

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 safely protect only one operator. Separate two-hand control stations must be provided for each operator in a multiple-worker environment.

Safety modules XPSBA, BC 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 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 to ensure that when only one operator is released, the hazardous zone cannot be reached before the hazardous movement has been completed or stopped.

XPSBA

This module is designed for use on lighter duty applications where a two-hand control function is desired, but where the safety category is B or 1 (per EN 954-1) and the two-hand control requirements meet Type III A (per EN 574). **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 a category B or 1.** For press applications, for applications in category 2, 3, or 4, or if application calls for a Type III C module, use XPSBC or XPSBF module.

XPSBC and XPSBF

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



Characteristics				
Module type		XPSBA	XPSBC	
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)		Category 1 max.	Category 4 max.	
Conformity to standards		EN/IEC 60204-1, EN/IEC 60947-5-1, EN 574/ISO 13851 type III A, EN 50082-2	EN/IEC 60204-1, EN/IEC 60947-5-1, EN 574 type III C/ISO 13851, EN 50082-2	
Product certifications		UL, CSA	UL, CSA, INRS	
Supply	Voltage	V	~ 24, ~ 115, ~ 230	
	Voltage limits		~ 24 V: - 20...+ 20% (~ 24 V), - 20...+ 10% (~ 24 V), - 15...+ 15% (~ 115 V), - 15...+ 10% (~ 230 V) ~ 115 V: - 20...+ 10% (~ 24 V), - 15...+ 10% (~ 24 V), - 15...+ 15% (~ 115 V), - 15...+ 10% (~ 230 V)	
	Frequency	Hz	50/60	
Power consumption		VA	< 20 (apparent power) < 6	
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/ISO 13851		III A	III C	
Synchronization time		s	0.5 maximum	
Control unit voltage	~ 24 V version	V	24	
	~ 24 V, 115 V, 230 V version	V	24	
Minimum voltage and current				
U min./I min. - ~ 24 V version 68 °F (20 °C)			Between terminals T11-T12, T11-T13 18 V/30 mA	
U min./I min. - ~ 24 V/115 V/230 V version 68 °F (20 °C)			Between terminals T11-T13, T21-T23 18 V/140 mA	
Calculation of wiring resistance RL (for XPSBC only) between terminals T11-T13, T21-T23 as a function of the internal supply voltage U int (terminals T13-T23)		Ω	- $RL_{max} = \frac{U_{int} - U_{min}}{I_{min}}$ Ue = true voltage applied to terminals A1-A2 U int = supply voltage Ue - 1 V (24 V version) (115 V, 230 V version) RL max. must not exceed 50 Ω U int between 30.5 V and 35 V, with typical value = 35 V	
Outputs	Voltage reference		Relay hard contacts	
	Number and type of safety circuits		1 N.O. (11-14)	
	Number and type of additional circuits		1 N.C. (11-12)	
	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	5	2.5
	Output fuse protection, using fuses conforming to EN/IEC 60947-5-1, VDE 0660 part 200	A	4 gG or 6 fast acting	4 gG
	Minimum current	mA	10	
Minimum voltage	V	17		
Electrical life		See page 2/172		
Response time		ms	< 25 < 30	
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			2 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	
1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14...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)	
2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14...0.75 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)	

Characteristics				
Module type		XPSBF1132	XPSBF1132P	
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)		Category 4 max.		
Conformity to standards		EN/IEC 60204-1, EN 574 type III C/ISO 13851, EN/IEC 60947-1, EN/IEC 60947-5-1, DIN V VDE 0801 (1990), DIN V VDE 0801 A1 (1994)		
Product certifications		UL, CSA, BIA		
Supply	Voltage	V	≐ 24	
	Voltage limits		- 20...+ 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/ISO 13851		
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 - 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 EN/IEC 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 2/172		
Response time		ms	< 20	
Rated insulation voltage (U_i)		V	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (U_{imp})		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)	
	2-wire connection	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)
		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)		




Selection

Standard EN 574/ISO 13851 defines the selection of two-hand controls according to the control system category.
The following table details the three 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 reinitialized					
Synchronous action (specified time limit)					
Use of proven components (Category 1 conforming to EN 954-1/ ISO 13849-1)			XPSBA●●		
Redundancy with partial error detection (Category 3 conforming to EN 954-1/ ISO 13849-1)				XPSBC XPSBF	
Redundancy + Self-monitoring (Category 4 conforming to EN 954-1/ ISO 13849-1)					XPSBC XPSBF

 Meets the requirements of standard EN 574/ISO 13851
 Conforming to standard EN 954-1/ISO 13849-1

References

Description	Type conforming to standard EN 574/ISO 13851	Type of terminal block connection	Number of safety circuits	Additional outputs	Supply	Reference	Weight
							oz (kg)
 Safety modules for electrical monitoring of two-hand control stations XPSBA●●●●	III A	Integrated in module	1 N.O.	1 N.C.	~ or ~ 24 V	XPSBA5120	7.055 (0.200)
					~ 115 V	XPSBA3420	7.055 (0.200)
					~ 230 V	XPSBA3720	7.055 (0.200)
 XPSBC●●●●	III C	Integrated in module	2 N.O.	1 N.C.	~ 24 V	XPSBC1110	14.110 (0.400)
					~ 24 V	XPSBC3110	14.110 (0.400)
					~ 115 V	XPSBC3410	14.110 (0.400)
					~ 230 V	XPSBC3710	14.110 (0.400)
 XPSBF1132P			2 N.O.	2 solid-state	~ 24 V	XPSBF1132	5.291 (0.150)
					Removable from module	~ 24 V	XPSBF1132P