

Safety automation solutions

Preventa safety modules types XPS BA, XPS BCE, XPS BF

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 dangerous movement zone.

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

Safety modules XPS BA, BCE and BF 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 dangerous 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 dangerous operation, the control sequence is cancelled. Resumption of the dangerous operation is possible only if both pushbuttons are returned to their initial position and reactivated within the required time interval.

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

Characteristics						
Module type			XPS BA	XPS BCE●●●●P	XPS BCE●●●●C	
Maximum achievable safety level			PL c/Category 1 conforming to EN/ISO 13849-1	PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061		
Reliability data	Mean Time To dangerous Failure (MTTF _d)	Years	160.8	37		
	Diagnostic Coverage (DC)	%	–	> 99		
	Probability of dangerous Failure per Hour (PFH _d)	1/h	7.1 x 10 ⁻⁷	3 x 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		- 20...+ 20% (24 V ~), - 20...+ 10% (24 V ~)	- 15...+ 10% (24 V ~, 24 V ~), - 15...+ 15% (115 V ~), - 15...+ 10% (230 V ~)		
	Frequency	Hz	50/60			
Consumption		VA	< 20 (apparent power)	< 4		
Module inputs fuse protection			Internal, electronic			
Inputs			S1: 1 NC + NO, S2: 1 NC + NO			
Two-hand control type Conforming to EN 574			III A	III C		
Synchronisation time		s	0.5 maximum			
Control unit voltage	24 V ~ version	V	24	24		
	24 V ~, 115 V, 230 V version	V	24	24		
Minimum voltage and current			Between terminals T11-T12, T11-T13			
	U min./I min. - 24 V ~ version (20°C)		18 V/30 mA	–		
	U min./I min. - 24 V ~/115 V/230 V version (20°C)		18 V/30 mA	–		
Calculation of wiring resistance RL (for XPS BCE only) between terminals S11-S13, S21-S23		Ω	–	–	–	
				$RL = \frac{U_e}{U_n} \times 160-127$	Ue = true voltage applied to terminals A1-A2 Un = nominal supply voltage	
				$RL = \frac{U_e}{U_n} \times 160-135$		
Outputs	Voltage reference		Volt-free			
	Number and type of safety circuits		1 NO (11-14)	2 NO (13-14, 23-24)		
	Number and type of additional circuits		1 NC (11-12)	1 NC (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 - 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 or 6 fast acting	6 gG		
	Minimum current	mA	10			
	Minimum voltage	V	17			
Electrical durability			See page 38610-EN/2			
Response time		ms	< 25	< 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		°C	- 10...+ 55	- 25...+ 55		
Storage temperature		°C	- 25...+ 85	- 25...+ 75		
Degree of protection conforming to IEC/EN 60529	Terminals		IP 20			
	Enclosure		IP 40			
Connections	Type	Terminals	Captive screw clamp terminals	Captive screw clamp terminals	Spring terminals	
		Terminal block	Integrated in module		Removable from module	
	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			
	2-wire connection	With cable end	With bezel, flexible cable: 0.25...1.5 mm ²			
		Without cable end	Solid or flexible cable: 0.14...0.75 mm ²		Solid or flexible cable: 0.2...1 mm ²	
		With cable end	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 mm ²

Safety automation solutions

Preventa safety modules type XPS BF

For electrical monitoring of two-hand control stations

Characteristics				
Module type		XPS BF1132	XPS BF1132P	
Maximum achievable safety level		PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061		
Reliability data	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 x 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... + 20%	
Consumption		W	< 2.5	
Module inputs fuse protection		Internal, electronic		
Inputs		S1: 1 NC + NO, S2: 1 NC + NO		
Two-hand control type		III C conforming to EN 574		
Synchronisation time		s	0.5 maximum	
Control unit voltage		V	24 V/8 mA	
Outputs	Voltage reference	Volt-free		
	Number and type of safety circuits	2 NO (13-14, 23-24)		
	Number and type of additional circuits	2 solid-state (type 24 V - 20 mA)		
	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 (I _{the})	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 durability		See page 38610-EN/2		
Response time		ms	< 20	
Rated insulation voltage (U_i)		V	300 (degree of pollution 2 conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (U_{imp})		kV	4 (overvoltage category III, conforming to IEC/EN 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display		3		
Operating temperature		°C	- 10... + 55	
Storage temperature		°C	- 25... + 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: 0.14...2.5 mm ²	
		With cable end	Without bezel, flexible cable: 0.25...2.5 mm ²	
	2-wire connection	With cable end	With bezel, flexible cable: 0.25...1.5 mm ²	
		Without cable end	Solid or flexible cable: 0.14...0.75 mm ²	
		With cable end	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	
With cable end	Double, with bezel, flexible cable: 0.5...1.5 mm ²			

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Selection

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.

Requirements of standard EN 574/ISO 13851	Type I	Type II	Type III		
			A	B	C
Use of both hands (simultaneous action)					
Link between input and output signals					
Output signal inhibited					
Prevention of accidental operation					
Tamper-proof					
Output signal reinitialised					
Synchronous action (specified time limit)					
Use of proven components (Category 1 conforming to EN/ISO 13849-1)			XPS BA●●		
Redundancy with partial error detection (Category 3 conforming to EN/ISO 13849-1)				XPS BCE XPS BF	
Redundancy + Self-monitoring (Category 4 conforming to EN/ISO 13849-1)					XPS BCE XPS BF
Two-hand control station	XY2 SB●●				

Meets the requirements of standard EN 574/ISO 13851

Conforming to standard EN/ISO 13849-1

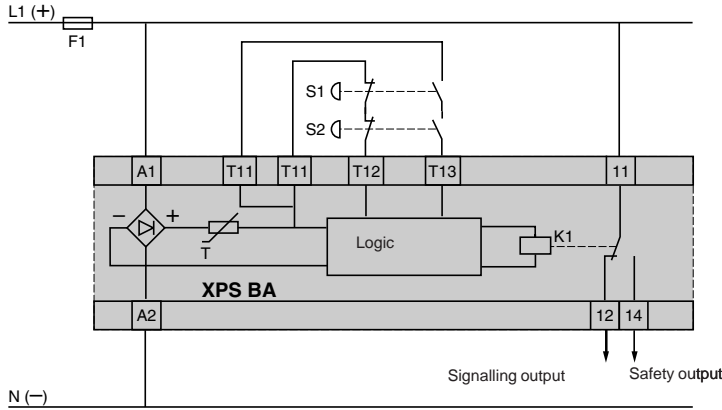
References

	Description	Type conforming to standard EN 574	Connection	Number of safety circuits	Additional outputs	Supply	Reference	Weight kg
 XPS BA5120	Safety modules for electrical monitoring of two-hand control stations	III A	Captive screw clamp terminals Terminal block integrated in module	1 NO	1 NC	~ or 24 V $\overline{\text{DC}}$	XPS BA5120	0.200
		III C	Captive screw clamp terminals Terminal block removable from module	2 NO	1 NC relay	~ and 24 V $\overline{\text{DC}}$	XPS BCE3110P	0.272
 XPS BCE●●●●P XPS BCE●●●●C			Spring terminals Terminal block removable from module	2 NO	1 NC relay	~ and 24 V $\overline{\text{DC}}$	XPS BCE3110C	0.272
						115 V ~	XPS BCE3410C	0.322
							230 V ~	XPS BCE3710C
 XPS BF1132			Captive screw clamp terminals Terminal block removable from module	2 NO	2 solid-state	24 V $\overline{\text{DC}}$	XPS BF1132	0.150
						2 NO	2 solid-state	24 V $\overline{\text{DC}}$

XPS BA

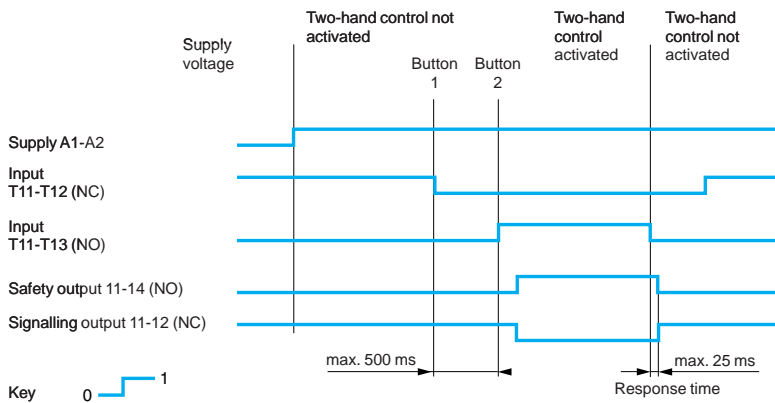
Module XPS BA associated with a two-hand control station

Type III A conforming to EN 574

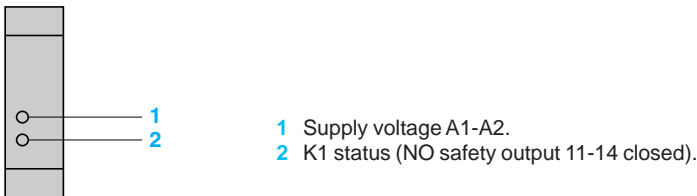


S1 and S2: pushbuttons. Must not be used for applications (presses) which require a type III C module (XPS BCE or XPS BF).

Functional diagram of module XPS BA



LED details (XPS BA)

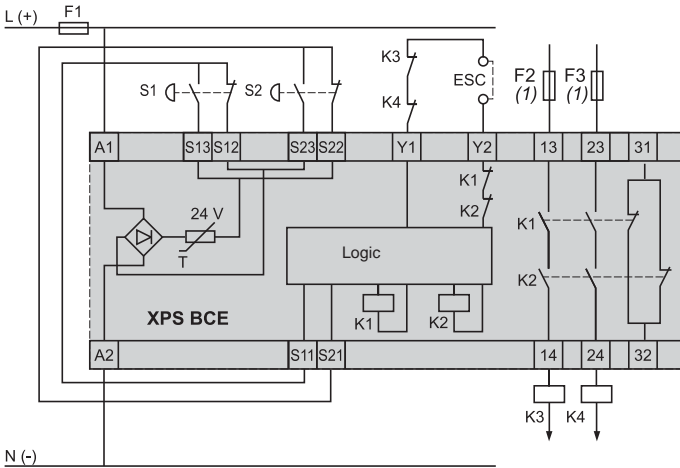


XPS BCE

Module XPS BCE associated with a two-hand control station

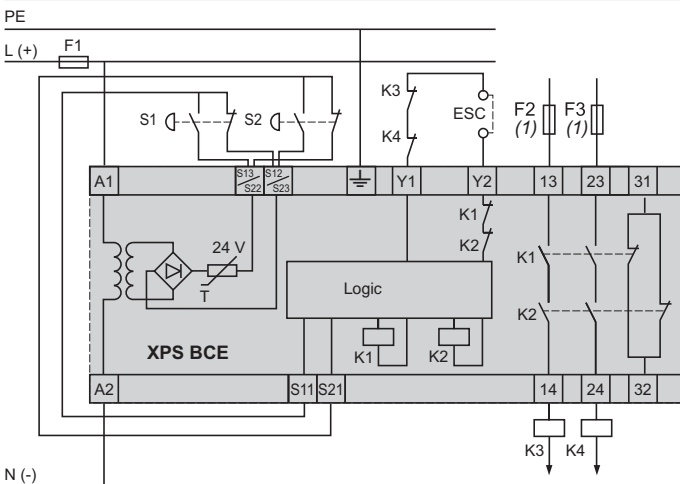
Type III C conforming to EN 574/ISO 13851

~ and 24 V ...



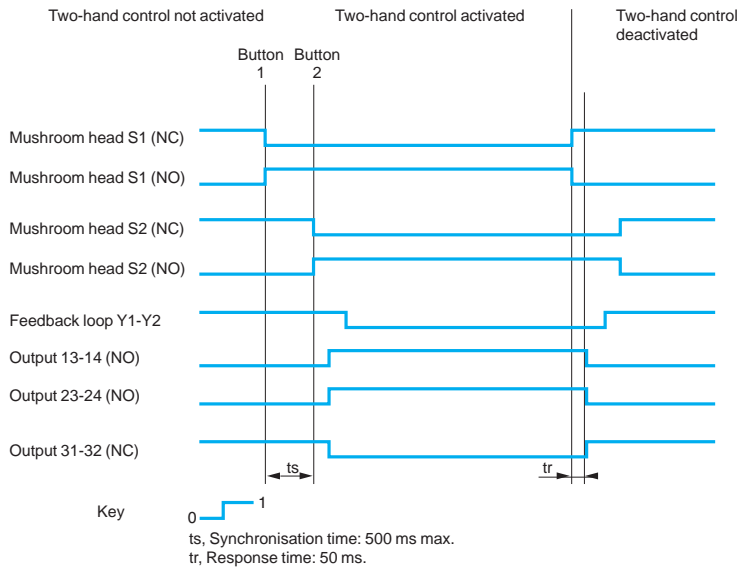
S1, S2: Two-hand control station pushbuttons
 ESC: External start conditions
 (1) Maximum fuse rating: see technical characteristics.

115 ~ and 230 V

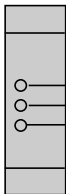


S1, S2: Two-hand control station pushbuttons
 ESC: External start conditions
 (1) Maximum fuse rating: see technical characteristics.

Functional diagram of module XPS BCE



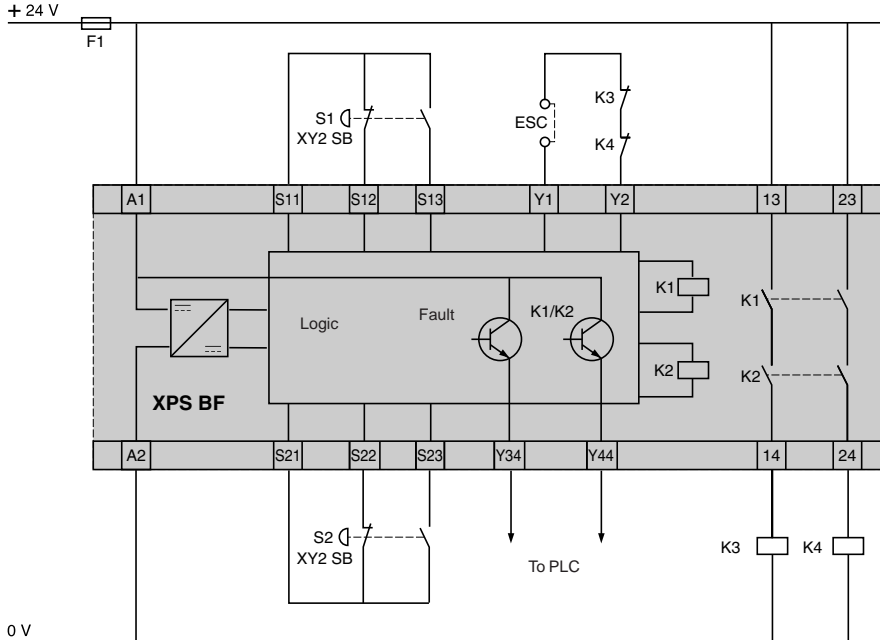
LED details (XPS BCE)



- 1 Supply voltage A1-A2.
- 2 K1 status (NO safety outputs closed).
- 3 K2 status (NO safety outputs closed).

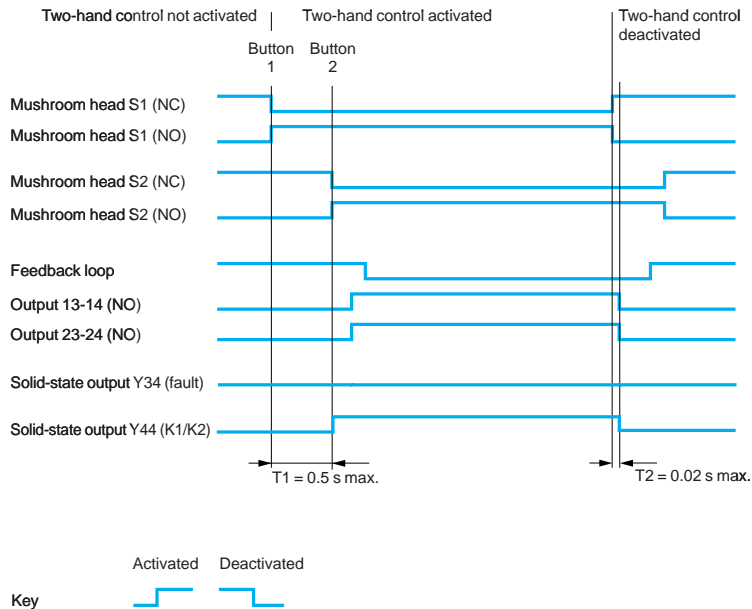
XPS BF

Module XPS BF associated with a two-hand control station

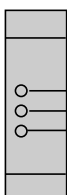


ESC: External start conditions.
Y1-Y2: feedback loop

Functional diagram of module XPS BF



LED details (XPS BF)



- 1 Supply voltage A1-A2 (fuse status).
- 2 Fault signalling.
- 3 K1-K2 status (NO safety outputs closed).