Operating principle

XPS-AV and XPS-AT safety modules are used to monitor Emergency stop circuits, conforming to standards EN 418 and EN 60204-1, and also comply with the safety requirements for the electrical monitoring switches used in conjunction with machine guards conforming to the standard EN1088. 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 a fault in the safety circuit itself.

In addition to the three instantaneous opening safety outputs (stop category 0), the modules incorporate stop category 1 time delay outputs (3 for XPS-AV and 2 for XPS-AT), 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 XPS-AV, the time delay of the 3 output circuits is adjustable, in 15 preset values, between 0 and 300 seconds using selector keys.
For module XPS-AT, the time delay of the 2 output circuits is adjustable between 0 and 30 seconds using a 12-position selector switch.

The XPS-AV module also incorporates 3 solid state signalling outputs for signalling to the process PLC.

To assist diagnostics, the modules incorporate LEDs to indicate the state of the monitoring circuit.

The function for monitoring the Start button can be configured by wiring.

Characteristics

Module type		**XPS-AV11113 and AV11113P**	**XPS-AT●●●●**
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1)		Category 4 max.	Category 4 max. (instantaneous safety outputs) Category 3 max. (time delay safety outputs)
Supply - voltage - voltage limits	**V**	⎓ 24	∿ and ⎓ 24, ∿ 115, ∿ 230
		- 20…+ 20 %	- 20…+ 10 % (24 V) - 15…+ 15 % (115 V) - 15…+ 10 % (230 V)
- frequency	**Hz**	–	50/60
Consumption	**W**	< 5	< 8
Module fuse protection		Internal, electronic	Internal, electronic
Adjustable time delay	**s**	0…300	0…30
Start button monitoring		Yes/No (configurable by terminal connection)	Yes/No (configurable by terminal connection)
Control unit voltage (at nominal supply voltage)		Between terminals S21-S22, S31-S32 or S11-S12	Between terminals S11-S12, S21-S22 or S11-B1
- 24 V version	**V**	24	24
- 115 V and 230 V versions	**V**	–	48
Calculation of wiring resistance RL between input terminals	Ω	100 max. Maximum cable length: 2000 m	RL max. = $\frac{\text{U int - U min.}}{\text{I min.}}$ 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

Characteristics (continued)

Module type			XPS-AV11113	XPS-AV11113P	XPS-AT●●●●
Synchronization time between inputs		**s**	For guard: 1.5 For emergency stop: unlimited		Approx. 0.075 (automatic start, terminals S33-Y2 and Y3-Y4 linked)
Outputs					
- voltage reference			Volt-free		
- number and type of instantaneous opening safety circuits			3 N/O (03-04, 13-14, 23-24)		3 N/O (13-14, 23-24, 33-34)
- number and type of time delay opening safety circuits			3 N/O (37-38, 47-48, 57-58)		2 N/O (57-58, 67-68)
- number and type of additional circuits			3 solid state		1 N/C (41-42)
- breaking capacity in AC-15					
	instantaneous outputs	**VA**	C300: inrush 1800, maintained 180		B300: inrush 3600, maintained 360
	time delay outputs	**VA**	C300: inrush 1800, maintained 180		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
	time delay outputs		24 V/1.25 A L/R = 50 ms		24 V/1.5 A L/R = 50 ms
- breaking capacity of solid state outputs			24 V/20 mA		–
- max. thermal current (the)					
	instantaneous outputs	**A**	3.3 for all 3, or 6 for 1 and 2 for 2, or 4 for 2 and 2 for 1		5
	time delay outputs		3.3 for all 3, or 6 for 1 and 2 for 2, or 4 for 2 and 2 for 1		2.5
- max. total thermal current		**A**	20		8
- output fuse protection conforming to IEC EN 947-5-1. DIN VDE 0660 part 200					
	instantaneous outputs	**A**	4 gG or 6 fast acting		6 gG
	time delay outputs		4 gG or 6 fast acting		4 gG
- minimum current		**mA**	10		10
- minimum voltage		**V**	17		17
Electrical durability			See page 38610/6		
Response time on instantaneous opening inputs		**ms**	< 30		< 20
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to IEC EN 947-5-1, DIN VDE 0110 parts 1 and 2)		
Rated impulse withstand voltage (Uimp.)		**kV**	4 (overvoltage category III, conforming to IEC EN 947-5-1, DIN VDE 0110 parts 1 and 2)		
LED display			11		4
Operating temperature		**°C**	- 10…+ 55		
Storage temperature		**°C**	- 25…+ 85		
Degree of protection conforming to IEC EN 529	Terminals		IP 20		
	Enclosure		IP 40		
Connection	Type		Captive screw clamp terminals	Captive screw clamp terminals, separate removable block	Captive screw clamp terminals
- 1-wire connection	Without cable end		Solid or flexible cable: 0.14… 2.5 mm²	Solid or flexible cable: 0.2… 2.5 mm²	Solid or flexible cable: 1 x 4 mm²
	With cable end		Without bezel, flexible cable: 0.25…2.5 mm²	Without bezel, flexible cable: 0.25…2.5 mm²	Flexible cable: 2 x 2.5 mm²
	With cable end		With bezel, flexible cable: 0.25…1.5 mm²	With bezel, flexible cable: 0.25…2.5 mm²	–
- 2-wire connection	Without cable end		Solid or flexible cable: 0.14…0.75 mm²	Solid cable: 0.2…1 mm² Flexible cable: 0.2…1.5 mm²	–
	With cable end		Without bezel, flexible cable: 0.25…1 mm²	Without bezel, flexible cable: 0.25…1 mm²	–
	With cable end		Double, with bezel, flexible cable: 0.5…1.5 mm²	Double, with bezel, flexible cable: 0.5…1.5 mm	–

Safety solutions using Preventa

Safety modules for Emergency stops and switches monitoring

XPS-AV11113

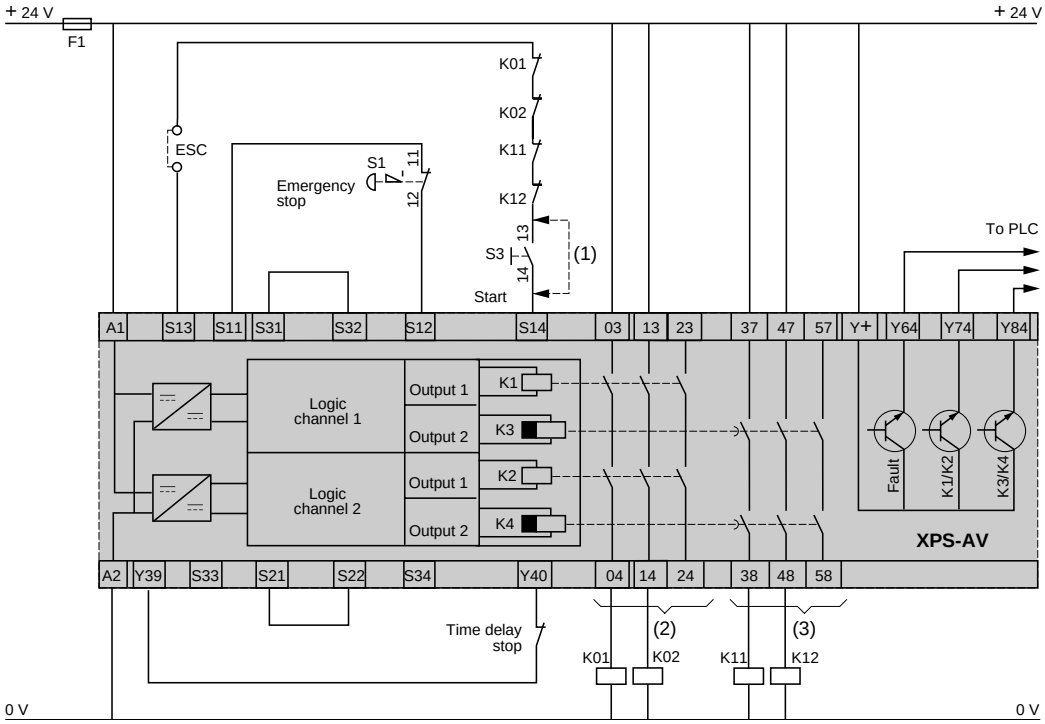
XPS-AV11113P

XPS-AT●●●●

References

Description	Type of connection terminal block	Number of safety circuits	Additional outputs	Supply	Reference	Weight kg
Safety modules for Emergency stop and switch monitoring	Integrated in module	6 N/O (3 N/O time delay)	3 solid state	⎓ 24 V	**XPS-AV11113**	0.320
	Separate, can be removed from module	6 N/O (3 N/O time delay)	3 solid state	⎓ 24 V	**XPS-AV11113P**	0.320
	Integrated in module	5 N/O (2 N/O time delay)	1 N/C	∿ and ⎓ 24 V	**XPS-AT5110**	0.650
				∿ 115 V	**XPS-AT3410**	0.850
				∿ 230 V	**XPS-AT3710**	0.850

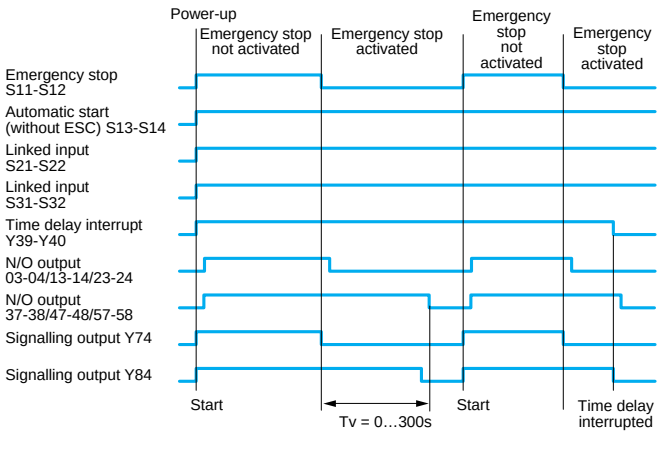
XPS-AV
Module XPS-AV associated with an Emergency stop pushbutton with 1 N/C contact, automatic start or unmonitored start



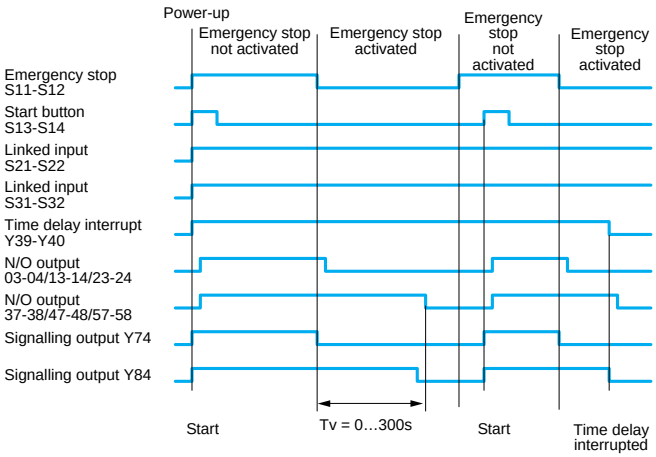
(1) Link for automatic start.
(2) Instantaneous opening safety outputs (stop category 0).
(3) Time delay opening safety outputs (stop category 1).
ESC = External start conditions.

Functional diagrams

Automatic start



Unmonitored start

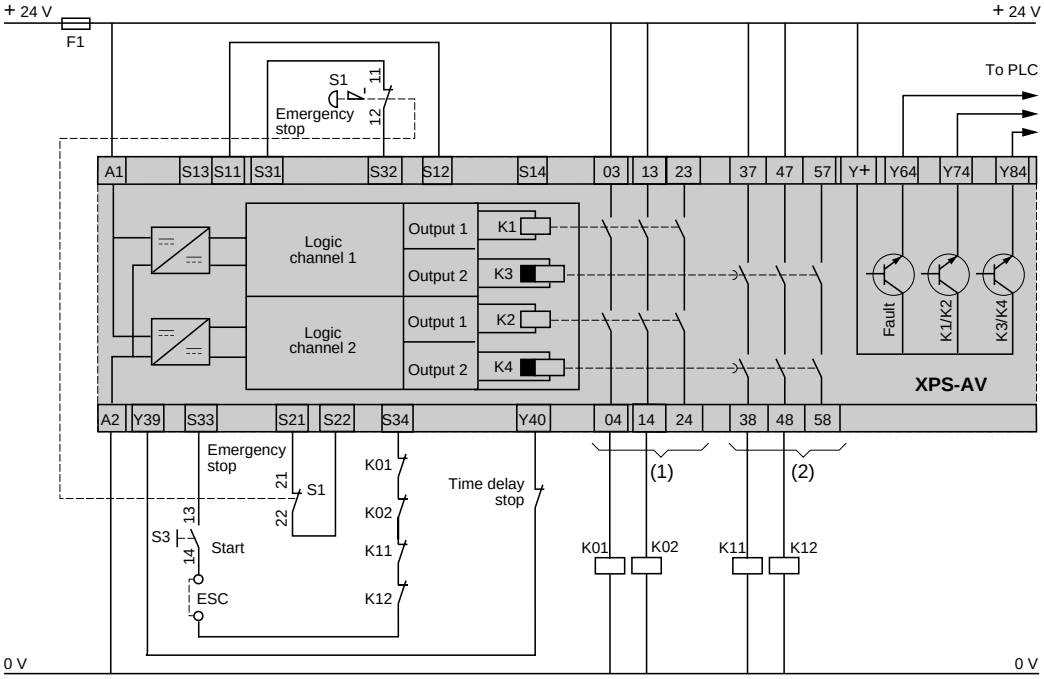


Automatic start
There is no start contact or it is shunted.

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

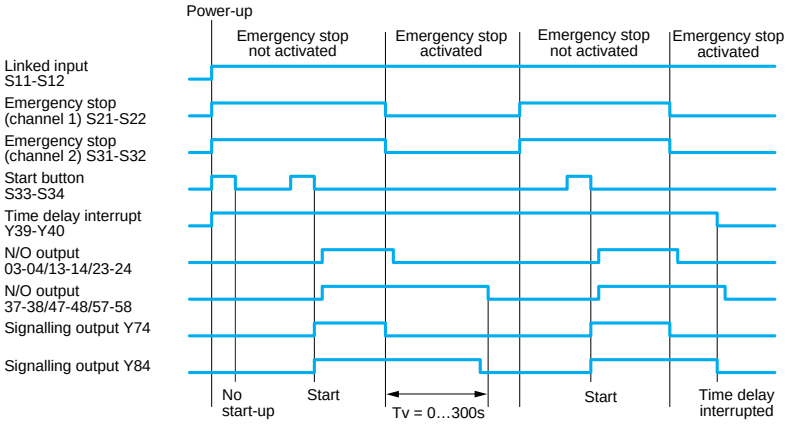
Monitored start
The start input is monitored so that there is no start-up in the event of the start contact being shunted or the start circuit being closed for more than 10 s. Start-up is triggered following activation of the start button (push-release function) on opening of the contact.

XPS-AV
Module XPS-AV associated with an Emergency stop button with 2 N/C contacts, monitored start

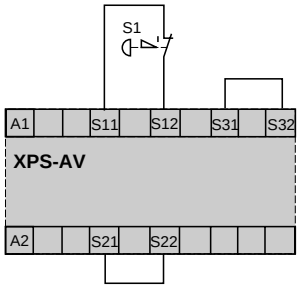


(1) Instantaneous opening safety outputs (stop category 0).
(2) Time delay opening safety outputs (stop category 1).
ESC = External start conditions.

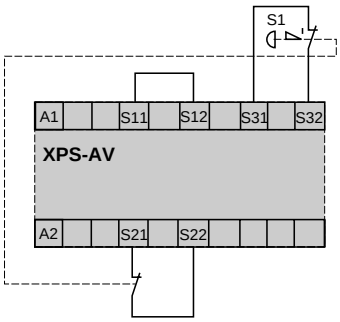
Functional diagram
Monitored start



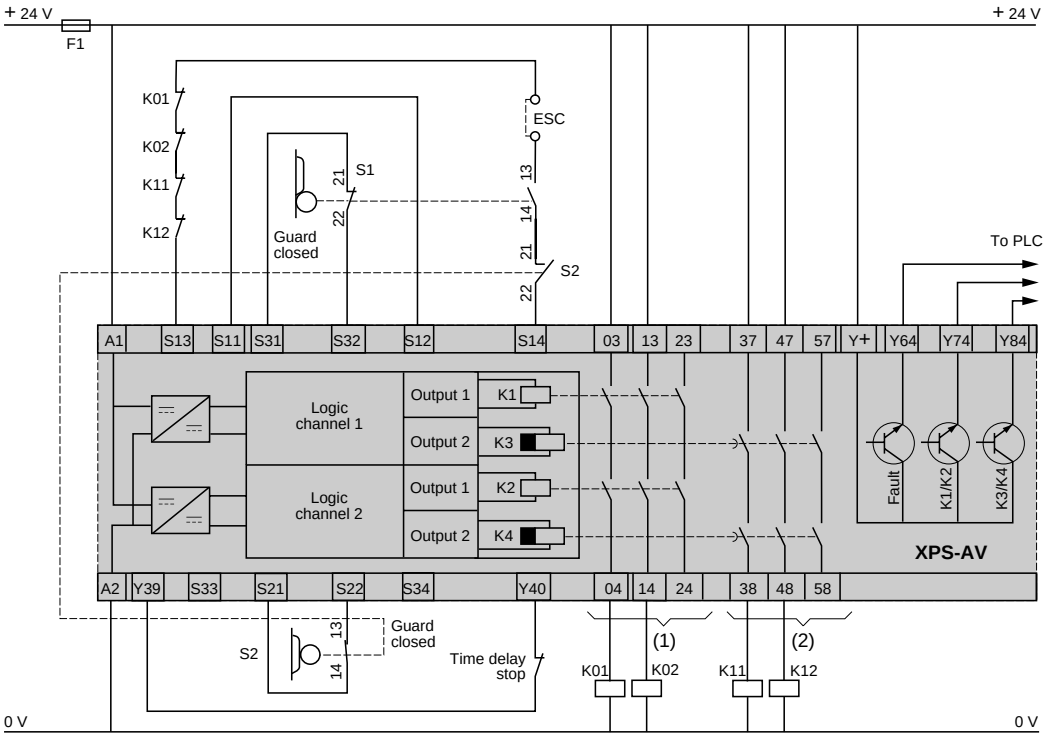
Emergency stop monitoring function configuration
1-channel wiring



2 channel wiring, with short-circuit detection

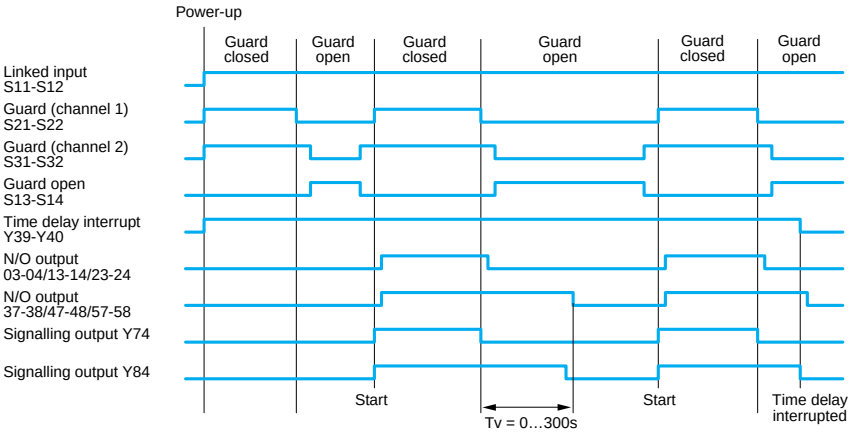


XPS-AV
Monitoring of a movable guard associated with 2 switches
Automatic start (diagram shown for guard closed)

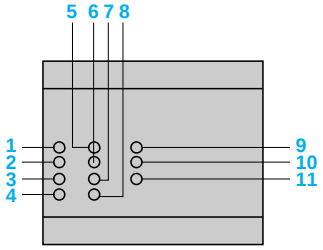


(1) Instantaneous opening safety outputs (stop category 0).
(2) Time delay opening safety outputs (stop category 1).
ESC = External start conditions.

Functional diagram

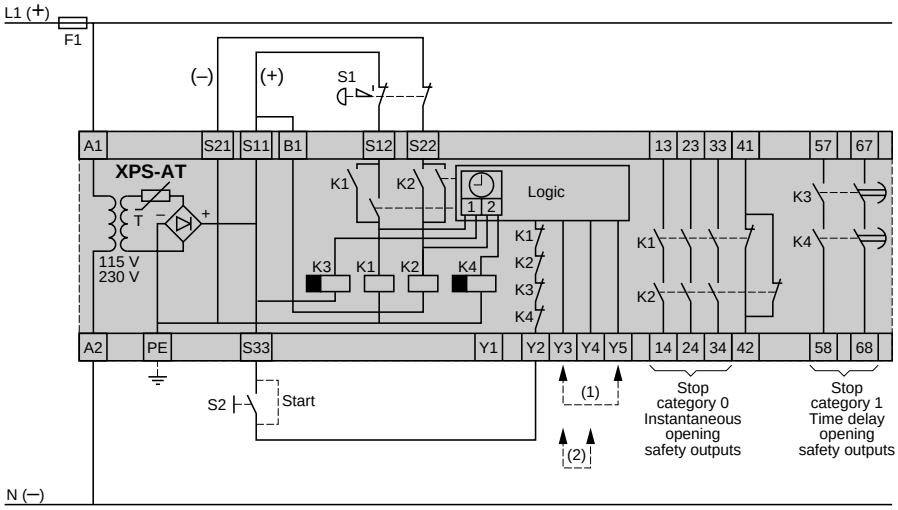


Key to LEDs



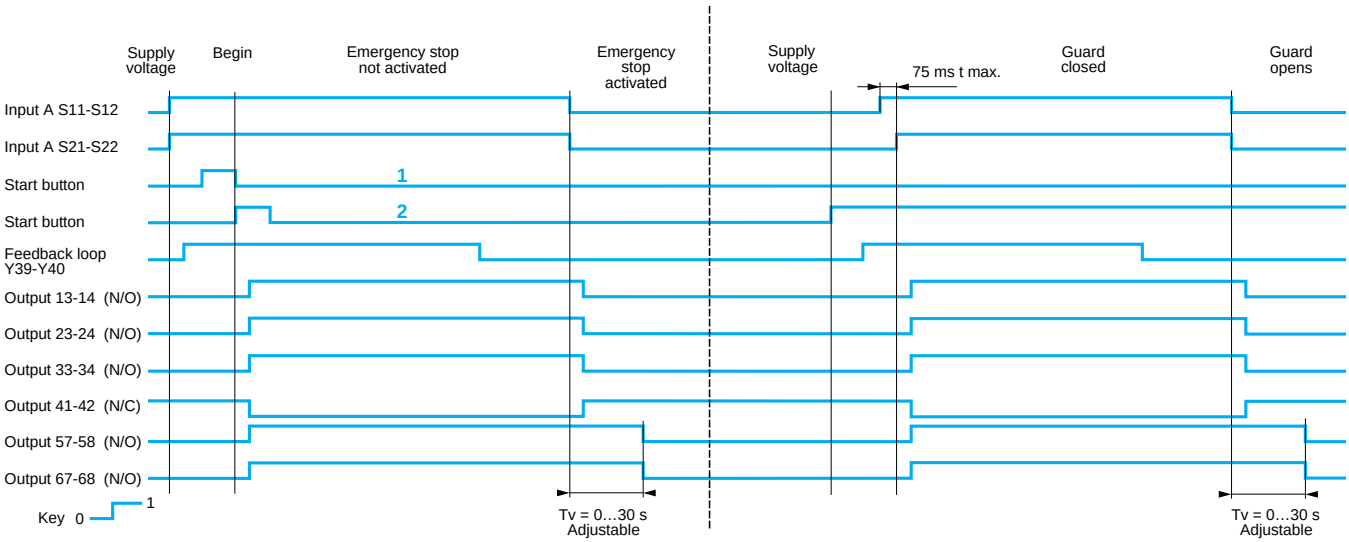
1 S12 input state
2 S22 input state
3 S32 input state
4 S34 input state
5 S14 input state
6 Y40 input state (time delay stop)
7 K1/K2 state (N/O instantaneous opening safety outputs)
8 K3/K4 state (N/O time delay opening safety outputs)
9 A1-A2 supply voltage
10 Fault
11 Configuration mode

XPS-AT
Module XPS-AT associated with an Emergency stop pushbutton



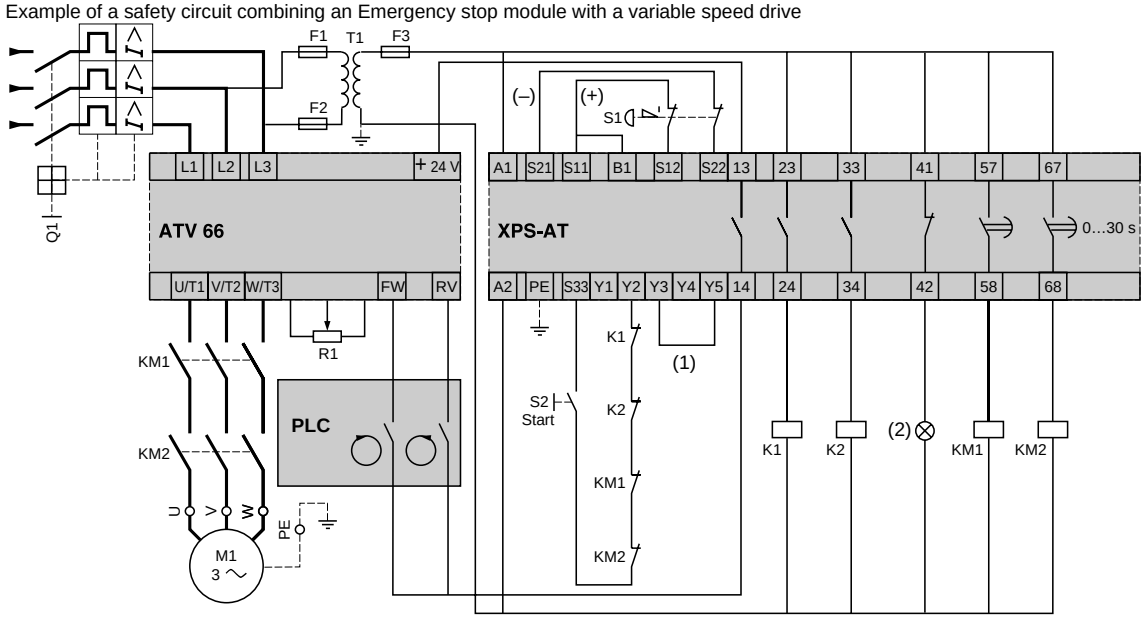
S1: Emergency stop button with 2 N/C contacts (recommended application).
Output 41-42 must not be used as a safety circuit.
(1) With Start button monitoring
(2) Without Start button monitoring

Functional diagram for module XPS-AT with Emergency stop button monitoring



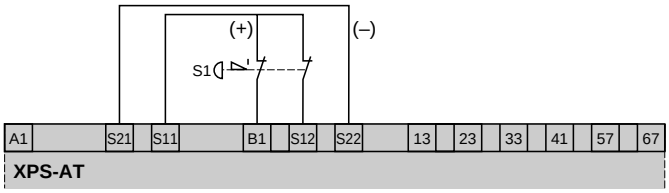
1 With Start button monitoring (connection Y3-Y5)
2 Without Start button monitoring (connection Y3-Y4)

XPS-AT
Example of a safety circuit combining an Emergency stop module with a variable speed drive

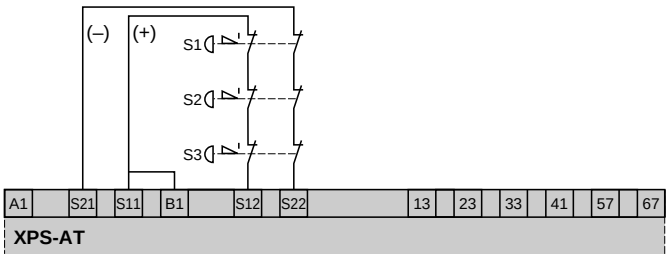


(1) With Start button monitoring
(2) “Emergency stop” signalling
S1: Emergency stop button with 2 N/C contacts (recommended application)

XPS-AT
Connection with 1 Emergency stop pushbutton

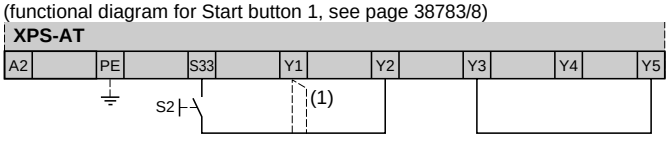


Both input channels are supplied on the same polarity.
S1: Emergency stop pushbutton with 2 N/C contacts.
(a short-circuit between the 2 inputs is not detected)

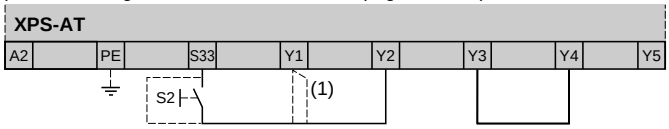


Connection of multiple Emergency stop pushbuttons with 2 N/C contacts (recommended application).
The 2 input channels are supplied on different polarity.
A short-circuit between the 2 inputs is detected.

XPS-AT
Configuration with Start button monitoring
(functional diagram for Start button 1, see page 38783/8)

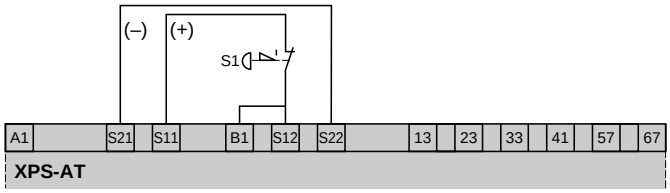


Configuration without Start button monitoring
(functional diagram for Start button 2, see page 38783/8)



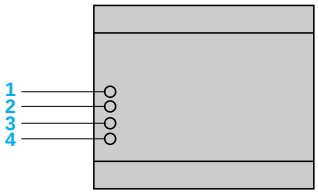
(3) Auxiliary terminal (to be used to separate the feedback loop from the wiring to the Start button)

Monitoring an Emergency stop pushbutton 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

XPS-AT
Key to LEDs



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