Safety solutions using Preventa

Safety modules for monitoring Emergency stops, switches, safety mats and edges and security light barriers

Operating principle

XPS-AK safety modules are designed to conform with category 4 of standard EN 954-1.
They are used for:
- Monitoring Emergency stop circuits conforming to standards EN 418 and EN 60204-1
- Electrical monitoring switches activated by protection devices, with optional selection of synchronisation time between signals
- Monitoring 4-wire safety mats or edges
- Monitoring type 4 light barriers conforming to EN 61496-1, which have solid state safety outputs (for example, XUS-LC type barriers, see page 30302/4)

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.
XPS-AK●●●●P safety modules have removable terminal blocks, which facilitate machine maintenance.
To aid diagnostics, the modules have 4 LEDs on the front face which provide information on the monitoring circuit status.
The function for monitoring the Start button can be configured by wiring.

Characteristics

Module type			**XPS-AK3●1144**	**XPS-AK3●1144P**
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1)			Category 4 max.	
Supply				
- voltage		**V**	∿ and ⎓ 24, ∿ 110 and ⎓ 24, ∿ 120 and ⎓ 24, ∿ 230 and ⎓ 24	
- voltage limits			- 15…+ 10 %	
- frequency		**Hz**	50/60	
Consumption		**VA**	≤ 5 (version 24 V), ≤ 6 (versions 110, 120 and 230 V)	
Module fuse protection			Internal, electronic	
Start button monitoring			Yes/No (configurable terminal connection)	
Control unit voltage and current (between terminals S21-S22 and 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			Volt-free	
- 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	
- solid state output breaking capacity			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 IEC 947-5-1, DIN VDE 0660 part 200	
- minimum current		**mA**	10	
- minimum voltage		**V**	17	
Electrical durability			See page 38610/6	
Response time on input opening		**ms**	≤ 40	
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to IEC 947-5-1, DIN VDE 0110 parts 1 and 2)	
Rated impulse withstand voltage (Uimp.)		**kV**	4 (overvoltage category III, conforming to IEC 947-5-1, DIN VDE 0110 parts 1 and 2)	
LED display			4	
Operating temperature		**°C**	- 10…+ 55	
Storage temperature		**°C**	- 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, separate removable block
1-wire connection	Without cable end		Solid or flexible cable: 0.14…2.5 mm^2	Solid or flexible cable: 0.2…2.5 mm^2
	With cable end		Without bezel, flexible cable: 0.25…2.5 mm^2	Without bezel, flexible cable: 0.25…2.5 mm^2
	With cable end		With bezel, flexible cable: 0.25…1.5 mm^2	With bezel, flexible cable: 0.25…2.5 mm^2
2-wire connection	Without cable end		Solid or flexible cable: 0.14…0.75 mm^2	Solid cable: 0.2…1 mm^2, flexible cable: 0.2…1.5 mm^2
	With cable end		Without bezel, flexible cable: 0.25…1 mm^2	Without bezel, flexible cable: 0.25…1 mm^2
	With cable end		Double, with bezel, flexible cable: 0.5…1.5 mm^2	Double, with bezel, flexible cable: 0.5…1.5 mm^2

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XPS-AK3●1144

References

Description	Type of connection terminal block	No. of safety circuits	Additional outputs	Solid state outputs to PLC	Supply	Reference	Weight kg
Safety modules for monitoring Emergency stops, switches, safety mats and edges and security light barriers	Integrated in module	3	1	4	∿ 24 V ⎓ 24 V	**XPS-AK311144**	0.300
					∿ 110 V	**XPS-AK361144**	0.400
					∿ 120 V ⎓ 24 V	**XPS-AK351144**	0.400
					∿ 230 V ⎓ 24 V	**XPS-AK371144**	0.400
	Separate, can be removed from module	3	1	4	∿ 24 V ⎓ 24 V	**XPS-AK311144P**	0.300
					∿ 110 V ⎓ 24 V	**XPS-AK361144P**	0.400
					∿ 120 V ⎓ 24 V	**XPS-AK351144P**	0.400
					∿ 230 V ⎓ 24 V	**XPS-AK371144P**	0.400

XPS-AK3●1144P

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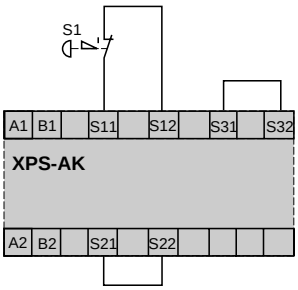
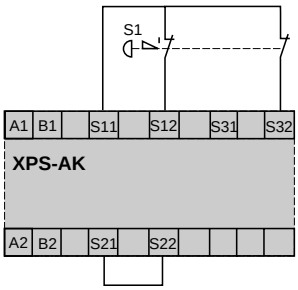
XPS-AK

Emergency stop monitoring function configuration
1-channel wiring
Emergency stop button with a single N/C contact

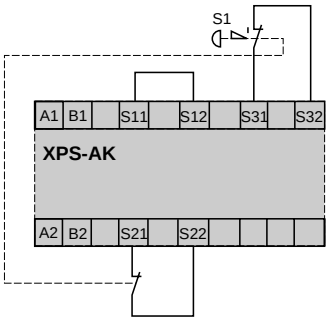


Not all faults are detected:
a short-circuit on the Emergency stop pushbutton is not detected

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

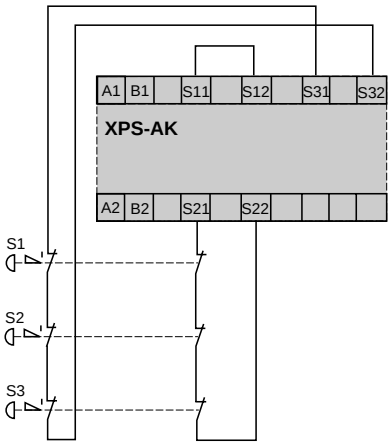


Emergency stop button with 2 N/C contacts, with short-circuit detection (recommended application).



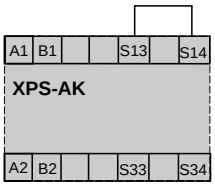
The 2 input channels are connected to different polarities.
A short-circuit between the 2 inputs is detected.

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

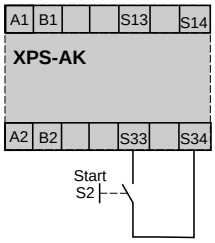


The 2 input channels are connected to different polarities.
A short-circuit between the 2 inputs is detected.

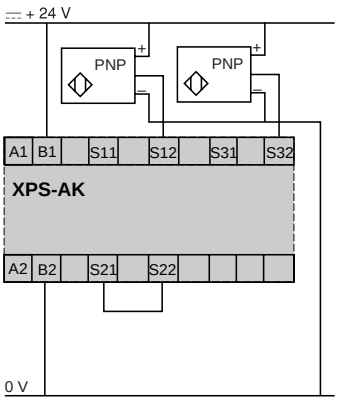
Start configurations
Automatic start



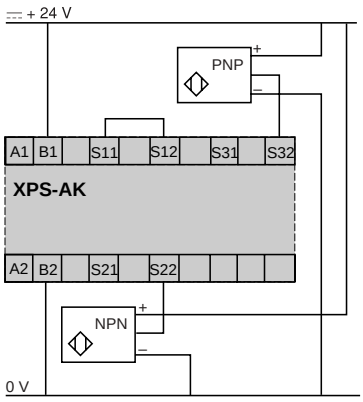
With start button monitoring



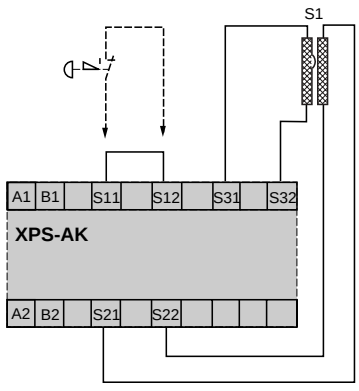
Proximity sensor monitoring
Sensors with PNP outputs
Without short-circuit detection



Sensors with NPN and PNP outputs
With short-circuit detection



Safety mat and edge monitoring



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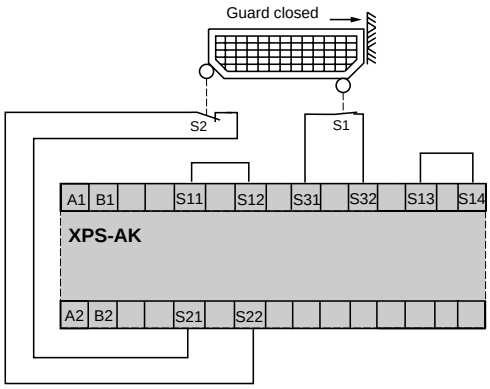
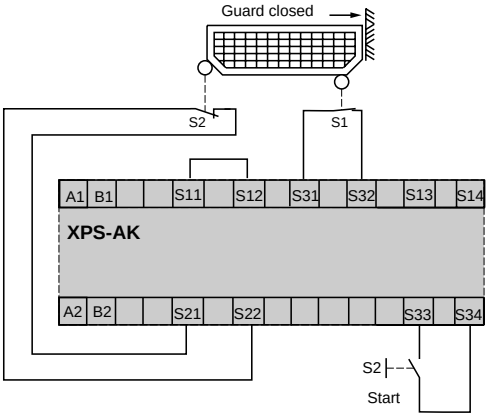
Monitoring of a movable guard associated with 2 switches with 1 contact each (switch 1 with N/O contact, switch 2 with N/C contact).

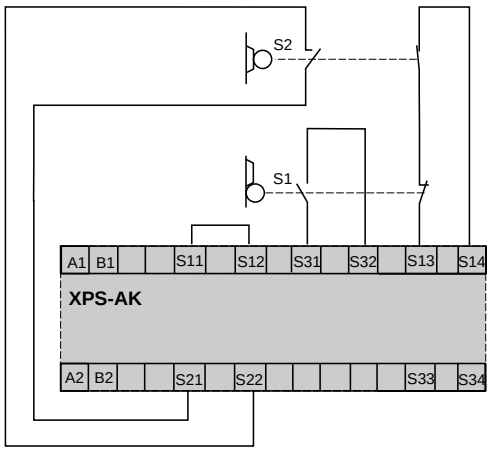
Automatic start, without synchronisation time monitoring



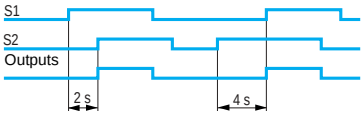
Manual start via Start button



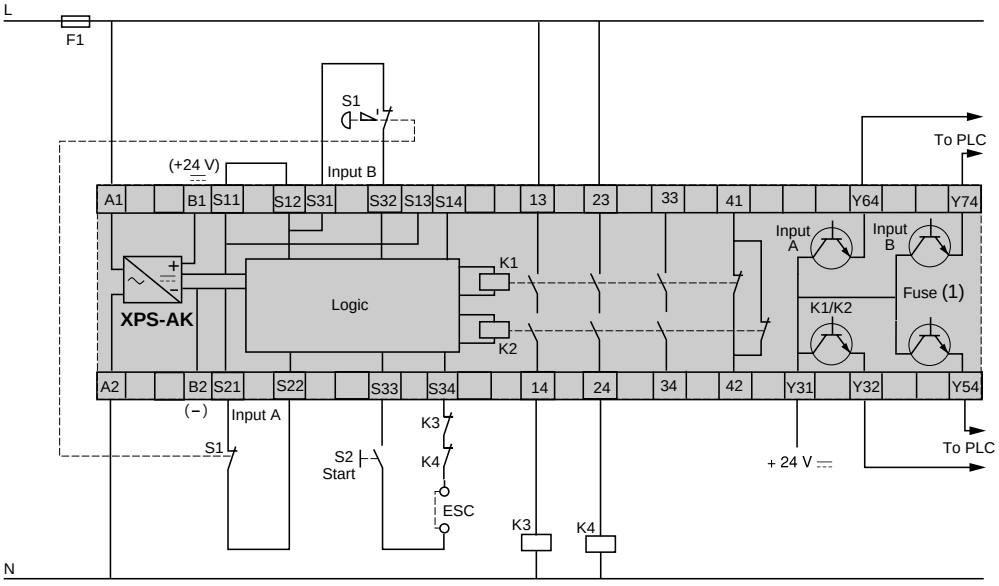
Monitoring of a movable guard associated with 2 switches and automatic start (diagram shows guard open)



Functional diagram for outputs



Module XPS-AK associated with an Emergency stop button with 2 N/C contacts



Supply connection depending on voltage:
~ on terminals A1/A2, or ⎓ 24 V on terminals B1/B2

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

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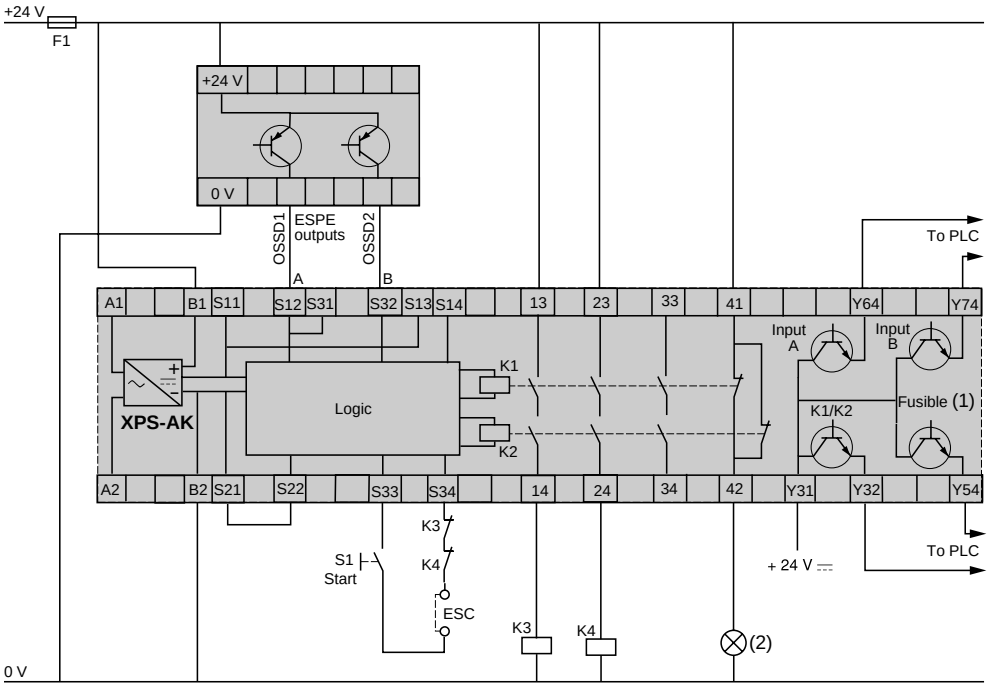
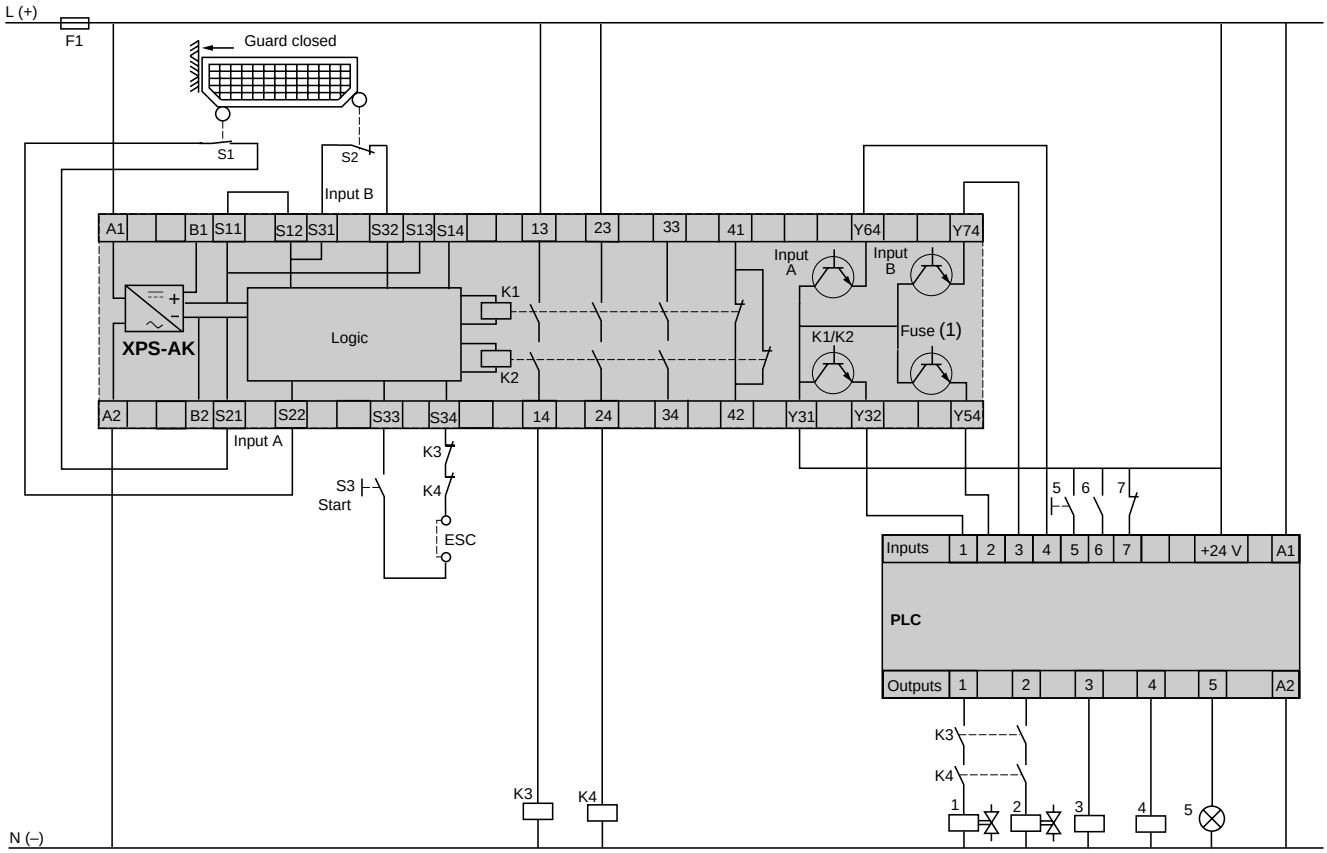
XPS-AK

Module XPS-AK 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 XPS-AK for limit switch monitoring and a PLC

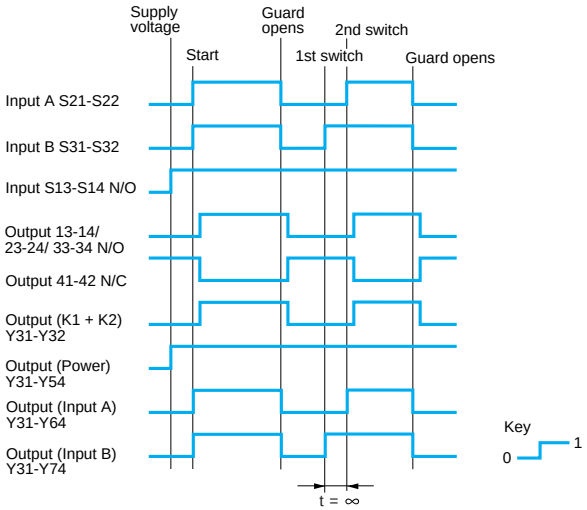


ESC: External start conditions
(1) Operating status of internal electronic fuse

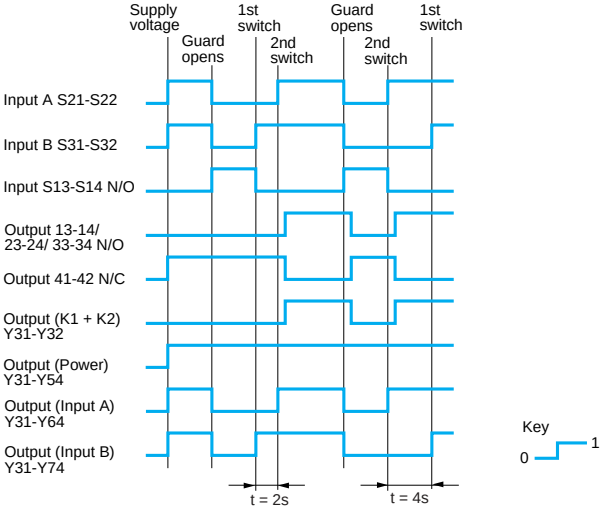
XPS-AK

Functional diagrams

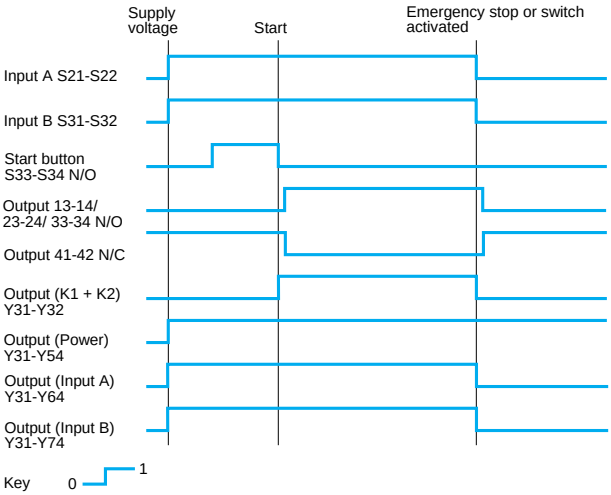
Switch monitoring function with automatic start



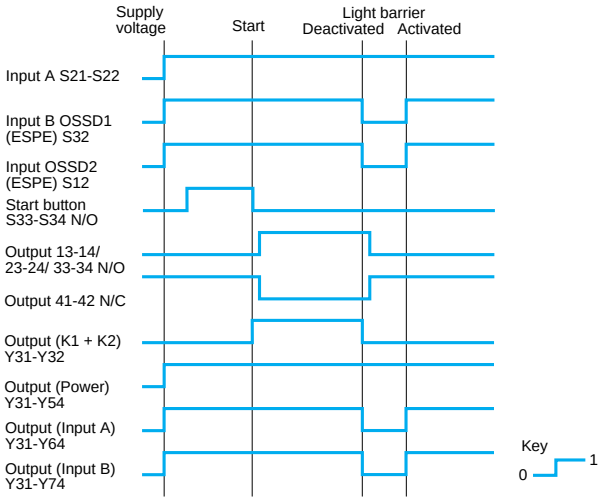
Switch monitoring function with automatic start and synchronisation of time monitoring



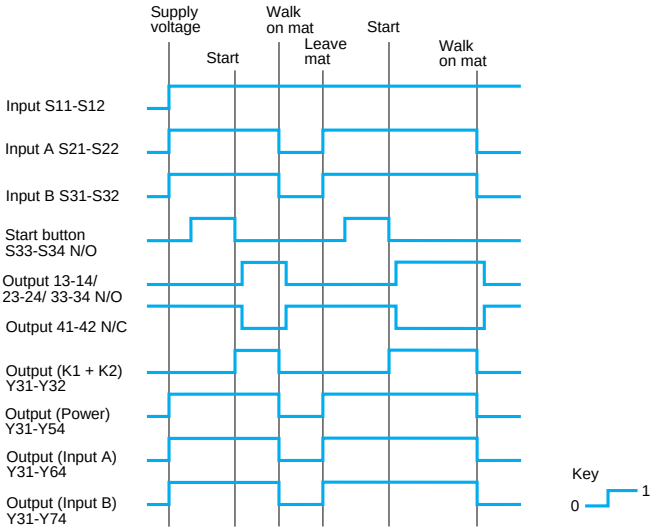
Emergency stop monitoring or switch monitoring function



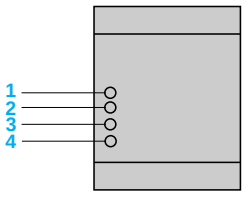
Light barrier monitoring function (ESPE) with solid state outputs



Safety mat and edge monitoring function with monitored start



Key to LEDs



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