaking capacity in AC-15		C300 (inrush: 1800 VA/maintained: 180 VA)
	Breaking capacity in DC-13		24 V/1.5 A - L/R = 50 ms (contact 13-14) 24 V/1.2 A - L/R = 50 ms (contact 21-22)
	Breaking capacity of solid-state outputs		24 V/20 mA, 48 V/10 mA
	Max. thermal current (Ithe)	**A**	2.5
	Output fuse protection	**A**	4 gG, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200
	Minimum current (volt-free contact)	**mA**	10
	Minimum voltage (volt-free contact)	**V**	17
Electrical life			See page 3/12
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
Rated impulse withstand voltage (Uimp)		**kV**	4 (overvoltage category III, conforming to EN//IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
LED display			4
Operating temperature		**°F (°C)**	+ 14…+ 131 (- 10…+ 55)
Storage temperature		**°F (°C)**	- 13…+ 185 (- 25…+ 85)
Degree of protection Conforming to IEC 60529	Terminals		IP 20
	Enclosure		IP 40
Connection	Type		Captive screw clamp terminals, removable terminal block
1-wire connection	Without cable end		Solid or flexible cable: 24-14 AWG (0.2…2.5 mm^2)
	With cable end		Without bezel, solid or flexible cable: 24-14 AWG (0.25…2.5 mm^2)
			With bezel, solid or flexible cable: 24-14 AWG (0.25…2.5 mm^2)
2-wire connection	Without cable end		Solid cable: 24-18 AWG (0.2…1 mm^2), flexible cable: 24-16 AWG (0.2…1.5 mm^2)
	With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm^2)
			With bezel, flexible cable: 22-14 AWG (0.5…1.5 mm^2)

(1) Per EN/ISO 13849-1 and EN/IEC 62061

References

XPSVNE

Description	Number of safety circuits	Solid-state outputs for PLC	Supply	Frequency of motor power supply	Reference	Weight oz (kg)
Safety modules for zero speed detection	2	2	⎓ 24 V	≤ 60 Hz	**XPSVNE1142P**	17.637 (0.500)
				> 60 Hz	**XPSVNE1142HSP**	17.637 (0.500)
			∿ 115 V	≤ 60 Hz	**XPSVNE3442P**	21.164 (0.600)
				> 60 Hz	**XPSVNE3442HSP**	21.164 (0.600)
			∿ 230 V	≤ 60 Hz	**XPSVNE3742P**	21.164 (0.600)
				> 60 Hz	**XPSVNE3742HSP**	21.164 (0.600)

Principle: page 3/94 | Specifications: page 3/95 | References: page 3/95 | Wiring diagrams: page 3/96 | Dimensions: page 3/112

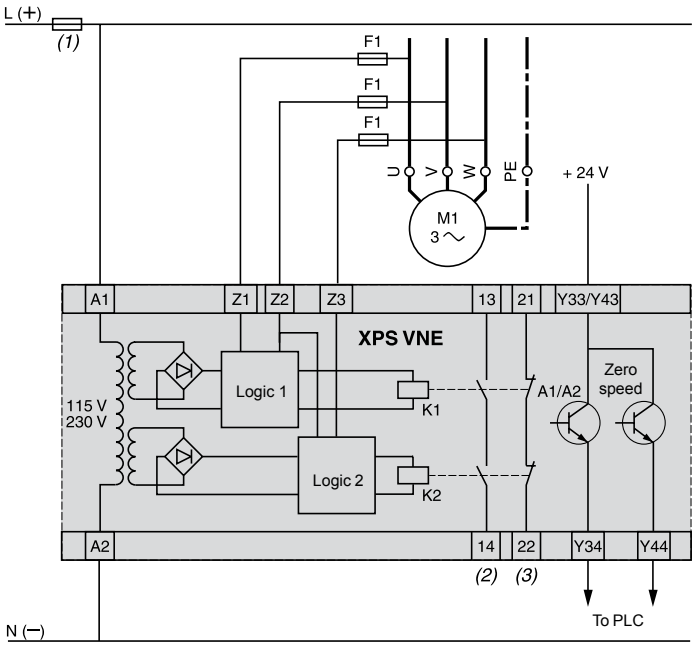
Safety relays

Preventa™ safety relay modules type XPSVNE

For zero speed detection

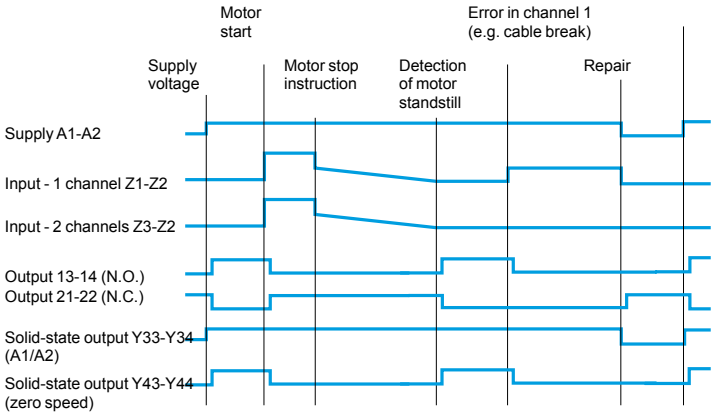
XPSVNE

Wiring diagram



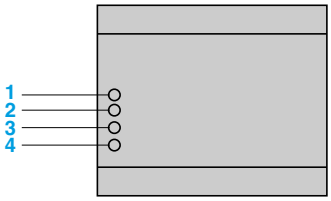
(1) Technical specifications for establishing maximum rating of fuses, see page 3/95.
(2) Contacts are open when motor is running, closed when motor is stopped.
(3) Contacts are closed when motor is running, open when motor is stopped.
F1 = 2 A

Functional diagram of module XPSVNE



Key 0 ⌐ 1
The voltages at terminals Z1, Z2 and Z3 are indicated solely for the purposes of schematic diagram reintroduction.

LED details



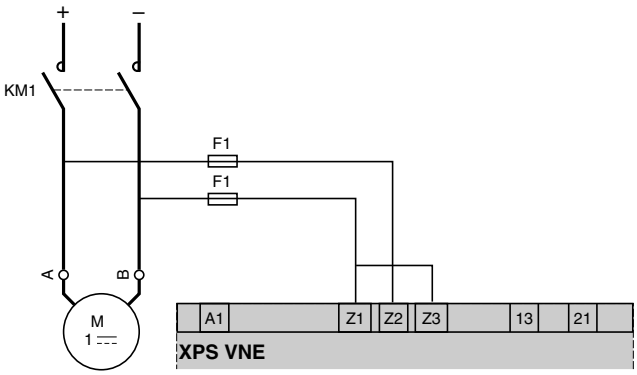
1 Supply voltage A1-A2.
2 Stop detected by channel 1.
3 Stop detected by channel 2.
4 Motor stop condition detected by both channels within time window.

Safety relays

Preventa™ safety relay modules type XPSVNE

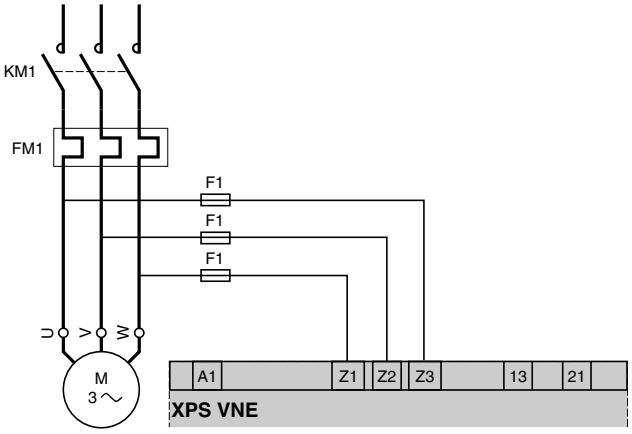
For zero speed detection

Module XPSVNE associated with a d.c. motor



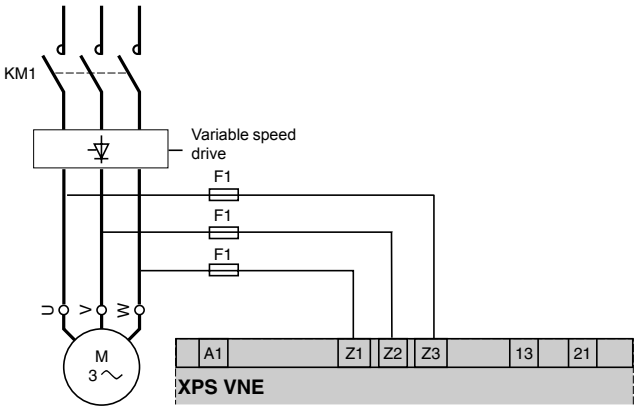
F1 = 2 A

Module XPSVNE associated with a 3-phase motor



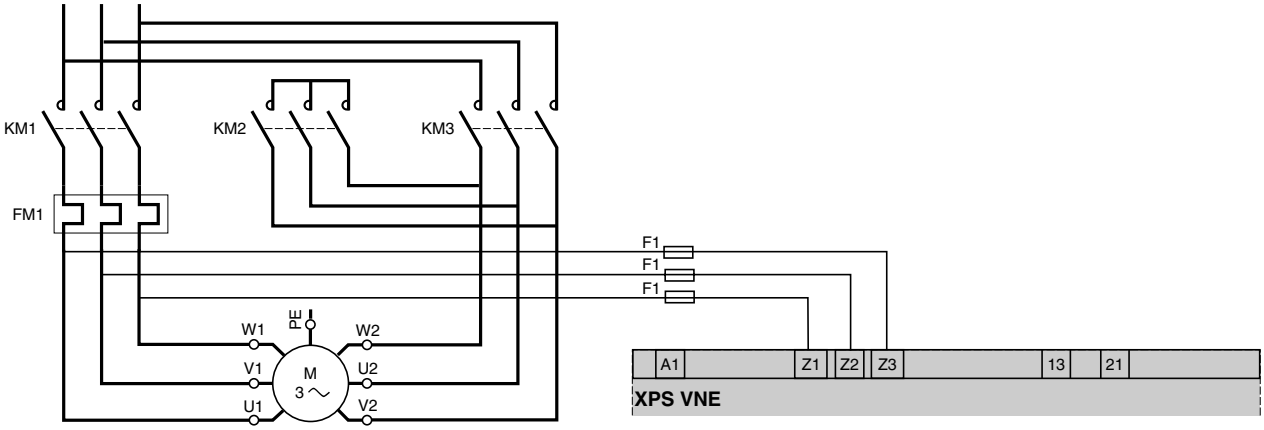
F1 = 2 A

Module XPSVNE associated with a 3-phase motor + variable speed drive



F1 = 2 A

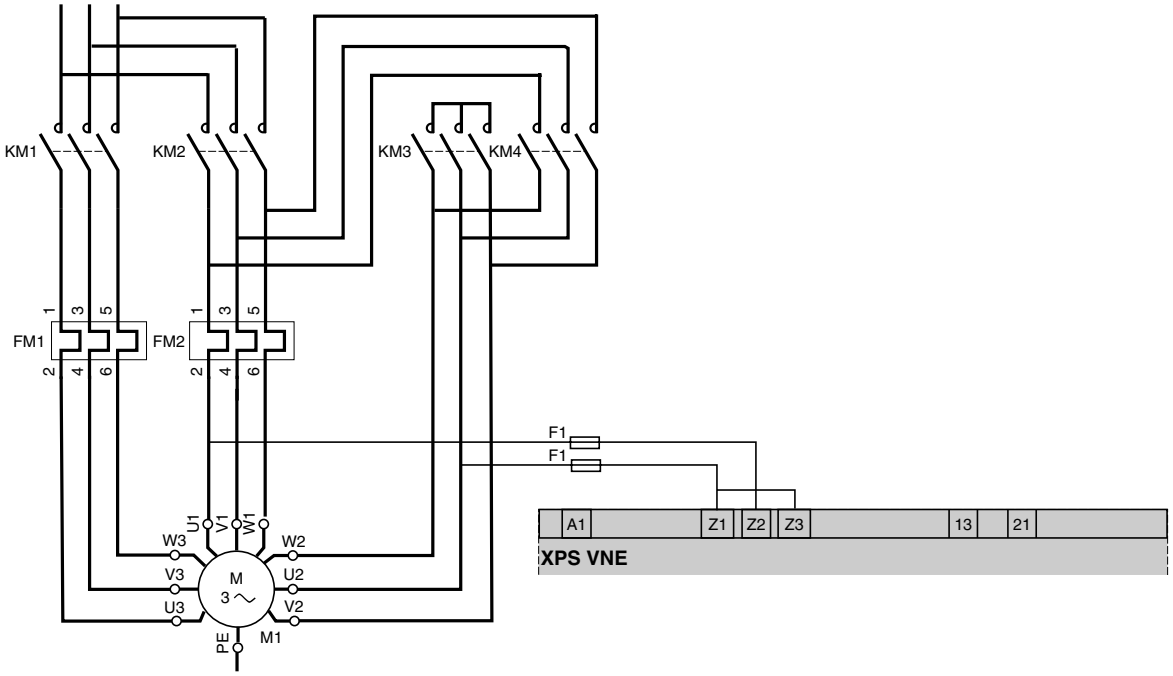
Module XPSVNE associated with a 3-phase motor with start-delta starting



F1 = 2 A
KM1: Fast rotation speed
KM2: Slow rotation speed
KM3: Star
The “Star” contactor (KM3) must be closed after the motor is de-energized, in order to allow detection of zero speed.

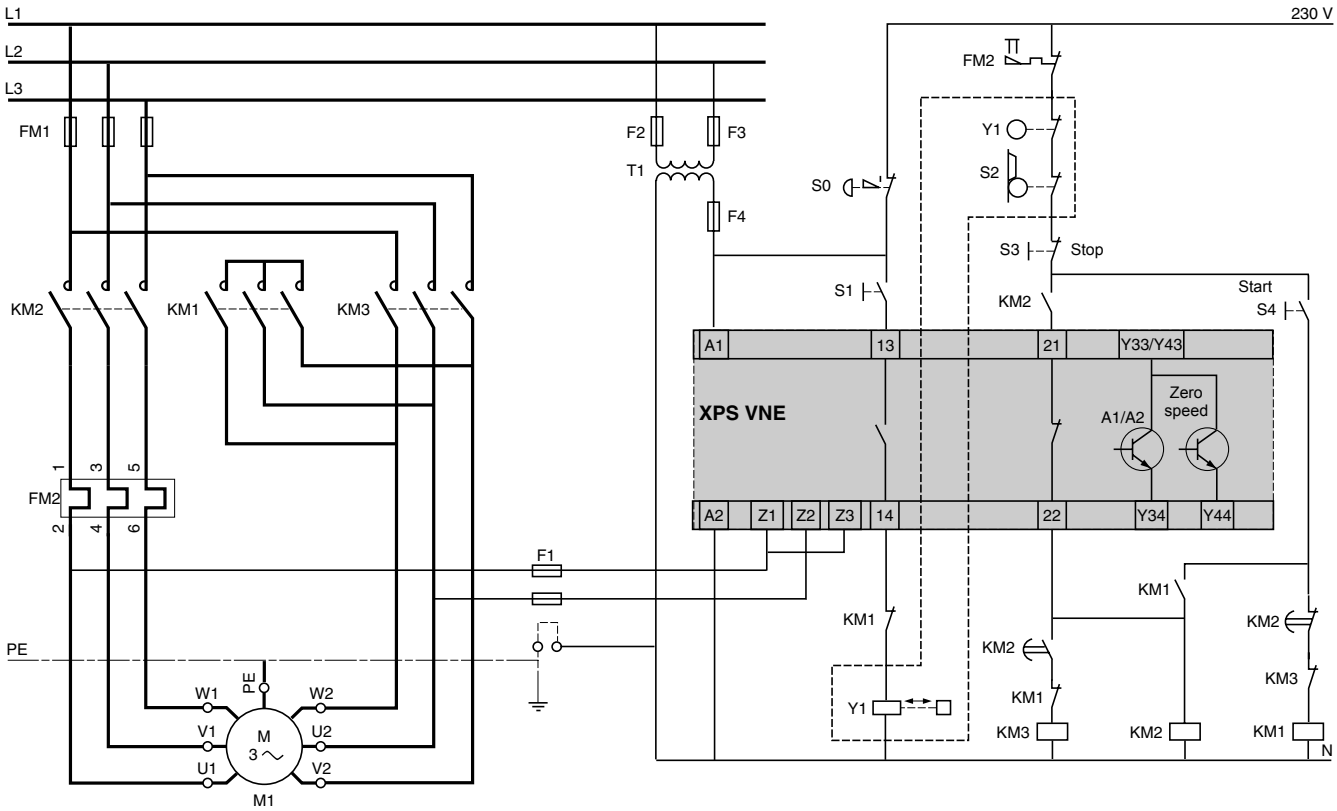
3

Module XPSVNE associated with a 3-phase motor with variable number of poles and star-delta starting



F1 = 2 A
KM1: Fast rotation speed
KM2: Slow rotation speed
KM3: Star
KM4: Delta

Module XPSVNE associated with a star-delta motor starter and guard switch type XCS E

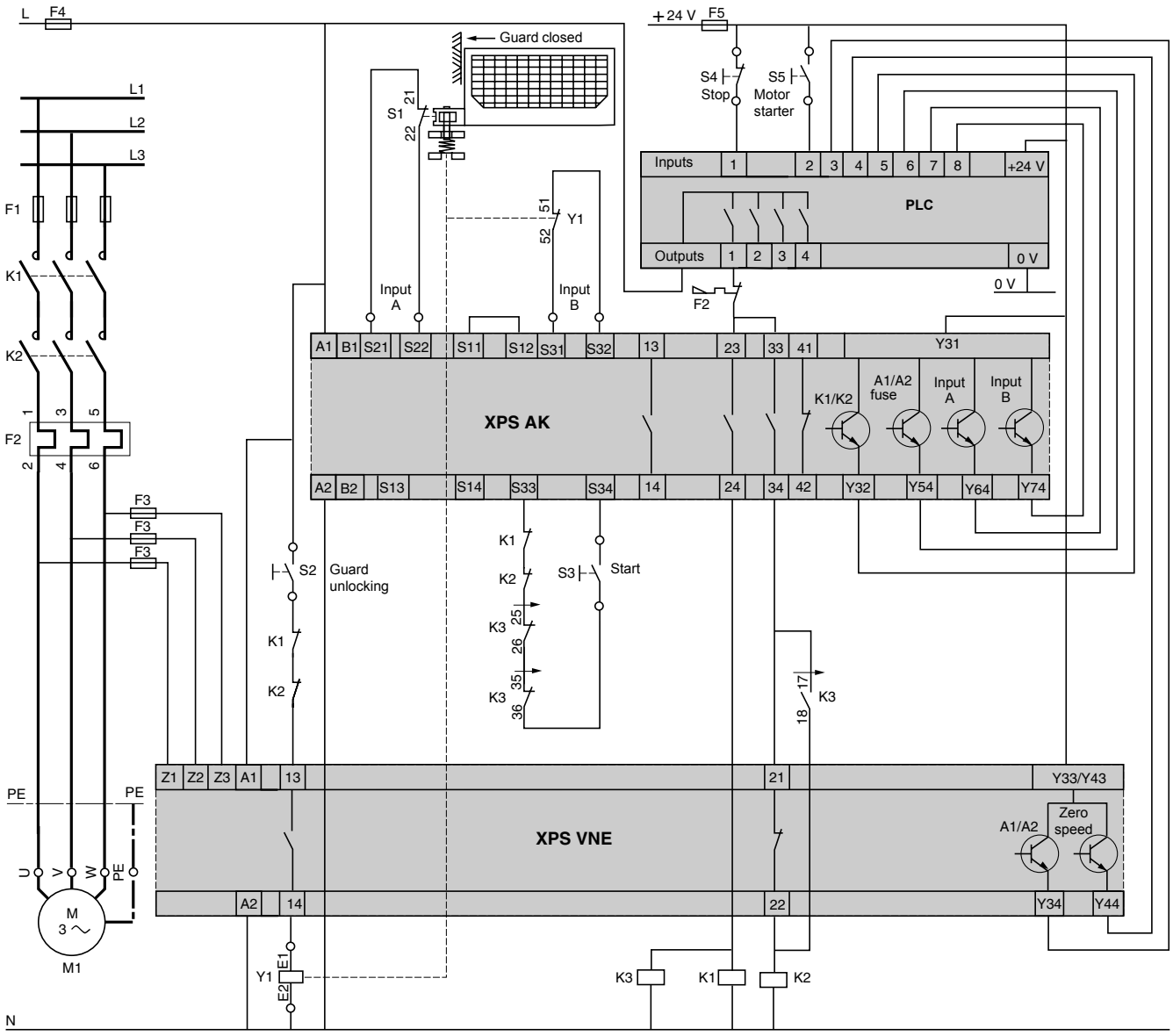


Safety relays

Preventa™ safety relay modules type XPSVNE

For zero speed detection

Association of safety modules XPSVNE and XPSAK



S1 + Y1: Guard switch with solenoid locking without power, type XCSE or XCSL

Pulse on de-energization relay XPSTSW

Safety relays

Preventa™ safety relay modules type XPSPVT

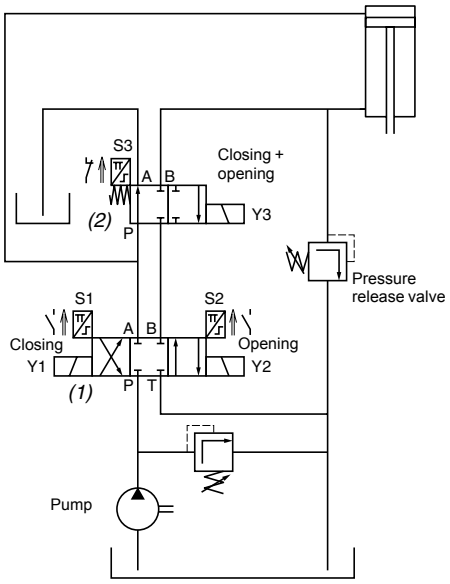
For dynamic monitoring of hydraulic valves on linear presses

Operating principle

Safety relay module XPSPVT is specifically designed for monitoring hydraulic safety system valves which control the movements of potentially hazardous machines.
The operating principle of this module is explained in the circuit diagram of a hydraulic safety system for linear presses (see below).

This hydraulic safety system features a 3 position piston which controls the up and down stroke of the operating cylinder. The circuit is equipped with a safety valve, to complete the redundant system. This circuit must be activated to enable the up and down stroke of the cylinder.
If either of the 2 pistons becomes defective (for example, due to a broken spring or to oil contamination), and the valve piston shifts from its normal position towards the open position, the XPSPVT module will detect it and prevent resumption of the piston stroke.
Proximity sensors integrated in the valve to detect the piston positions and connected to the XPSPVT module must be damped when the valve coils are in the de-energized state (zero position).
The sensor circuits of the XPSPVT module are designed to allow connection of NPN and PNP proximity sensors or sensing components. Either 2-wire or 3-wire types can be used.
The wiring diagram on page 3/102 shows how to connect proximity sensors.

Hydraulic safety system circuit operating on a linear press.
Monitoring of valves in position 0.



(1) 3 position hydraulic valve.
(2) 2 position hydraulic valve.

Safety relays

Preventa™ safety relay modules type XPSPVT

For dynamic monitoring of hydraulic valves on linear presses

Specifications

Module type				XPSPVT
Maximum achievable safety level (2)				PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061
Reliability data (1)	Mean Time To dangerous Failure ($MTTF_d$)		**Years**	50.9
	Diagnostic Coverage (DC)		**%**	0 to 99
	Probability of dangerous Failure per Hour (PFH_d)		**1/h**	2.24×10^{-8}
Conformity to standards				EN 60204-1, EN/IEC 60947-5-1, EN 693, EN 50082-2
Product certifications				UL, CSA
Supply	Voltage		**V**	⎓ 24
	Voltage limits			- 10…+ 10%
Power consumption			**W**	< 6
Outputs	Voltage reference			Relay hard contacts
	Number and type of safety circuits			2 N.O. (13-14, 33-34) + 1 N.C. (21-22)
	Number and type of additional circuits			–
	Wiping time		**ms**	100 (minimum value)
	Breaking capacity	AC-15	**VA**	C300: inrush 1800, maintained 180
		DC-13	**VA**	24 V/1.5 A - L/R = 50 ms
	Max. thermal current (Ithe)		**A**	2.5
	Output fuse protection, using fuses conforming to EN/IEC 60947-5-1, VDE 0660 part 200		**A**	4 gG
	Minimum current		**mA**	10
	Minimum voltage		**V**	17
Electrical life				See page 3/12
Response time			**ms**	< 15
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
Rated impulse withstand voltage (Uimp.)			**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-1, DIN VDE 0110 parts 1 & 2)
LED display				8
Operating temperature			**°F (°C)**	+ 14…+ 131 (- 10…+ 55)
Storage temperature			**°F (°C)**	- 13…+ 185 (- 25…+ 85)
Degree of protection conforming to IEC 60529		Terminals		IP 20
		Enclosure		IP 40
Polycarbonate enclosure		Type		Removable
		Number of terminals		20
Connection		Type		Captive screw clamp terminals: without cable end 2 x 14 AWG (2 x 2.5 mm^2), with cable end 2 x 16 AWG (2 x 1.5 mm^2), min. Ø 0.5 mm

Reference

XPSPVT

Description	Display	Supply	Reference	Weight oz (kg)
Safety module for dynamic monitoring of hydraulic valves on linear presses	8 LEDs	⎓ 24 V	**XPSPVT1180**	19.048 (0.540)

(1) Using an appropriate and correctly connected control system.
(2) The Category, the Performance Level (PL) or the Safety Integrity Level Claim Level (SILCL) are only achieved with the full connection to the base unit or start unit.

Principle: page 3/100 | Specifications: page 3/101 | References: page 3/101 | Wiring diagrams: page 3/102 | Dimensions: page 3/112

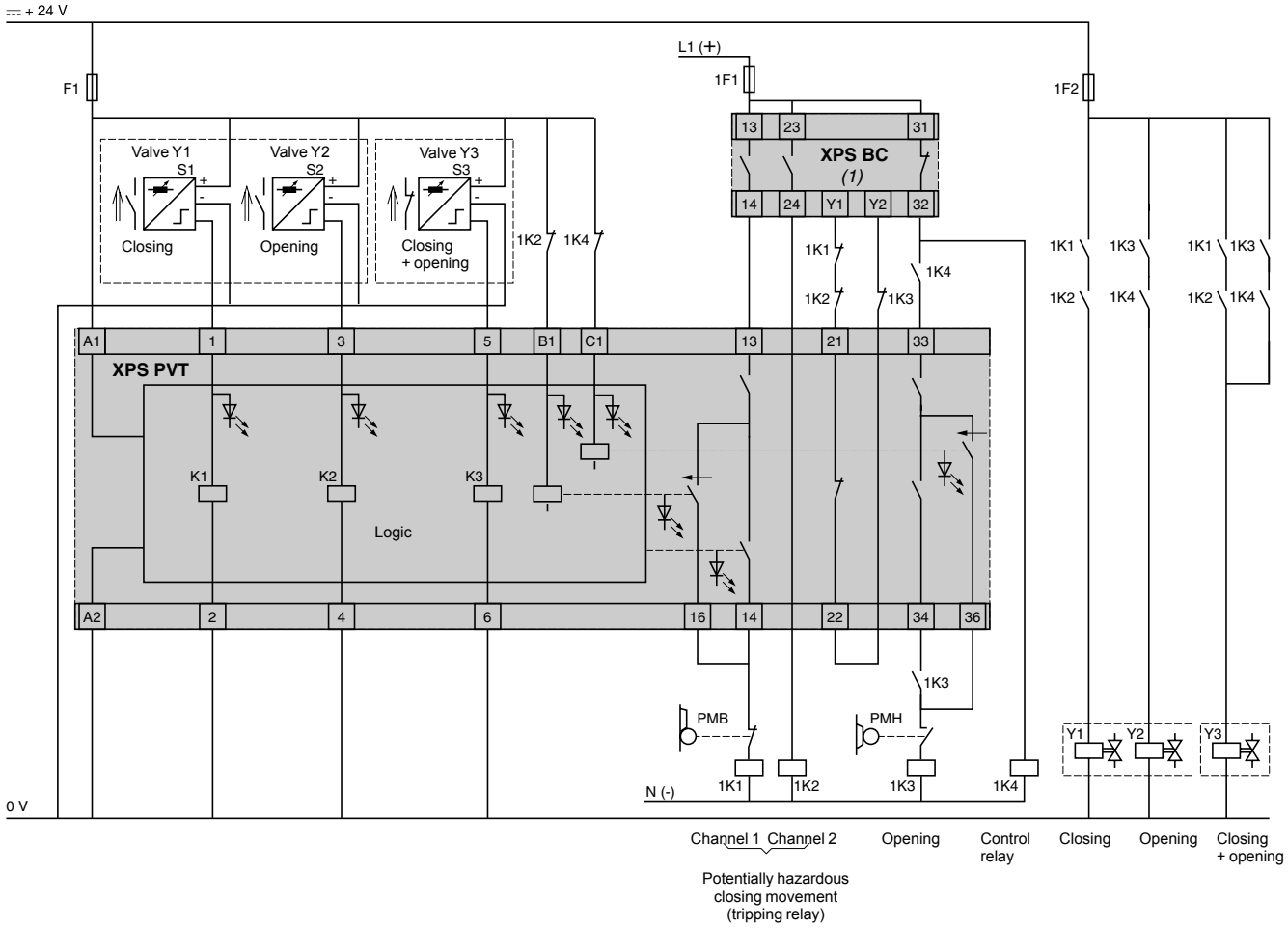
Safety relays

Preventa™ safety relay modules type XPSPVT

For dynamic monitoring of hydraulic valves on linear presses

XPSPVT

Wiring diagram for module XPSPVT



(1) Two-hand control or presence sensor outputs.

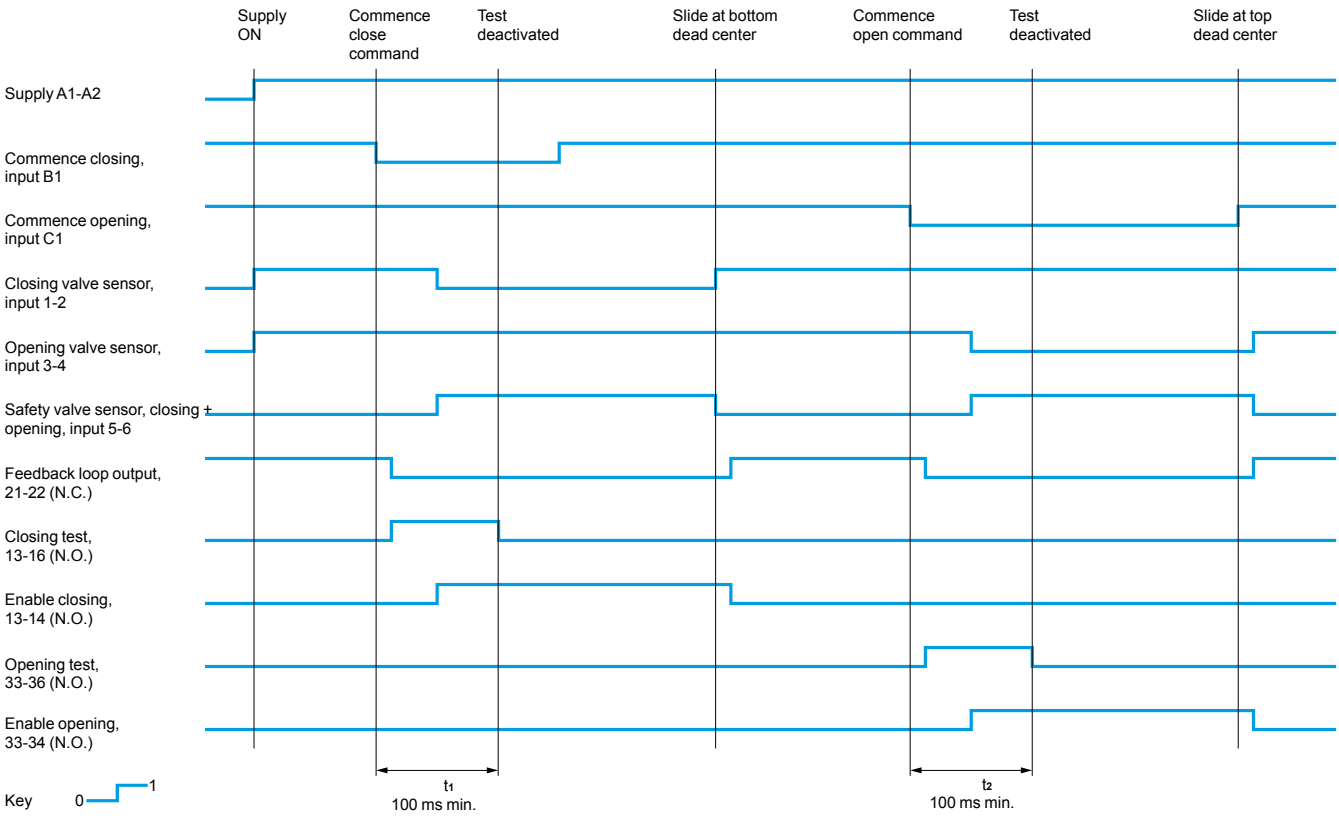
Safety relays

Preventa™ safety relay modules type XPSPVT

For dynamic monitoring of hydraulic valves on linear presses

XPSPVT

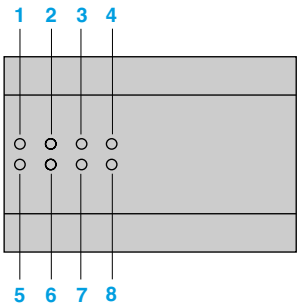
Functional diagram of module XPSPVT



Sensor Status During Press Cycle

Description	Valve Y1 Sensor S1 (N.O.)	Valve Y2 Sensor S2 (N.O.)	Valve Y3 Sensor S3 (N.C.)
Press Ram Stopped	**Contact closed**	**Contact closed**	**Contact open**
Press Ram Moving	**Contact open**	**Contact closed**	**Contact closed**
Press Ram Closing	**Contact closed**	**Contact open**	**Contact closed**

LED details



1 Closing command.
2 Closing test.
3 Opening command.
4 Opening test.
5 Opening valve (Y2) in position 0.
6 Closing enabled.
7 Safety valve (Y3) activated.
8 Closing valve (Y2) in position 0.

Safety relays

Preventa™ safety relay modules type XPSPVK

For dynamic monitoring of double-bodied solenoid valves

Operating principle

Safety relay module XPSPVK is specially designed for dynamic monitoring of the safety valves in eccentric presses, conforming to European standard EN 692.
This standard establishes the specifications related to safety control systems for presses equipped with friction clutches.
To meet the requirements of this standard, the clutch/brake control must be monitored dynamically.
This function is provided by a double-bodied solenoid valve (safety valve for presses) which performs the functions of two valves mounted in one body.

The position of the two valve pistons can be monitored by proximity sensors, mechanical limit switches or pressure switches.
Module XPSPVK checks for the correct operation of the double-bodied safety valves at 3 points in the cycle.

- Start at top dead center: checks the rest position of the two valves.
- Take-on point (transfer function): checks that the two valves are in the “activated” (energized) position.
- Press stop trigger point: checks that the two valves return to the rest position. Return must be simultaneous for both valves within a defined time period.

To set up an automatic disconnect of the XPSPVK module at the first machine stroke, a N.C. auxiliary contact mounted on the main control contactor or on another contactor/relay, activated at the same time, can be wired to terminals 7 and 8 in parallel with the RESET button.
If an anomaly is detected during the cycle, the XPSPVK module will stop the slide stroke and will also inhibit the start of another cycle.

Specifications

Module type			**XPSPVK**
Maximum achievable safety level (2)			PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061
Reliability data (1)	Mean Time To dangerous Failure ($MTTF_d$)	**Years**	90.2
	Diagnostic Coverage (DC)	**%**	0 to 99
	Probability of dangerous Failure per Hour (PFH_d)	**1/h**	1.25×10^{-8}
Conformity to standards			EN 60204-1, EN/IEC 60947-5-1, EN 692, EN 50082-2
Product certifications			UL, CSA
Supply	Voltage	**V**	⎓ 24, ∿115, ∿ 230
	Voltage limits		- 10…+ 10% (⎓ 24 V) - 15…+ 15% (∿ 115 V) - 15…+ 10% (∿ 230 V)
	Frequency	**Hz**	50/60
Power consumption	⎓ 24 V	**W**	< 9
	∿ 115 V/230 V	**VA**	< 16
Outputs	Voltage reference		Relay hard contacts
	Number and type of safety circuits		1 N.O. (13-14) transfer function + 1 N.C. (21-22) feedback loop
	Number and type of additional circuits		4 solid-state outputs
	Breaking capacity in AC-15	**VA**	C300: inrush 1800, maintained 180
	Breaking capacity in DC-13		24 V/1.5 A - L/R = 50 ms
	Max. thermal current (Ithe)	**A**	2.5
	Breaking capacity of solid-state outputs		24 V/20 mA, 48 V/10 mA
	Output fuse protection	**A**	4 gG, conforming to EN/IEC 60947-5-1, VDE 0660 part 200
	Minimum current (relay hard contacts)	**mA**	10
	Minimum voltage (relay hard contacts)	**V**	17
Response time		**ms**	< 40
Electrical life			See page 3/12
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
Rated impulse withstand voltage (Uimp.)		**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-1, DIN VDE 0110 parts 1 & 2)
LED display			8
Operating temperature		**°F (°C)**	+ 14…+ 131 (- 10…+ 55)
Storage temperature		**°F (°C)**	- 13…+ 185 (- 25…+ 85)
Degree of protection Conforming to IEC 60529	Terminals		IP 20
	Enclosure		IP 40
Polycarbonate enclosure	Type		Removable
	Number of terminals		32
Connection	Type		Captive screw clamp terminals: without cable end 2 x14 AWG (2 x 2.5 mm^2), with cable end 2 x16 AWG (2 x 1.5 mm^2), min. Ø 0.5 mm

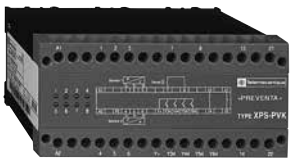
(1) Using an appropriate and correctly connected control system.
(2) The Category, the Performance Level (PL) or the Safety Integrity Level Claim Level (SILCL) are only achieved with the full connection to the base unit or start unit.

Safety relays

Preventa™ safety relay modules type XPSPVK

For dynamic monitoring of double-bodied solenoid valves

References



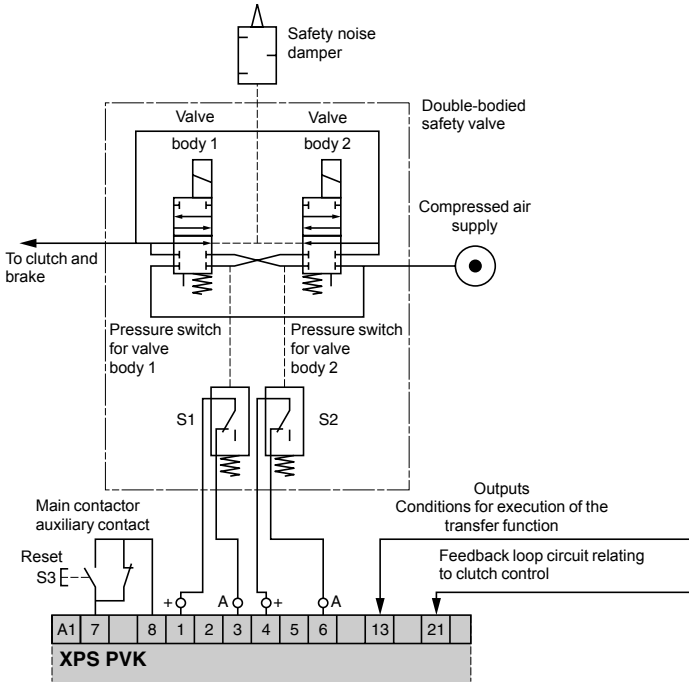
XPSPVK

Description	Display	Supply	Reference	Weight oz (kg)
Safety modules for dynamic monitoring of double-bodied solenoid valves	8 LEDs	⎓ 24 V	**XPSPVK1184**	24.692 (0.700)
		~ 115 V	**XPSPVK3484**	31.747 (0.900)
		~ 230 V	**XPSPVK3784**	31.747 (0.900)

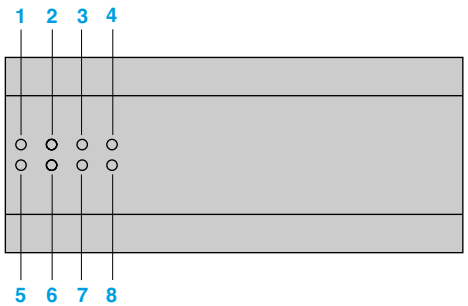
Wiring diagrams

XPSPVK

Monitoring of a press safety valve by an XPSPVK module



LED details

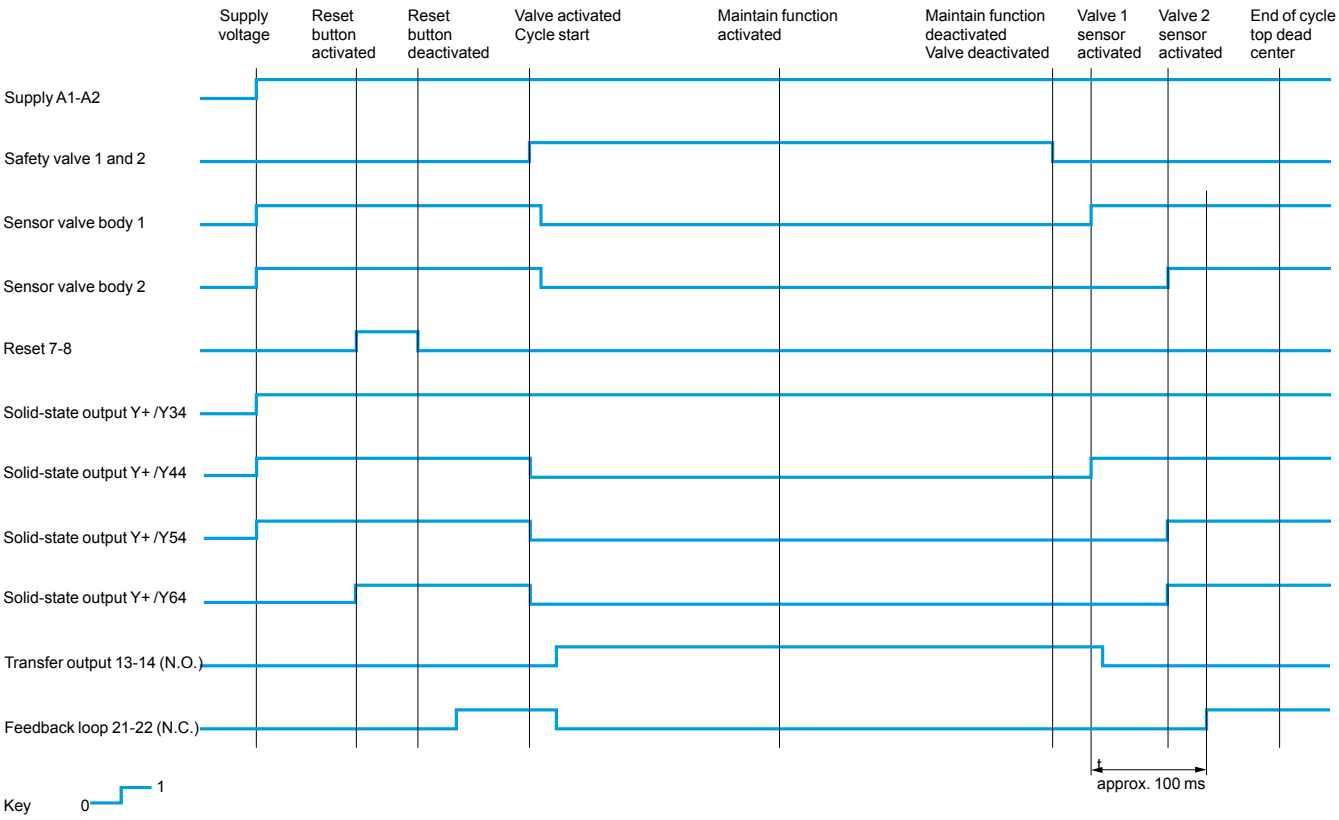


1 DC internal supply n° 1.
2 DC internal supply n° 2.
3 Valve n° 1 blocked.
4 Valve n° 2 blocked.
5 Ready for monitoring
6 Disconnect synchronized.
7 Reset.
8 Valves 1 and 2 energized.

3

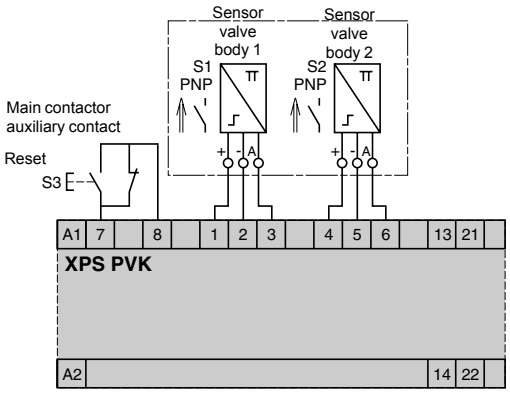
XPSPVK

Functional diagram of module XPSPVK

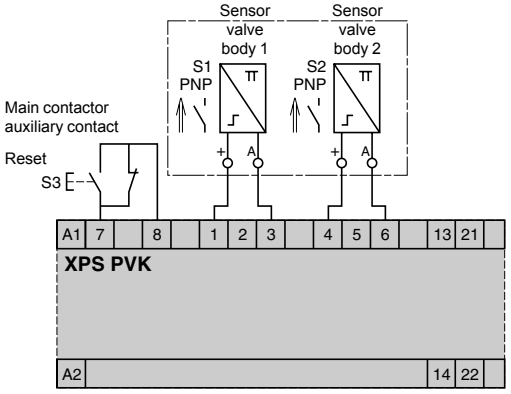


Connection of module XPSPVK with 3-wire (or 2-wire) proximity sensors

3-wire sensors



2-wire sensors



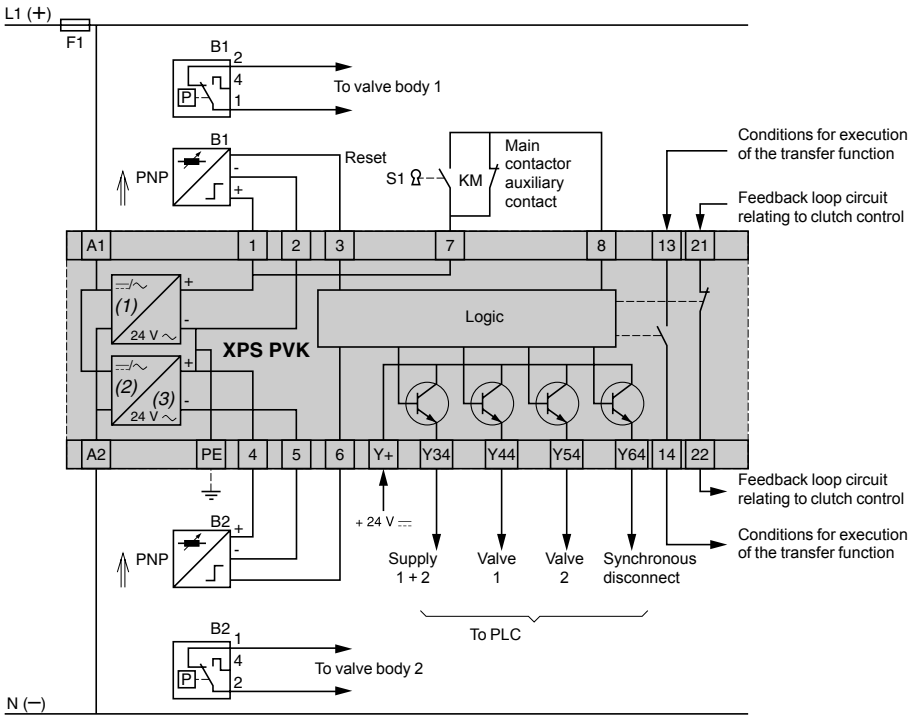
Safety relays

Preventa™ safety relay modules type XPSPVK

For dynamic monitoring of double-bodied solenoid valves

XPSPVK

Connection of module XPSPVK with an eccentric press safety valve



(1) Internal supply n° 1.
(2) Internal supply n° 2.
(3) For a ⎓ 24 V version: integrated ⎓/⎓ adaptor.

Safety relays

Preventa™ safety relay modules type XPSOT

For safety stop with automatic overtravel monitoring and control

Operating principle

Safety relay module XPSOT is used on eccentric presses to monitor overtravel and ensure that the press slide stops in a non-hazardous position, that is, top dead center (TDC) during normal (non-emergency) operation. Use of this module, designed in accordance with standard EN 692 relating to mechanical press safety, makes it possible to create a redundant, self-monitoring control system.

The two essential functions of this safety module are to:

■ **Trigger the end of cycle stop sequences slightly before top dead center (at point A) so as to come to complete stop at TDC.**

After TDC, the permissible overtravel is approximately 10°. The safety module immediately detects any overtravel. Overtravel is indicative of braking device deterioration and, in this case, jog mode must be used to move the slide back to TDC. The next cycle will be inhibited to allow maintenance to be performed on the braking device (cam 1).

■ Take over control monitoring during the dangerous part of the cycle (slide downstroke). Any stop instruction issued between TDC (0°) and point C (approximately 150° after TDC) causes an immediate stop of the press. **This approximate value of 150° corresponds to the 0.315" (8mm) tool closure dimension (safety point).**

When a stop instruction is issued after this safety point, the press completes the cycle and comes to a complete stop at TDC (cam 2).

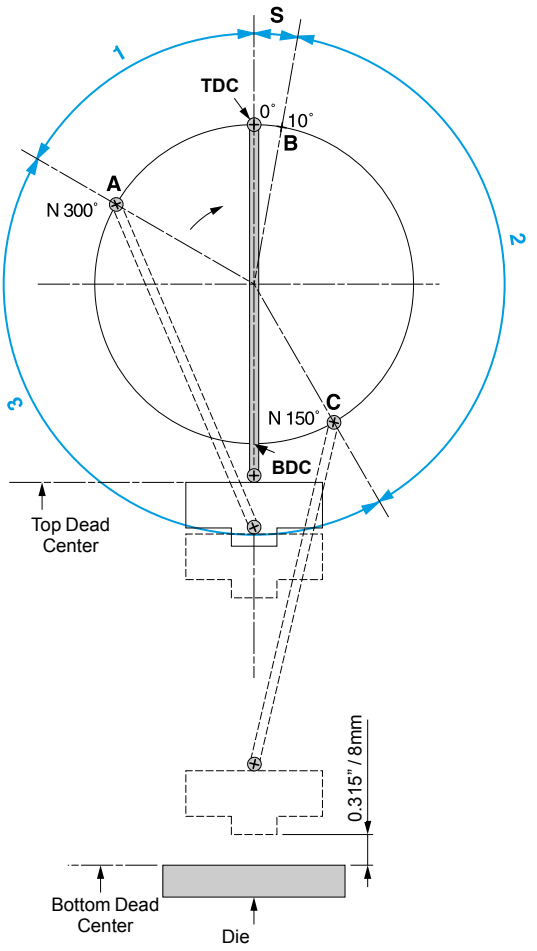
Control of the hazardous part of the cycle (generally the slide downstroke) is usually activated from a two-hand control station associated with a safety module (type XPSBC) monitoring this station to qualify as a category 4 control system according to standard EN 954-1/ISO 13849-1.

Overtravel monitoring is performed **on each cycle** by safety module XPSOT.

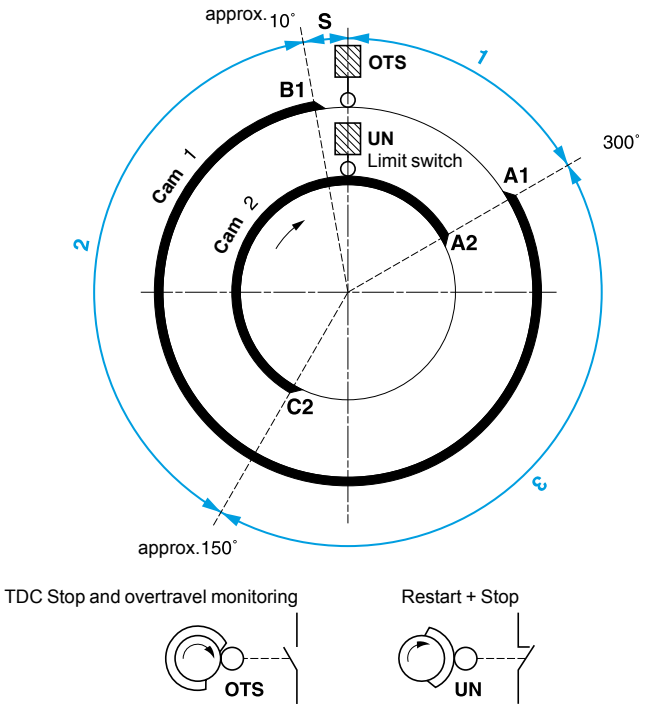
Safety relays
Preventa™ safety relay modules type XPSOT
For safety stop with automatic overtravel monitoring and control

Operating principle (continued)

Press diagram



Control cams diagram



1 Permissible overtravel zone.
2 Dangerous zone (usually slide downstroke).
3 Non-dangerous zone (usually slide upstroke).

S Permissible overtravel.
A Stop instruction trip point.
B Point at which permissible overtravel is exceeded (a stop instruction issued after point **B** will lock up the press).
C Takeover point, beyond which the press will complete its cycle up to **TDC**.
TDC Top dead center, actual stopping zone of the press.
BDC Bottom dead center.

Cam operation
Cam 1 is associated with the **OTS** limit switch (LS), cam 2 with the **UN** limit switch (the limit switches must be located on different cams for safety reasons).
The **OTS** limit switch is deactivated at TDC, at which point the **UN** limit switch is activated.
Point A1 of **cam 1** is located approximately 300° after TDC and, when reached, the press stops and comes to a standstill: **A1 is the press stop trigger point.**
Point B1, located approximately 10° after TDC, constitutes the end of cam 1: **If B1 is exceeded during stopping**, the overtravel is abnormally long, **the press locks up** and the next cycle is inhibited.
Point A2 of cam 2 functions like point A1 on cam 1 (contact state of the **UN** limit switch reversed in relation to the state of the **OTS** limit switch).
Point C2, located approximately 150° after TDC, corresponds to the 8 mm tool closing dimension. Stop instructions issued after C2 is reached are not executed until point A2 is reached.

Safety relays

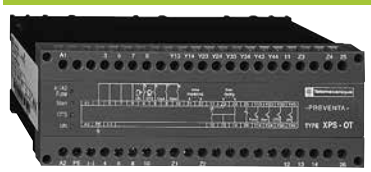
Preventa™ safety relay modules type XPSOT

For safety stop with automatic overtravel monitoring and control

Specifications

Module type			XPSOT
Maximum achievable safety level (2)			PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061
Reliability data (1)	Mean Time To dangerous Failure ($MTTF_d$)	**Years**	60.9
	Diagnostic Coverage (DC)	**%**	0 to 99
	Probability of dangerous Failure per Hour (PFH_d)	**1/h**	1.33×10^{-8}
Conformity to standards			EN 60204-1, EN/IEC 60947-5-1, EN 692, EN 50082-2
Product certifications			UL, CSA
Supply	Voltage	**V**	∼ 115, ∼ 230
	Voltage limits		- 15…+ 15% (115 V) - 15…+ 10% (230 V)
	Frequency	**Hz**	50/60
Power consumption		**VA**	< 12
Module inputs fuse protection			Internal, electronic
Outputs	Voltage reference		Relay hard contacts
	Number and type of safety circuits		3 N.O. (11-12, 11-13, 11-14)
	Number and type of additional circuits		4 solid-state outputs
	Breaking capacity in AC-15	**VA**	C300: inrush 1800, maintained 180
	Breaking capacity in DC-13		24 V/1.5 A - L/R = 50 ms
	Breaking capacity of solid-state outputs		24 V/20 mA, 48 V/10 mA
	Max. thermal current (Ithe)	**A**	2.5
	Output fuse protection	**A**	4 gG, conforming to EN/IEC 60947-5-1, VDE 0660 part 200
	Minimum current (relay hard contacts)	**mA**	10
	Minimum voltage (relay hard contacts)	**V**	17
Electrical life			See page 3/12
Response time		**ms**	< 20
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
Rated impulse withstand voltage (Uimp.)		**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-1, DIN VDE 0110 parts 1 & 2)
LED display			4
Operating temperature		**°F (°C)**	+ 14…+ 131 (- 10…+ 55)
Storage temperature		**°F (°C)**	- 13…+ 185 (- 25…+ 85)
Degree of protection conforming to IEC 60529	Terminals		IP 20
	Enclosure		IP 40
Polycarbonate enclosure	Type		Removable
	Number of terminals		42
Connection	Type		Captive screw clamp terminals: - - without cable end 2 x 14 AWG (2 x 2.5 mm^2), - - with cable end 2 x 16 AWG (2 x 1.5 mm^2), - - min. Ø 0.5 mm

References



XPSOT

Description	Display	Supply	Reference	Weight oz (kg)
Safety modules for safety stop with automatic overtravel monitoring and control	4 LEDs	∼ 115 V	**XPSOT3444**	38.801 (1.100)
		∼ 230 V	**XPSOT3744**	38.801 (1.100)

(1) Using an appropriate and correctly connected control system.
(2) The Category, the Performance Level (PL) or the Safety Integrity Level Claim Level (SILCL) are only achieved with the full connection to the base unit or start unit.

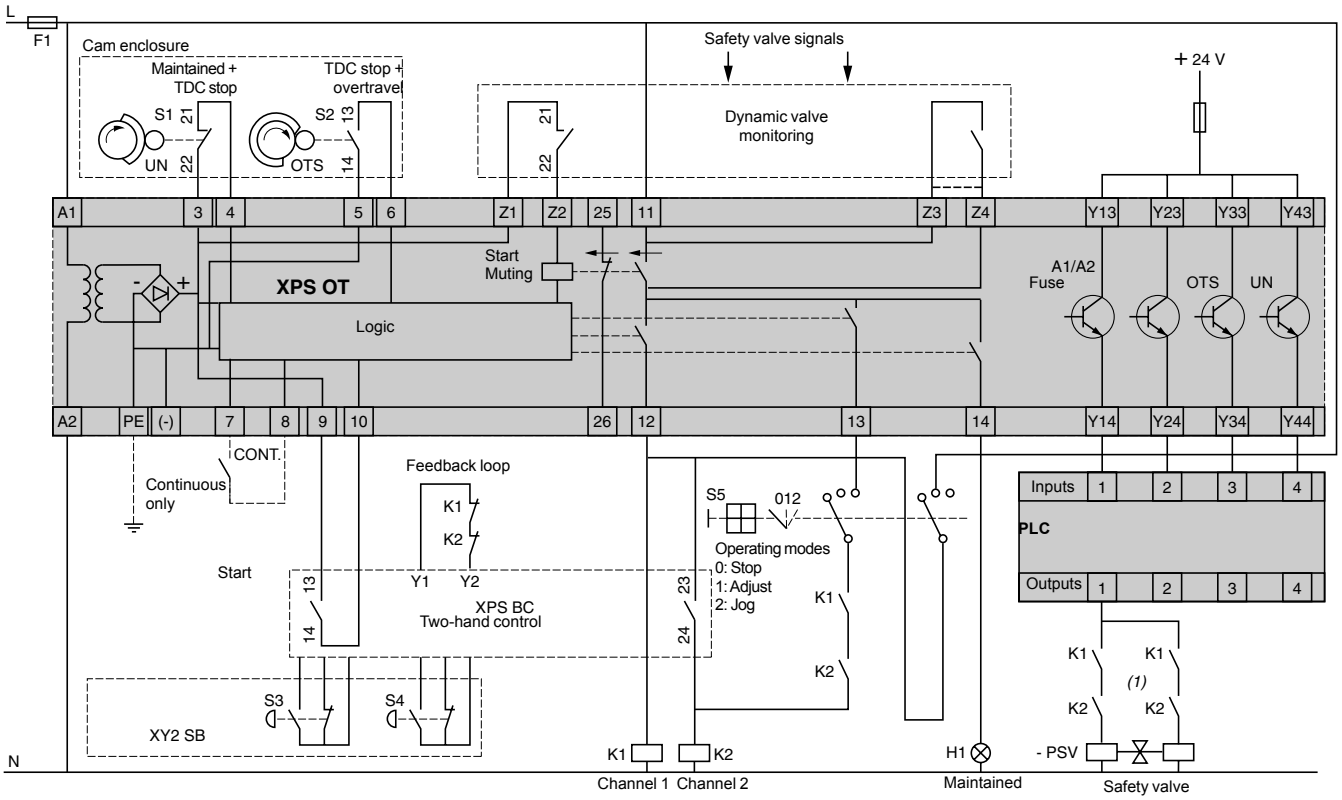
Safety relays

Preventa™ safety relay modules type XPSOT

For safety stop with automatic overtravel monitoring and control

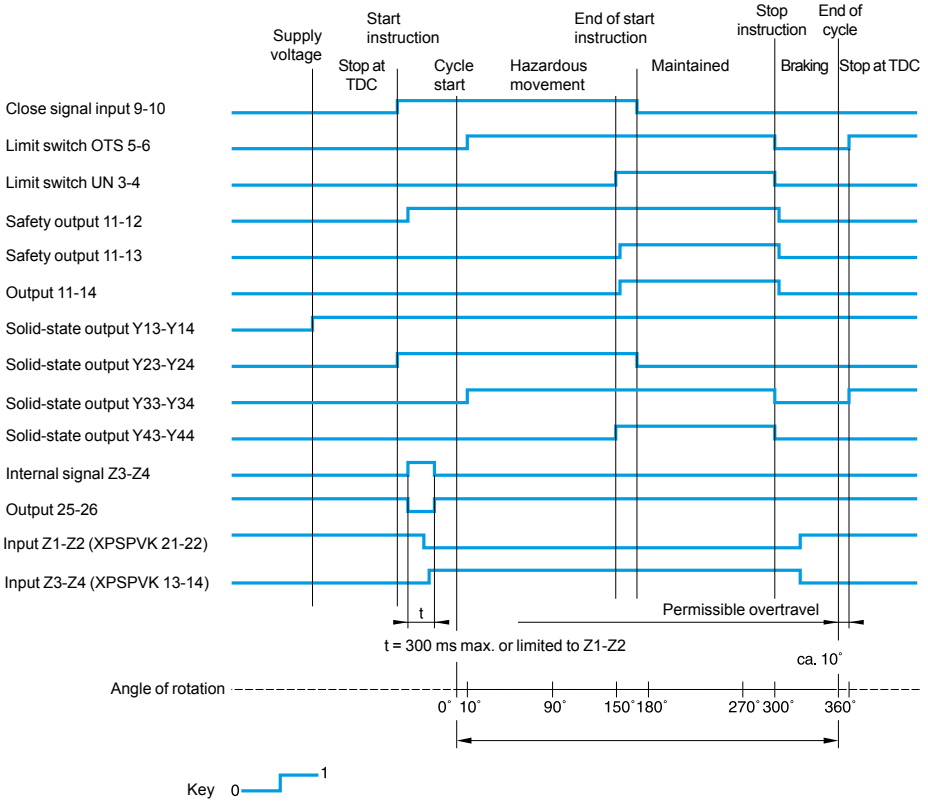
XPSOT

Wiring diagram

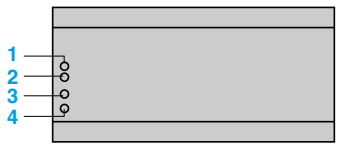


(1) The 2 coils of the safety valve must be wired separately.

Functional diagram



LED details



1 Voltage present on terminals A1/A2.
2 Close instruction.
3 OTS limit switch activated.
4 UN limit switch activated.

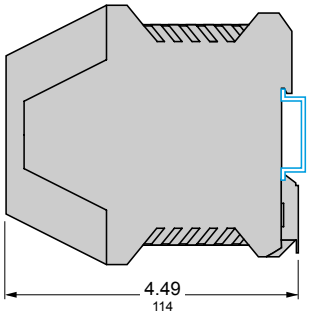
Safety relays

Preventa™ safety relay modules

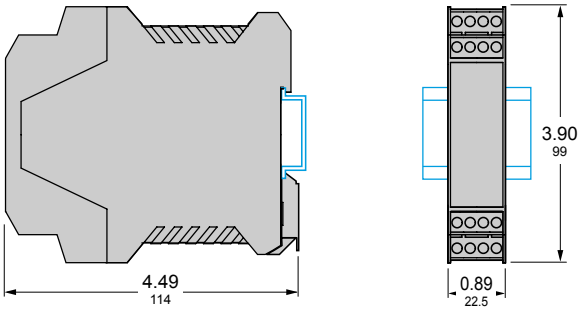
AM1 DP200 rail mounting

Dimensions

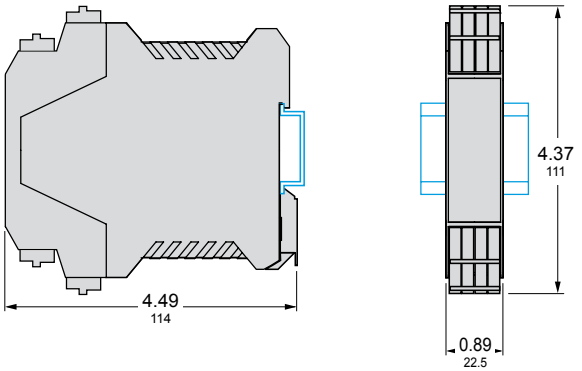
XPSAC●●●●, XPSAF●●●●, XPSAFL●●●●, XPSDMB●●●●, XPSVC●●●●, XPSEDA



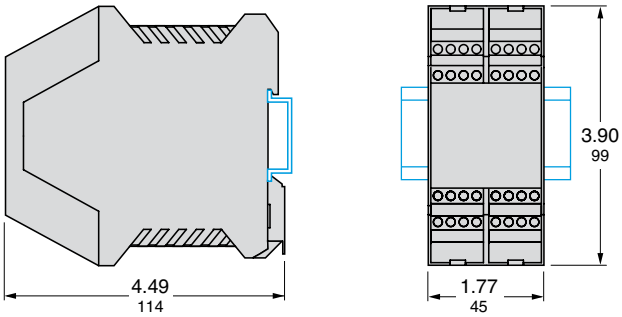
XPSAC●●●●P, XPSABV●●●●P, XPSAXE●●●●P, XPSAF●●●P, XPSAFL●●●●P, XPSBCE●●●●P, XPSBF●●●●P, XPSECME●●●●P, XPSDMB●●●●P, XPSVC●●●●P



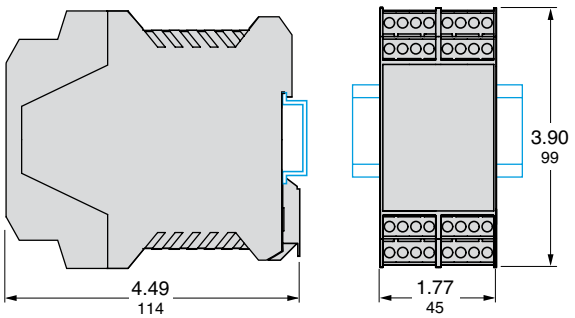
XPSABV●●●●C, XPSAXE●●●●C, XPSBCE●●●●C, XPSECME●●●●C



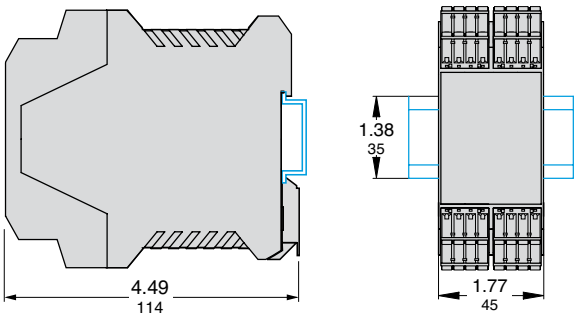
XPSAK●●●●, XPSAV●●●●, XPSCM●●●●, XPSDME●●●●, XPSATE●●●●, XPSECPE●●●●P



XPSAK●●●●P, XPSAV●●●●P, XPSCM●●●●P, XPSTSA●●●●P, XPSTSW●●●●P, XPSDME●●●●P, XPSATE●●●●P, XPSVNE●●●●P



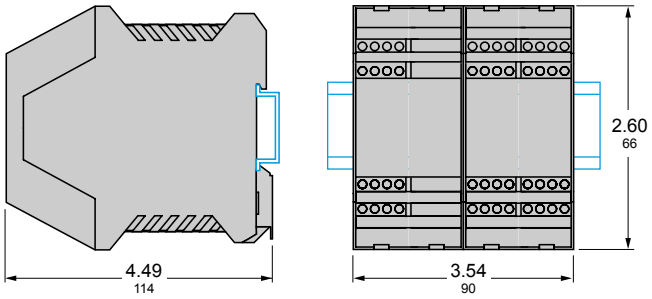
XPSAK●●●●C, XPSAV●●●●C, XPSCM●●●●C, XPSTSA●●●●C, XPSTSW●●●●C, XPSDME●●●●C, XPSATE●●●●C, XPSVNE●●●●C



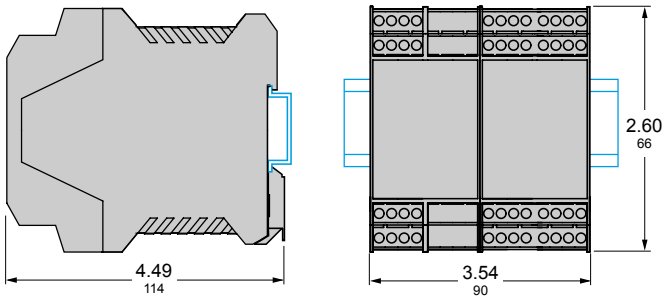
Dual Dimensions: INCHES
Millimieters

Dimensions

XPSAR●●●●●●

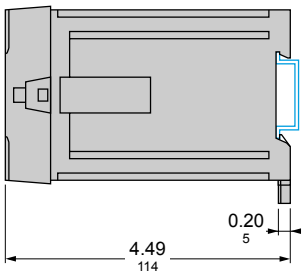


XPSAR●●●●●●P

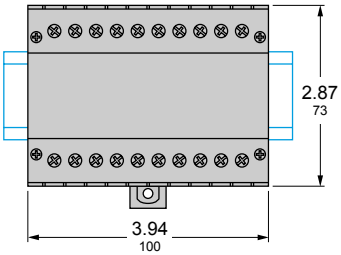


XPSPVT, XPSPVK

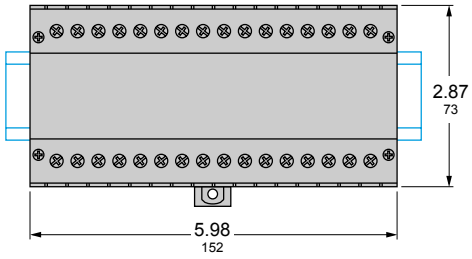
Common side view



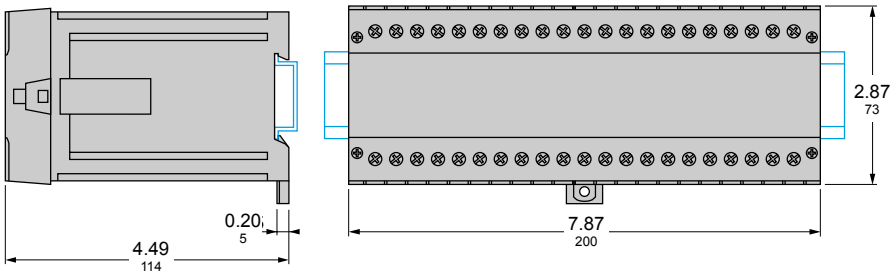
XPSPVT



XPSPVK



XPSOT



Dual Dimensions: INCHES / Millimieters

Mounting

All safety modules: 1.38 in (35 mm) DIN rail mounting.