



S-Range Electronic Monitoring Relays and Compact PNOZ X Safety Relays

pilz

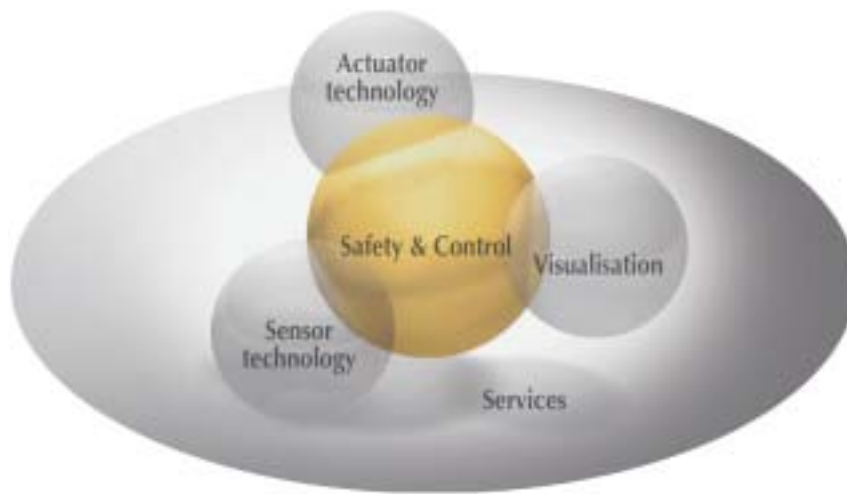
more than automation
safe automation

Configuration data sheets
– S-Range products and PNOZ X

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Single-phase voltage monitoring S1UM

1.1



The S1UM voltage monitoring relay is used to monitor min. or max. voltage values.

Approvals

	S1UM
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Unit features

- } 12 measuring ranges 0.1 V ... 500 V, selectable
- } Reaction time can be set to up to 10 seconds
- } Detects AC/DC voltage values automatically
- } Normally energised or normally de-energised mode
- } Galvanic isolation between measuring and supply voltage
- } S1UM UP version: measuring inputs are not polarity-sensitive

Description

The voltage monitoring relay is enclosed in an S-95 slimline housing. There are 8 versions available for AC operation and one for DC operation.

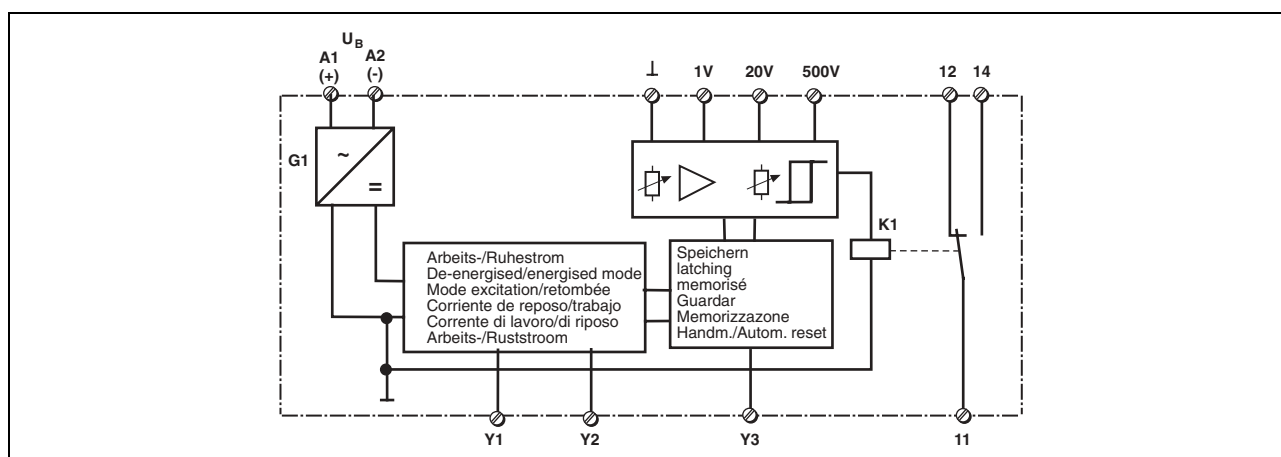
Features

- } Relay outputs: 1 auxiliary contact (C/O)
- } 3 measuring circuits for 1 V, 20 V and 500 V, each with 4 different ranges

- } Response value can be set from 20 % to 100 % of the measuring range limit value
- } Hysteresis can be set from 0.6 to $0.95 \times U_{on}$
- } Fault status can be latching or non-latching
- } LEDs for relay's switch status and for supply voltage

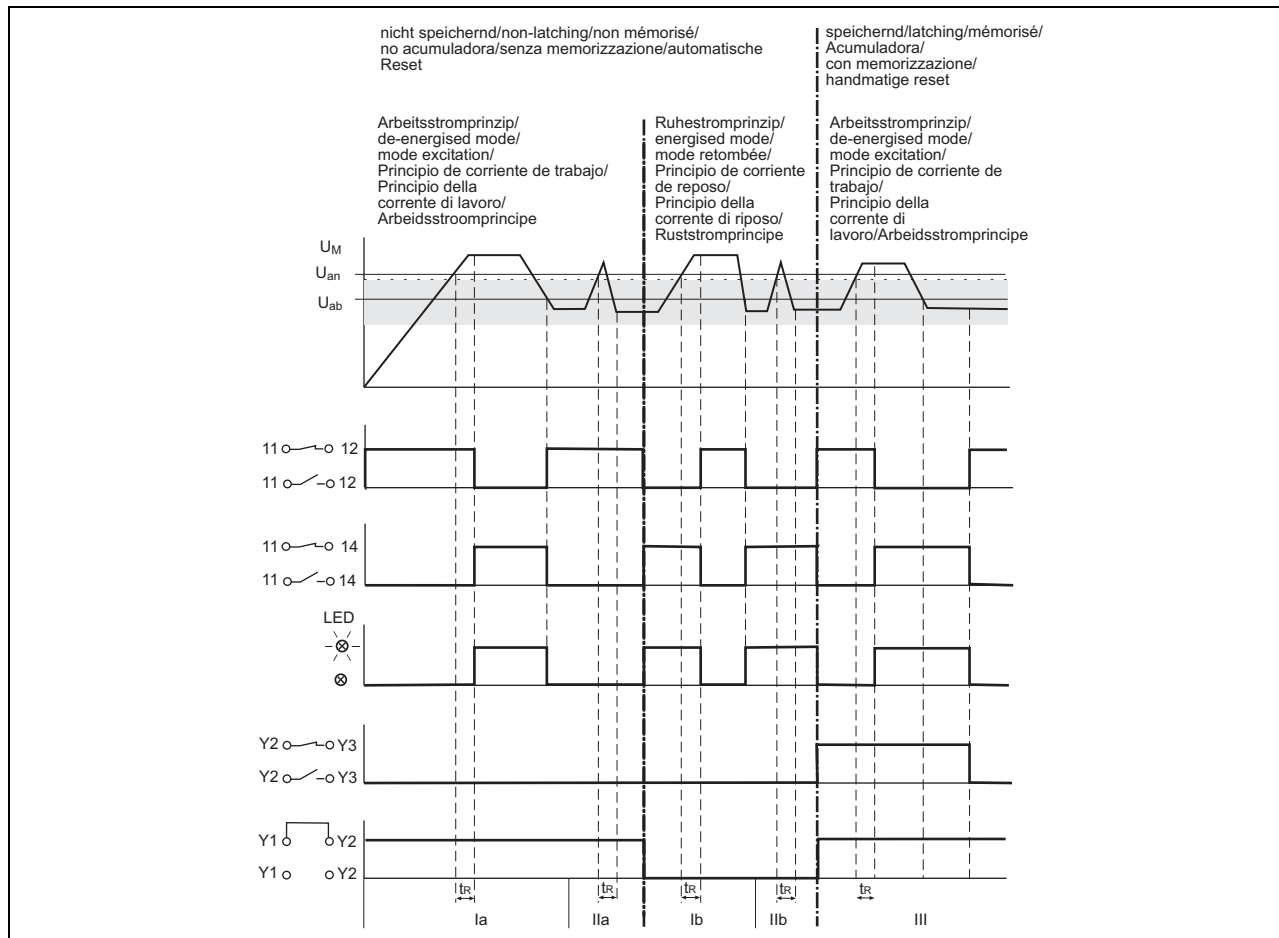
The S1UM monitors for voltage values exceeding a threshold limit. On the S1UM UP version, the measuring inputs are not polarity-sensitive. If the measuring voltage reaches the set response value U_{on} , auxiliary contact 11-14 changes over and the LED lights. If the measuring voltage falls below the hysteresis value U_{off} and automatic reset is selected, the auxiliary contact changes over again and the LED goes out. The unit is ready for operation again. If faults are latched, the unit will not be ready for operation again until an external reset button is operated or the supply voltage has been switched off and then on again.

Internal wiring diagram



Single-phase voltage monitoring S1UM

Timing diagram



Key

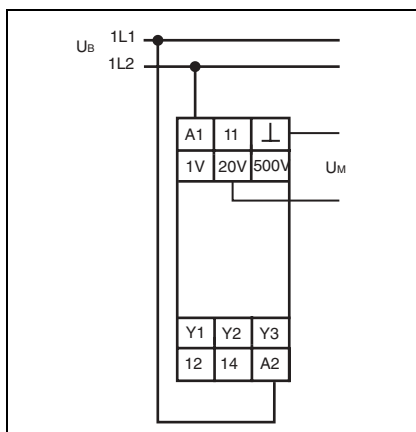
- } Hysteresis (U_{off}): 0.6 to $0.95 \times U_{on}$
- } Grey area: Adjustable hysteresis
- } t_R : Reaction time
- } Ia: $U_M > U_{on}$: Once t_R has elapsed, the relay energises and the LED "OUT" is lit.
 $U_M < U_{off}$: Relay de-energises and LED goes out.
- } IIa: $U_M > U_{on}$ before t_R has elapsed: Relay remains de-energised.
- } Ib: $U_M > U_{on}$: As above, but relay de-energises and LED "OUT" goes out.
 $U_M < U_{off}$: Relay energises and LED is lit.
- } IIb: As above, but relay remains energised.
- } III: $U_M > U_{on}$: See above
 $U_M < U_{off}$: Relay does not de-energise until Y2-Y3 is open.

Single-phase voltage monitoring S1UM

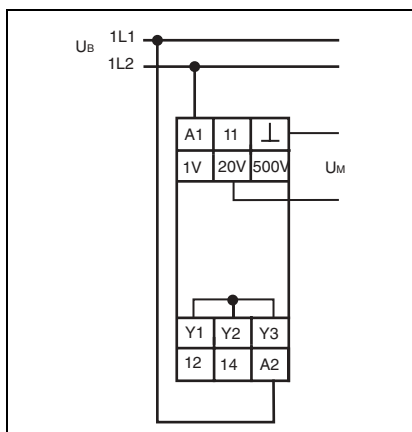
Connection examples

1.1

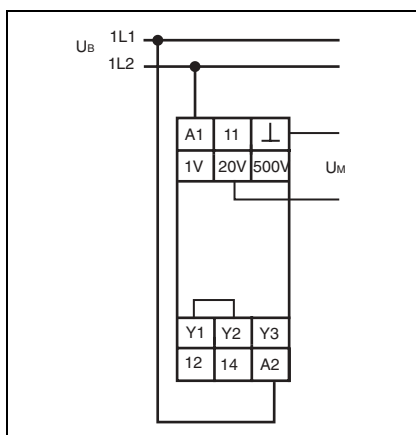
} Example 1
Normally energised, non-latching



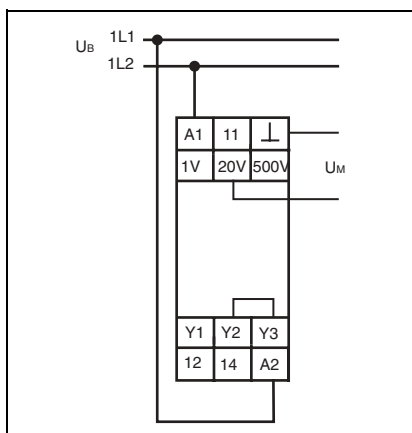
} Example 3
Normally de-energised, latching



} Example 2
Normally de-energised, non-latching



} Example 4
Normally energised, latching



Technical details

S1UM

Electrical data

Supply voltage	AC: 24, 42 ... 48, 110 ... 127, 230 ... 240 V DC: 24 V
Tolerance	85 ... 110 %
Power consumption	AC: 2 VA, DC: 1 W
Switching capability to EN 60947-4-1, 10/91	AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91	AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts	1 auxiliary contact (C/O)
Contact material	AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection to EN 60947-5-1	Max. 6 A quick or max. 4 A slow

Single-phase voltage monitoring S1UM

1.1

Measuring circuit	
Frequency range	0, 40 ... 400 Hz
Adjustable limit values for measuring ranges	1 V; 1; 0.5; 0.2; 0.1 V 2 V: 20, 10, 4, 2 V 500 V: 500, 250, 100, 50 V
Hysteresis	60 ... 95 % of response value
Impedance of the measuring inputs	1 V: 15 kOhm 20 V: 390 kOhm 500 V: 10 MOhm
Overload capacity of the measuring inputs	1 V: max. 40 V 20 V: max. 200 V 500 V: max. 700 V
Polarity of the measuring inputs	Polarised S1UM UP version: any status
Reaction time	0.1 ... 10 s
Temperature dependence	+/-0.05 % per +1 °C
Environmental data	
Ambient temperature	-15 - 55 °C
Mechanical data	
Max. cross section of external conductors	1 x 4 mm ² or 2 x 1.5 mm ² Single-core or multi-core with crimp connector
Dimensions (H x W x D)	87 x 22.5 x 122 mm
Weight	165 g

Order reference			
Type	U _B	U _M	Order no.
S1UM	24 VAC	500 VAC/DC	827 230
S1UM	42 - 48 VAC	500 VAC/DC	827 240
S1UM	110 - 130 VAC	500 VAC/DC	827 250
S1UM	230 - 240 VAC	500 VAC/DC	827 260
S1UM UP	24 VDC	500 VAC/DC	827 225
S1UM UP	24 VAC	500 VAC/DC	827 235
S1UM UP	42 - 48 VAC	500 VAC/DC	827 245
S1UM UP	110 - 130 VAC	500 VAC/DC	827 255
S1UM UP	230 - 240 VAC	500 VAC/DC	827 265

U_B: Supply voltage

U_M: Measuring voltage

Additional versions on request

Single-phase voltage monitoring ZUZ

1.1



The ZUZ electronic DC and AC voltage monitoring relay is designed for use with generators, accumulators etc.

Approvals

	ZUZ	
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Unit features

- } In-line connection
- } The measuring voltage is used as the supply voltage.
- } The measuring ranges are determined by the supply.
- } Various operating voltages can be selected.
- } Overvoltage and undervoltage can be set separately.
- } Normally energised mode

Description

The voltage monitoring relay is enclosed in an S-95, slimline housing. The unit can be operated with 3 AC voltages and 1 DC voltage.

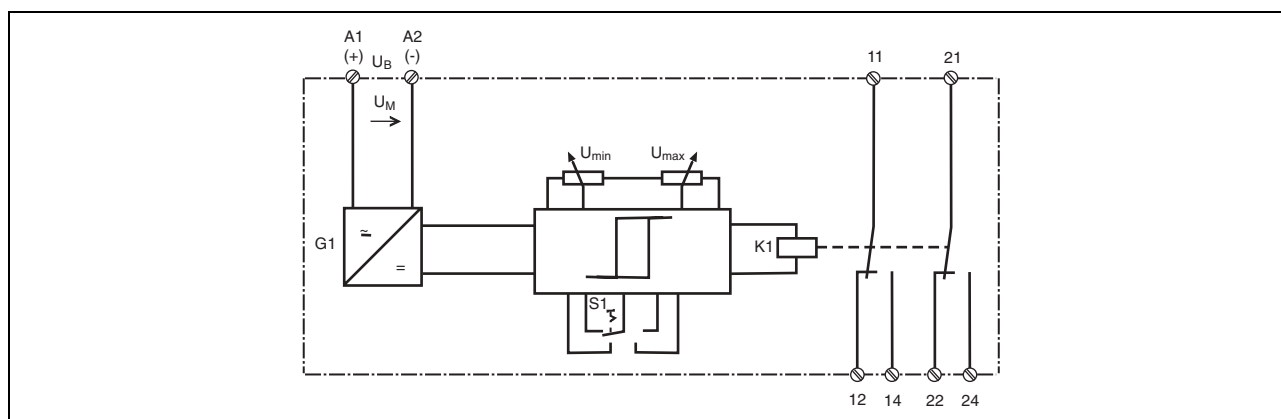
Features

- } Relay outputs:
2 auxiliary contact (C/O)
- } Setting options
Response value U_{min} : 75 ... 100 % U_B
Response value U_{max} : 100 ... 120 % U_B
- } 4 supply voltages can be set via rotary switch

- } LEDs for relay's switch status and for supply voltage

The ZUZ operates as a threshold switch. The response values for undervoltage and overvoltage can be set separately. If the measuring voltage exceeds U_{min} , the relay energises. Auxiliary contacts 11-12 and 21-22 are open, 11-14 and 21-24 are closed. If the measuring voltage exceeds U_{max} or drops below U_{min} , the relay de-energises. Auxiliary contacts 11-12 and 21-22 are closed, 11-14 and 21-24 are open. The "FAULT" LED is lit if U_B is outside the permitted range, i.e. it drops below U_{min} or exceeds U_{max} .

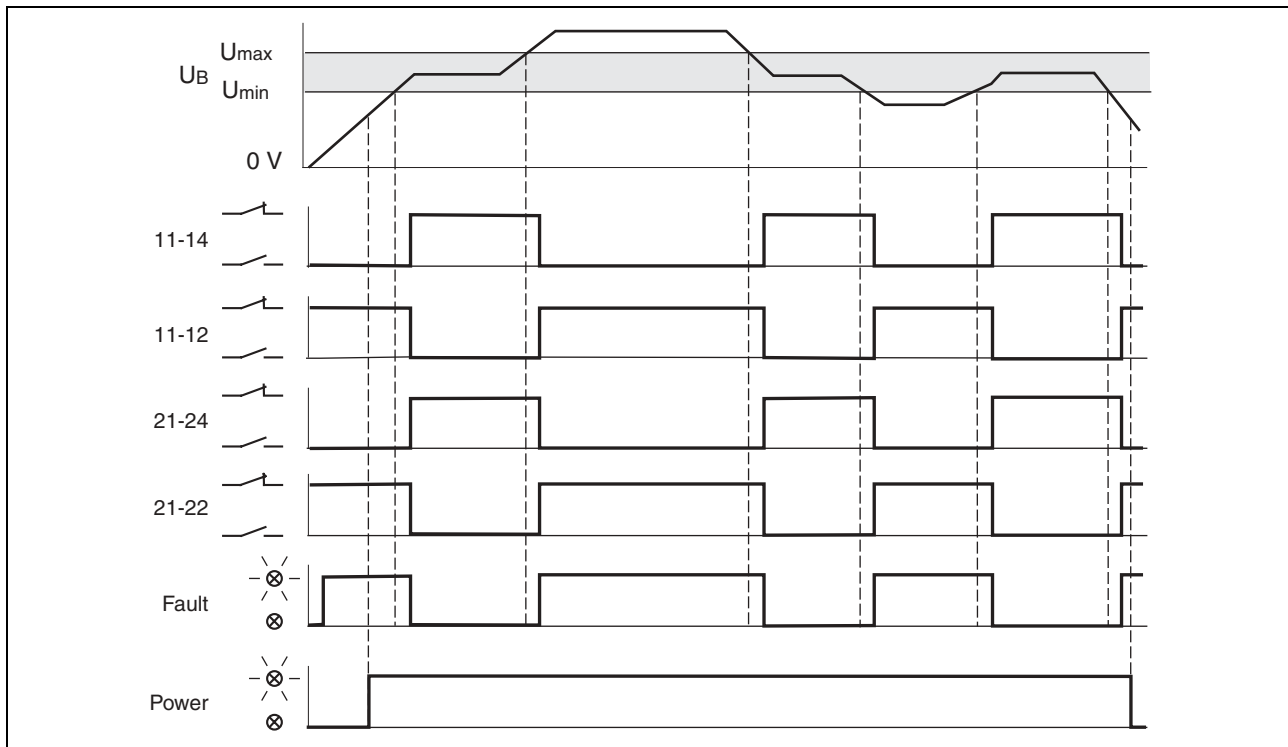
Internal wiring diagram



Single-phase voltage monitoring ZUZ

Timing diagram

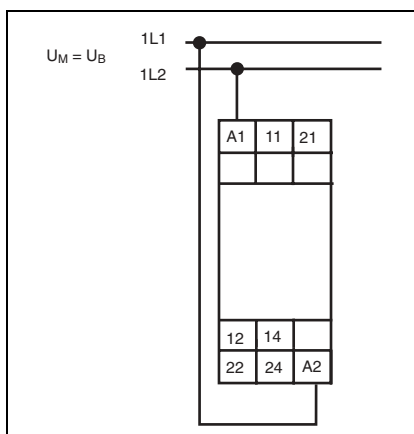
1.1



Key

- } $U_B > 50\% U_B$:
The mains control LED is lit
- } $U_B > U_{min}$:
The relay energises, the switch status LED goes out.
- } $U_B > U_{max}$:
The relay de-energises, the switch status LED is lit.
- } Rest condition
– Contact 11-12 and 21-22 closed
- Contact 11-14 and 21-24 open
- } Operating condition
– Contact 11-12 and 21-22 open
– Contact 11-14 and 21-24 closed

Connection example



Single-phase voltage monitoring ZUZ

1.1

Technical details		ZUZ
Electrical data		
Measuring voltage = supply voltage		AC: 24, 110, 230 V (selectable) DC: 24 V (selectable)
Tolerance		75 ... 125 %
Power consumption		300 VAC: 30 ... 40 VA 24 VDC: 0,5 ... 0.8 W
Switching capability to EN 60947-4-1, 10/91		AC1: 250 V/0.1 ... 5 A/1100 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91		AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts		2 auxiliary contacts (C/O)
Contact material		AgCdO
Contact fuse protection in accordance with EN 60947-5-1, 10/91		Max. 6 A quick or max. 4 A slow
Current consumption (power surge after mains zero point)		AC: 24 V, 200 mA; 42 V, 300 mA; 110 V, 600 mA; 300 V/800 mA DC: 24 V, 20 ... 30 mA
Measuring circuit		
Frequency range		AC: 50 ... 60 Hz
Adjustable limit values for measuring ranges		
Undervoltage		Measuring voltage - 25 %
Overvoltage		Measuring voltage + 20 %
Hysteresis		2 %
Reaction time		Max. 700 ms
Environmental data		
Ambient temperature		-15 ... +55 °C
Mechanical data		
Max. external conductor cross-section		1 x 4 mm ² or 2 x 1.5 mm ² Single-core or multi-core with crimp connector
Dimensions (H x W x D)		87 x 22.5 x 122 mm
Weight		130 g
Order reference		
Type	U _M	Order no.
ZUZ	24 VDC, 24, 110, 230 VAC	827 100

U_M: Measuring voltage

Three-phase voltage monitoring S3UM



The S3UM voltage monitoring relay is used to monitor overvoltage and undervoltage as well as the phase sequence in 3-phase supplies.

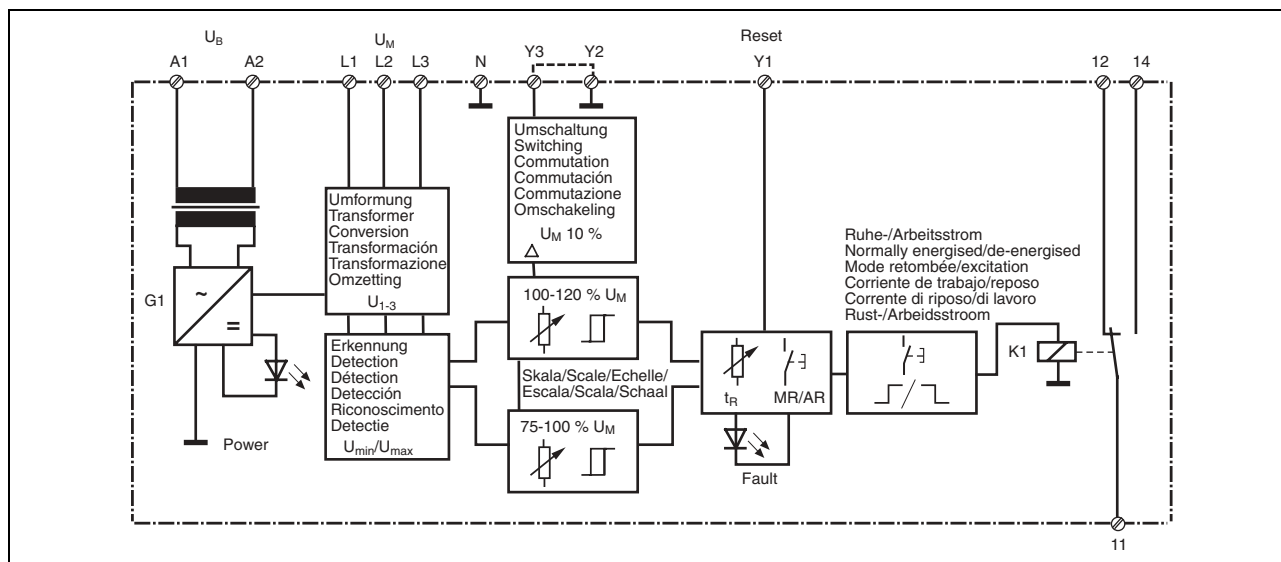
Approvals

	S3UM
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Approvals at U_M max. 240 VAC

Internal wiring diagram

MR: Manual reset, AR: Automatic reset



Unit features

- } Monitors supplies with and without neutral conductors
- } Trip device for undervoltage and overvoltage
- } Evaluates phase sequence
- } Detects asymmetry
- } Detects phase failure
- } Reaction time can be set to up to 10 s
- } Operates to normally energised or normally de-energised mode
- } Undervoltage value can be set from 75 % to 100 % of the rated mains voltage
- } Overvoltage value can be set from 100 % to 120 % of the rated mains voltage
- } Fault status can be latching or non-latching
- } LED as supply voltage indicator
- } LED for all faults: phase sequence error, under/overvoltage
- } Phase failure is detected even when there is voltage feedback from connected loads
- } Range switching 10 % for L1-L3
- } Separate supply voltage A1-A2

Description

The voltage monitoring relay is enclosed in an S-95, slimline housing. Various versions are available for AC and DC operation.

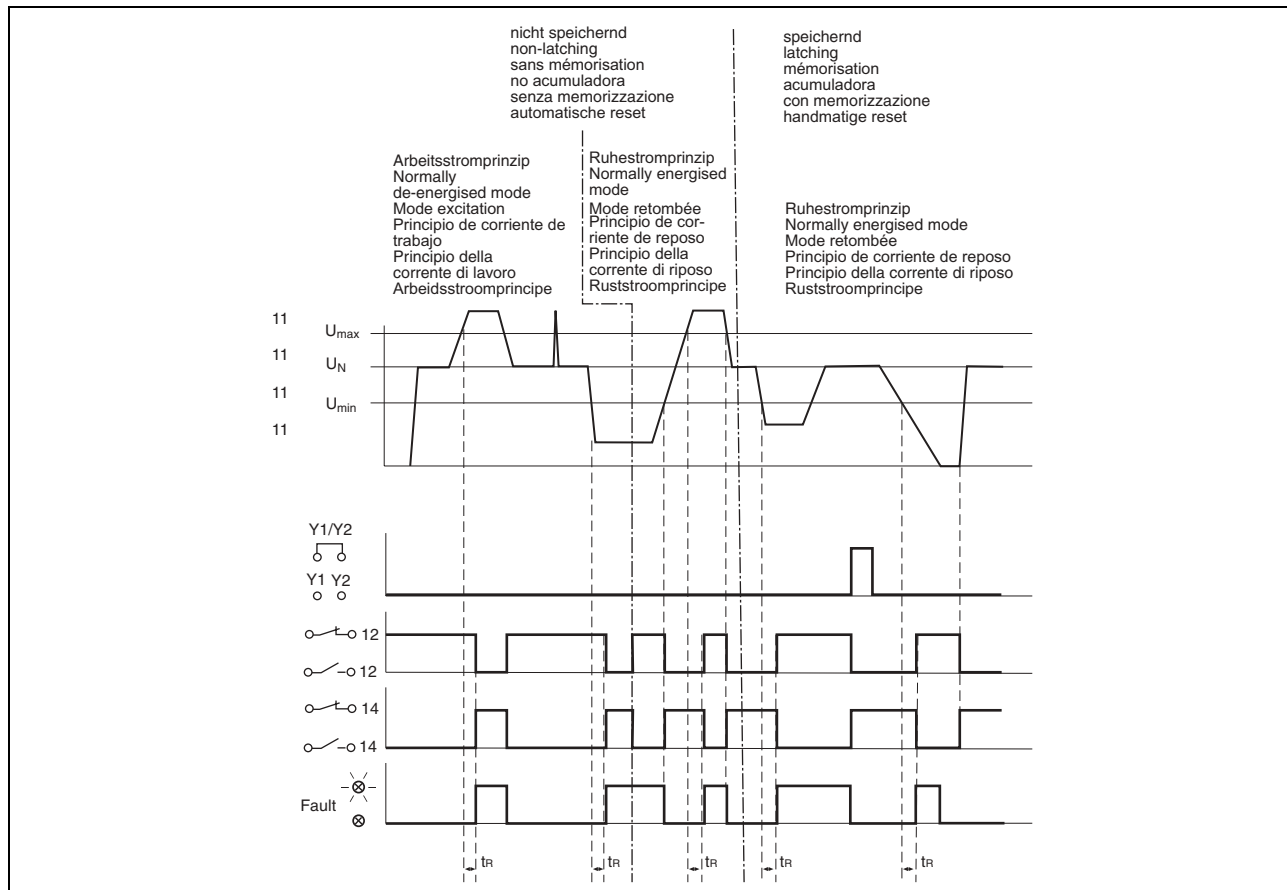
Features

- } Relay outputs: 1 auxiliary contact (C/O)
- } 2 measuring circuits

Three-phase voltage monitoring S3UM

Timing diagram

1.1



Key

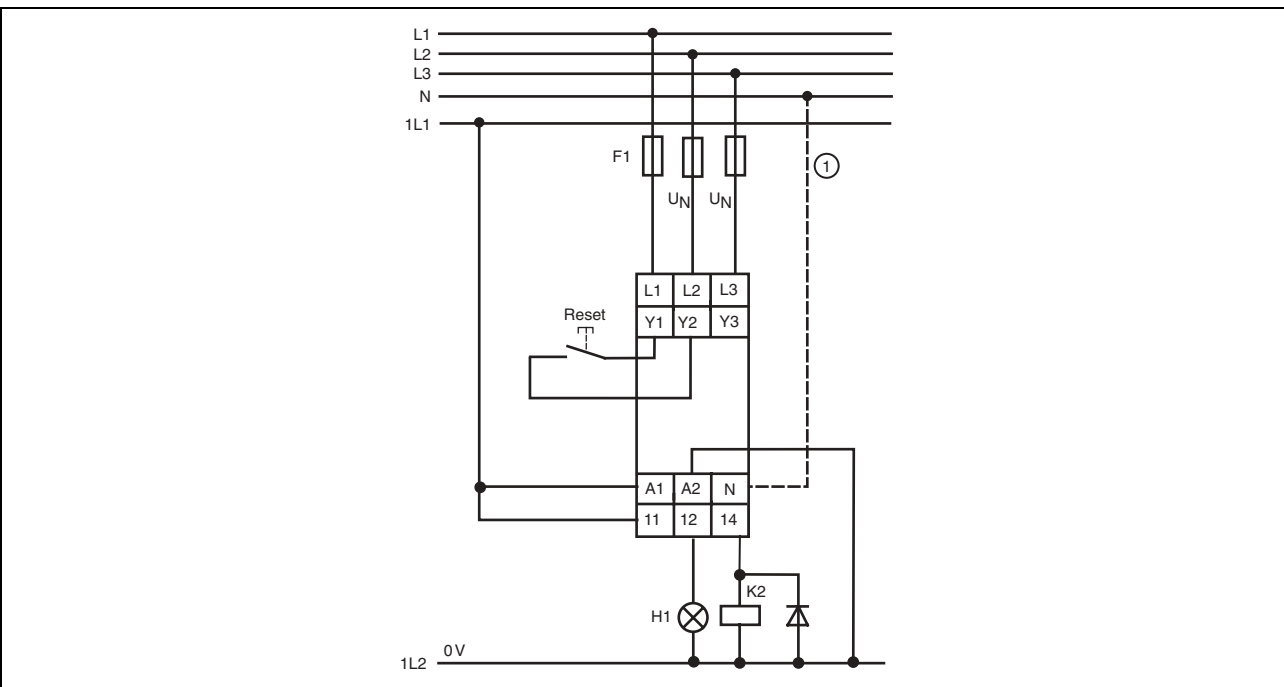
- } U_{max} Overvoltage response value
- } U_{min} Undervoltage response value
- } U_N Rated mains voltage
- } t_R Reaction time
- } Y1/Y2 linked: Automatic reset

Three-phase voltage monitoring S3UM

Application example

Safety device protects against over-voltage and undervoltage, operating in normally energised mode

1.1



} 1: Not required on three phase supplies

Technical details	S1WP
Electrical data	
Supply voltage	AC: 120, 230 V DC: 24 V
Tolerance	85 ... 110 %
Power consumption	AC: 2 VA DC: 1.5 W
Switching capability to EN 60947-4-1, 10/91	AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91	AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts	1 auxiliary contact (C/O)
Contact material	AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection in accordance with EN 60947-5-1, 10/91	Max. 6 A quick or max. 4 A slow

Three-phase voltage monitoring S3UM

1.1

Measuring circuit	
Measuring voltage	AC: 42, 230, 100/110, 400/440, 415/460 , 440/480, 500/550 V, selectable
Tolerance	75 ... 125 %
Measuring range switching (10 %) via terminals Y2, Y3	Open: High value Closed: Low value (ex-works setting)
Frequency range	40 ... 400 Hz
Adjustable limit values for measuring ranges	
Undervoltage	Measuring voltage - 25 %
Overvoltage	Measuring voltage + 20 %
Hysteresis	ca. 2 %
Reaction time	0,5 ... 10 s
Environmental data	
Ambient temperature	-15 ... +55 °C
Mechanical data	
Max. external conductor cross-section	1 x 4 mm ² or 2 x 1.5 mm ² Single-core or multi-core with crimp connector
Dimensions (H x W x D)	87 x 22.5 x 122 mm
Weight	170 g

Order reference			
Type	U _B	U _M	Order no.
S3UM	24 VDC	42 VAC	837 240
S3UM	24 VDC	100/110 VAC	837 250
S3UM	24 VDC	230 VAC	837 260
S3UM	24 VDC	400/440 VAC	837 270
S3UM	24 VDC	415/460 VAC	837 280
S3UM	24 VDC	440/480 VAC	837 285
S3UM	24 VDC	500/550 VAC	837 290
S3UM	120 VAC	440/480 VAC	837 395
S3UM	230 VAC	42 VAC	837 340
S3UM	230 VAC	100/110 VAC	837 350
S3UM	230 VAC	230 VAC	837 360
S3UM	230 VAC	400/440 VAC	837 370
S3UM	230 VAC	415/460 VAC	837 380
S3UM	230 VAC	500/550 VAC	837 390

U_B: Supply voltage

U_M: Measuring voltage

Additional versions on request

Phase sequence monitoring S1PN

1.1



The S1PN phase sequence monitoring relay detects the phase field of a 3-phase supply.

Approvals

	S1PN	
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Unit features

- } Measuring voltage up to 690 VAC
- } Detects asymmetry
- } Monitors phase sequence
- } Monitors phase failure
- } Fuse monitoring
- } LEDs
- } Extensive voltage range

The phase sequence monitoring relay is enclosed in an S-95 slimline housing. Three versions are available.

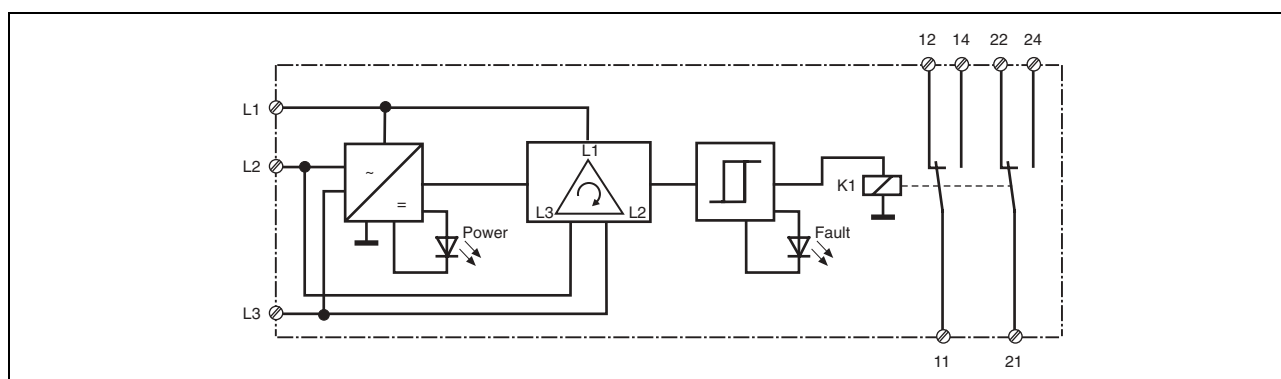
Features:

- } Relay outputs: 2 auxiliary contacts (C/O)
- } Phase field direction monitor
- } Detects fuse defect and phase failure, provided there is no voltage feedback from connected motors
- } LEDs for fault and supply voltage

The phase sequence monitoring relay detects the time sequence of the individual phases in a three phase supply. In a clockwise phase sequence, contacts 11-12 and 21-22 are open, con-

tacts 11-14 and 21-24 are closed. In an anti-clockwise phase sequence, contacts 11-14 and 21-24 are open, contacts 11-12 and 21-22 are closed. The S1PN can safely detect phase failure when the plant is at a standstill (load isolated from the measuring inputs).

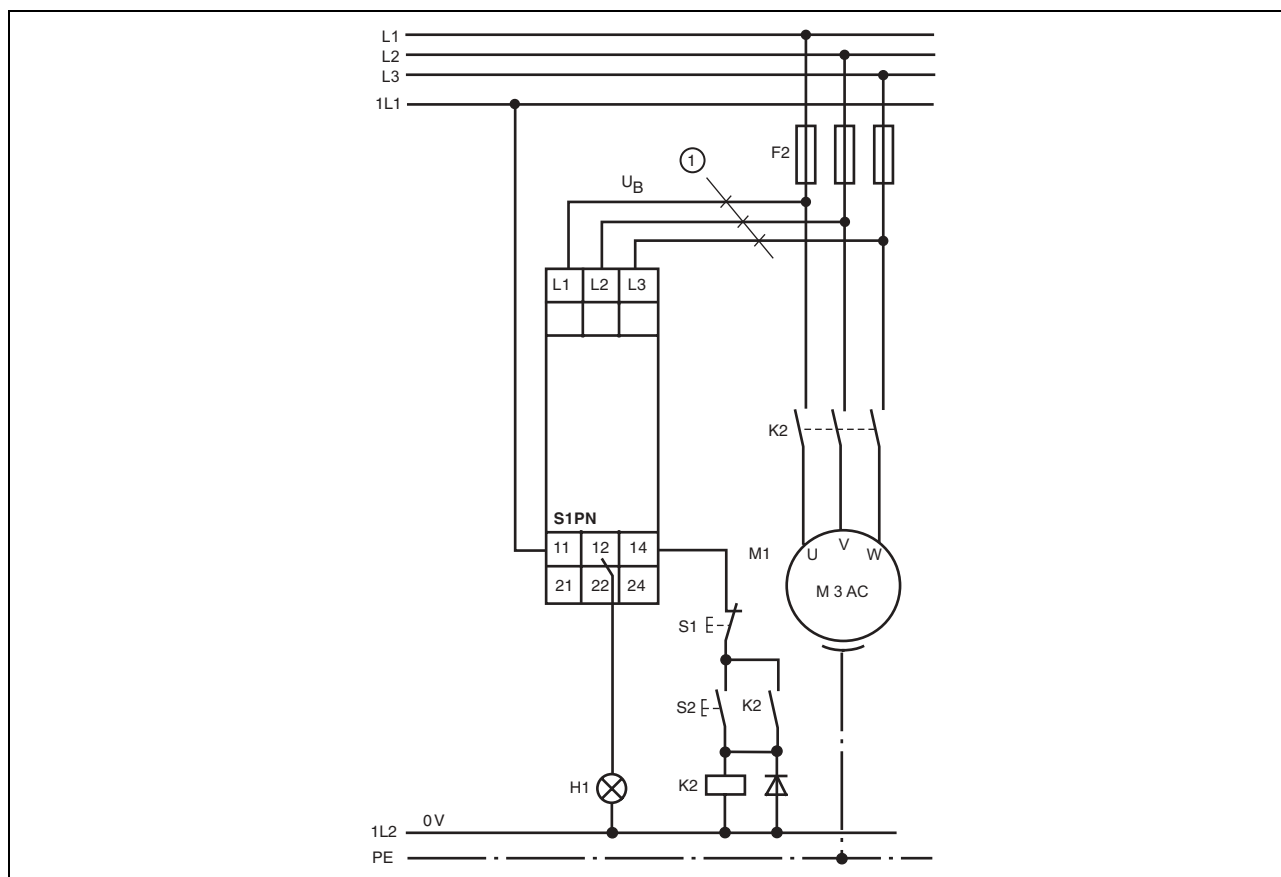
Internal wiring diagram



Phase sequence monitoring S1PN

Connection example

1.1



Key

- } 1 = Cable cross section max. 4 mm², on larger motor cables the supply line should be fused!

Technical details	S1PN
Electrical data	
Supply voltage	AC: 200 ... 240, 400 ... 500, 550 ... 690 V
Tolerance	85 ... 110 %
Power consumption	200 ... 240 V: 8 VA; 400 ... 500 V: 15 VA; 550 ... 690 V: 20 VA
Switching capability to EN 60947-4-1, 10/91	AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91	AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts	2 auxiliary contacts (2 C/O)
Contact material	AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection in accordance with EN 60947-5-1, 10/91	Max. 6 A quick or max. 4 A slow
Times	
Delay-on energisation	Max. 300 ms (with correct phase sequence)
Delay-on de-energisation	Max. 700 ms (after phase failure)

Phase sequence monitoring S1PN

1.1

Environmental data

Ambient temperature -15 ... +55 °C

Mechanical data

Max. cross section of external conductors 2 x 1.5 mm² or 1 x 4 mm²
Single-core or multi-core
with crimp connector

Dimensions (H x W x D) 87 x 22.5 x 122 mm

Weight ca. 130 g

Order reference

Type	U _B /U _M	Order no.
S1PN	200 - 240 V	890 200
S1PN	400 - 500 V	890 210
S1PN	550 - 690 V	890 220

U_B: Supply voltage

U_M: Measuring voltage

Fault voltage monitoring PFU6

1.1



The PFU6 monitors fault voltages on welding transformers in accordance with VDE 0545.

Approvals

	PFU6
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Unit features

- } Monitors voltage of 6 secondary windings on welding transformers
- } Displays fault voltage and open circuit
- } Supply voltage selectable:
24 V ... 42 VAC/DC or
42 ... 240 VAC/DC

Description

The PFU6 is enclosed in a P-97 housing.

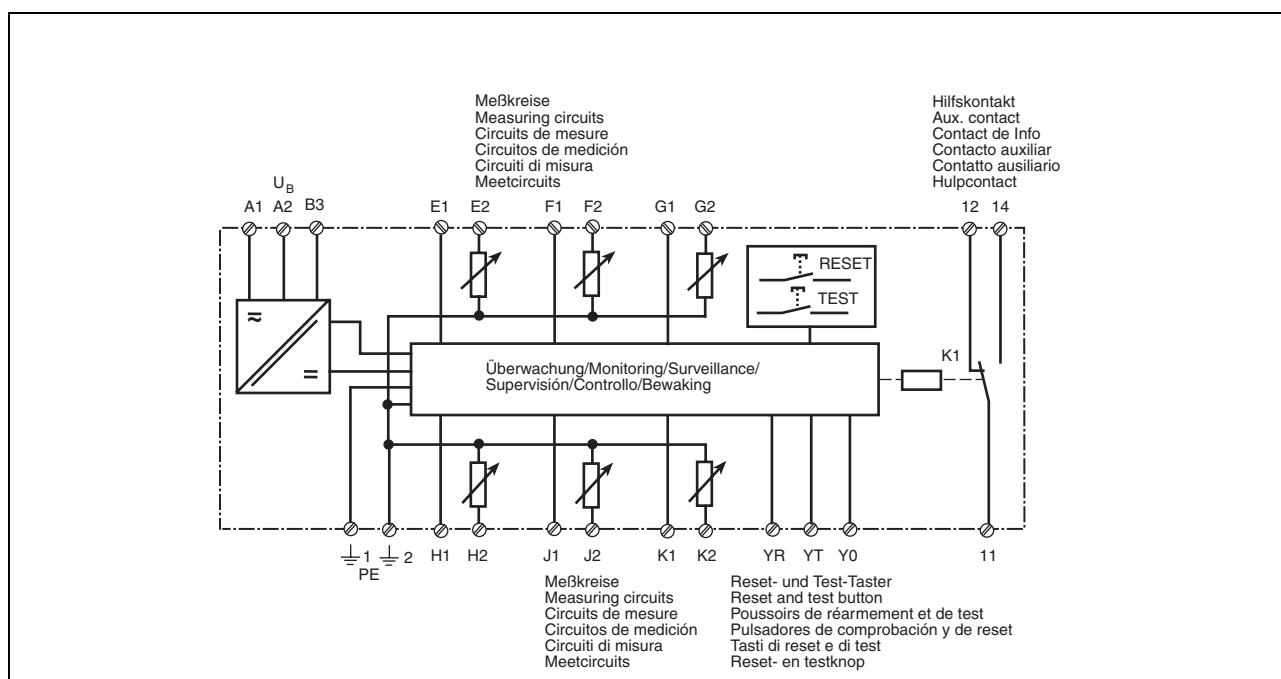
Features:

- } 6 measuring inputs
- } Relay outputs:
1 auxiliary contact (1 C/O)
- } LED for supply voltage, overvoltage, open circuit, PE connection
- } Manual reset
- } Test button
- } Connection for an external test and reset button

The PFU6 monitors the secondary windings on welding transformers for fault voltage. If the measured voltage exceeds the response value of 24 VAC/DC, output relay K1 de-energises and the LED for the affected measuring circuit will light.

The PFU6 monitors the measuring lines for open circuits and also monitors the PE connection. If the resistance value exceeds the response value of 350 k Ω , output relay K1 de-energises and the LED for the affected measuring circuit will flash. The unit logs the detected faults. Once the fault has been rectified, the unit can be restarted by pressing the reset button. An integral test function checks the measuring circuits.

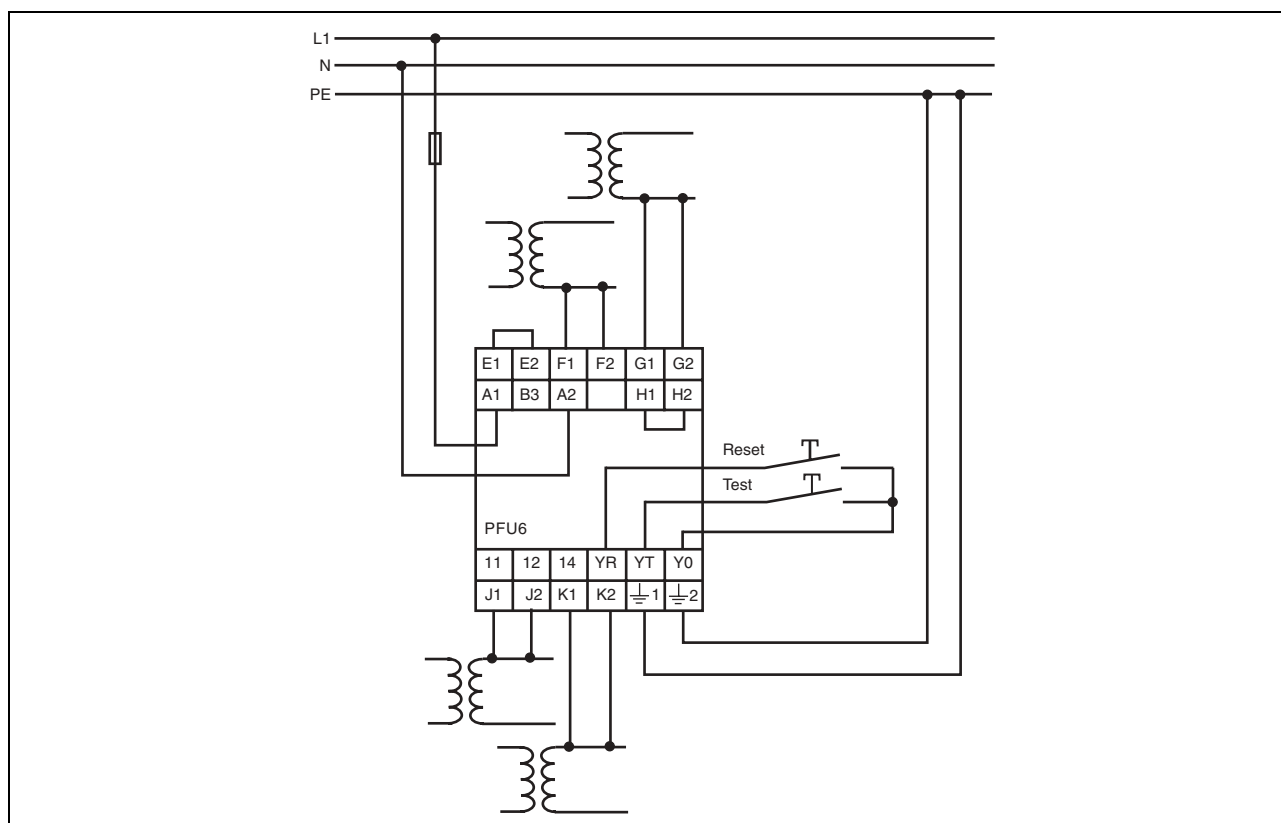
Internal wiring diagram



Fault voltage monitoring PFU6

Connection example

1.1



Technical details	PFU6
Electrical data	
Supply voltage	AC/DC: 24 ... 42 V, 42 ... 240 V
Tolerance	85 ... 110 %
Power consumption	Max. 2 W/4 VA
Switching capability to EN 60947-4-1, 10/91	AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91	AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts	1 auxiliary contact (1 C/O)
Contact material	AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection in accordance with EN 60947-5-1, 10/91	Max. 6 A quick or max. 4 A slow
Measuring circuit	
Measuring input	0 ... 690 VAC/DC
Frequency range	50 Hz ... 1 kHz
Response value	24 VAC/DC
Impedance of the measuring inputs	1 kT (ca. 1 kT up to 20 V, 20 kT at 100 V, 250 kT at 500 V)
Reaction time	Max. 150 ms at response value x 1.1
Response resistance	ca. 350 kT

Fault voltage monitoring PFU6

1.1

Mechanical data

Max. cross section of external conductors	2 x 2.5 mm ² Single-core or multi-core with crimp connector
Dimensions (H x W x D)	87 x 45 x 122 mm
Weight	240 g

Order reference

Type	U _B	Order no.
PFU6	24 - 42 VAC/DC, 42 V - 240 VAC/DC	841 000

U_B: Supply voltage

True power monitoring S1WP



True power converter for single and three-phase supplies, used to measure and monitor the rated power or true power on electrical machines.

Approvals

	S1WP	
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Unit features

- } 9 different measuring ranges
- } Large voltage measuring range
- } Analogue output can be switched for current and voltage
- } Relay output for monitoring underload or overload
- } Suitable for use with frequency-controlled motors
- } Suitable for current transformers

Description

The true power converter is enclosed in a 22.5 mm S-95 housing. 4 versions are available for different voltage measuring ranges, 2 versions are available for different current measuring ranges and 2 versions are available for a separate supply voltage.

Features:

- } Relay output:
 - 1 auxiliary contact (C/O)
- } Versions with 9 A and 18 A current measuring range
- } Fast, analogue reaction time
- } Adjustable switching threshold for underload or overload, from 5 to 100 % of the measuring range limit value
- } Switching hysteresis of 15 %
- } Adjustable monitoring reaction time
- } Adjustable start-up suppression time
- } LEDs for supply voltage and status of auxiliary contacts, underload or overload

The S1WP monitors the set upper and lower true power limit on a single or three phase supply. It converts the true power or rated power into an analogue output signal, which is proportional to the true power. The analogue output signal and the status of threshold monitoring are displayed at a relay output.

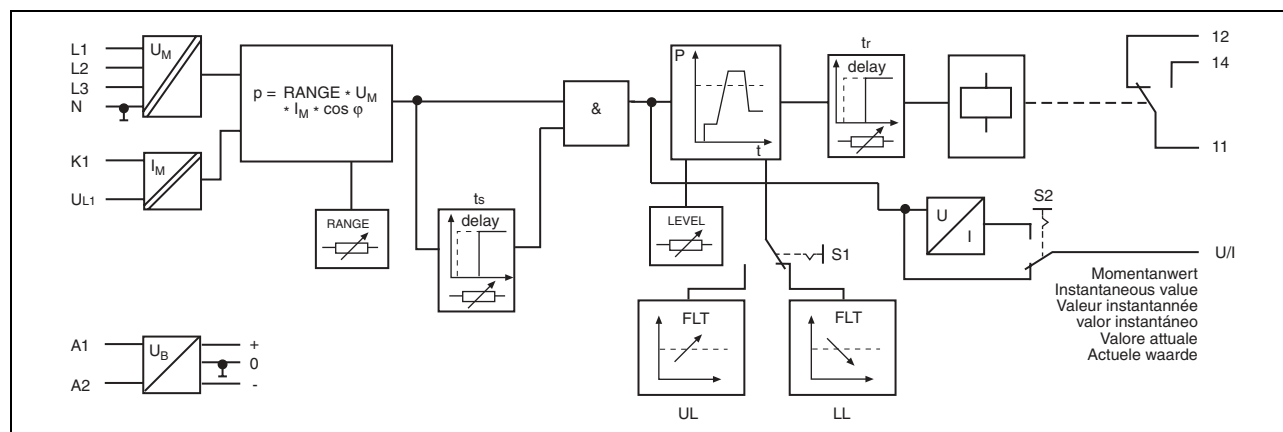
The S1WP operates in normally energised mode, so in its default state contact 11-14 is closed and contact 11-12 open. If normally de-energised mode is required, the functions of the upper and lower threshold are transposed. In overload (UL) mode, if the measured true power exceeds the switching threshold, the auxiliary contact switches and the "FLT" LED is lit. In underload (LL) mode, if the measured true power drops below the switching threshold, the auxiliary contact switches and the "FLT" LED is lit.

The measurement is suppressed during the machine's start-up phase, in order to avoid spurious output signals. The start-up suppression time t_s is adjustable. In the case of transient load fluctuations, the switching threshold

can be suppressed. The reaction time t_r is adjustable.

True power monitoring S1WP

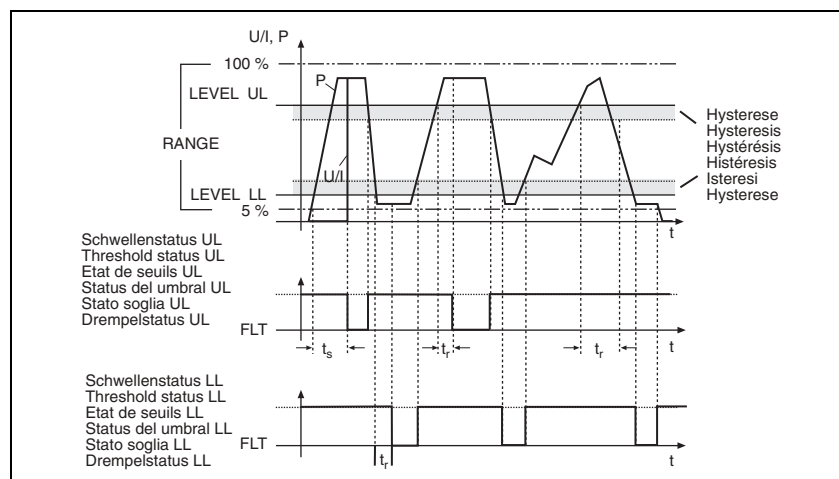
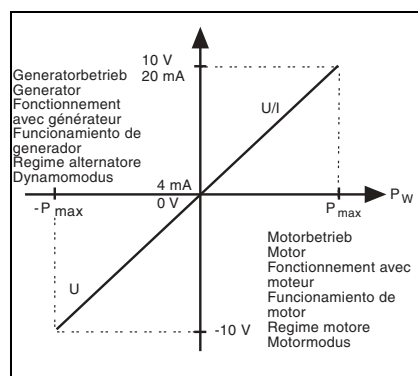
Internal wiring diagram



Key

} U_M Measuring voltage	} RANGE Measuring range	} UL Overload threshold
} I_M Measuring current	} t_s Start-up suppression time	} LL Underload threshold
} U_B Supply voltage	} t_r Reaction time	
} $\cos \varphi$ Power factor	} LEVEL Switching threshold	

Timing diagram



- } P Actual true power
- } U/I Analogue output signal, voltage or current

True power monitoring S1WP

Adjustable limit values for measuring ranges

Measuring range / RANGE	T	1	2	3	4	5	6	7	8	9	Version	
1 AC/DC 3 AC											I _M [A]	U _M [V]
0 ... 70 0 ... 120	*	0.208	0.415	0.623	0.83	1.04	1.25	1.45	1.66	1.87	9	120
		0.415	0.83	1.25	1.66	2.08	2.5	2.91	3.32	3.74	18	
0 ... 140 0 ... 240		0.415	0.83	1.25	1.66	2.08	2.5	2.91	3.32	3.74	9	240
		0.83	1.66	2.5	3.32	4.15	4.5	5.8	6.65	7.5	18	
0 ... 240 0 ... 415		0.72	1.44	2.15	2.88	3.6	4.3	5.03	5.75	6.5	9	415
		1.44	2.87	4.3	5.75	7.19	8.6	10.0	11.5	13.0	18	
0 ... 320 0 ... 550		0.95	1.9	2.85	3.8	4.76	5.7	6.7	7.6	8.6	9	550
		1.9	3.8	5.7	7.6	9.5	11.4	13.34	15.24	17.15	18	

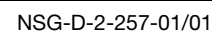
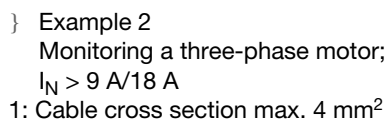
*Test: Function reserved

The information on U_M refers to the phase-to-phase voltage on the three phase supply (3AC). Where a single phase supply is used (1 AC), the voltage measuring range is reduced to:

$$U_{M(1AC)} = \frac{U_{M(3AC)}}{\sqrt{3}}$$

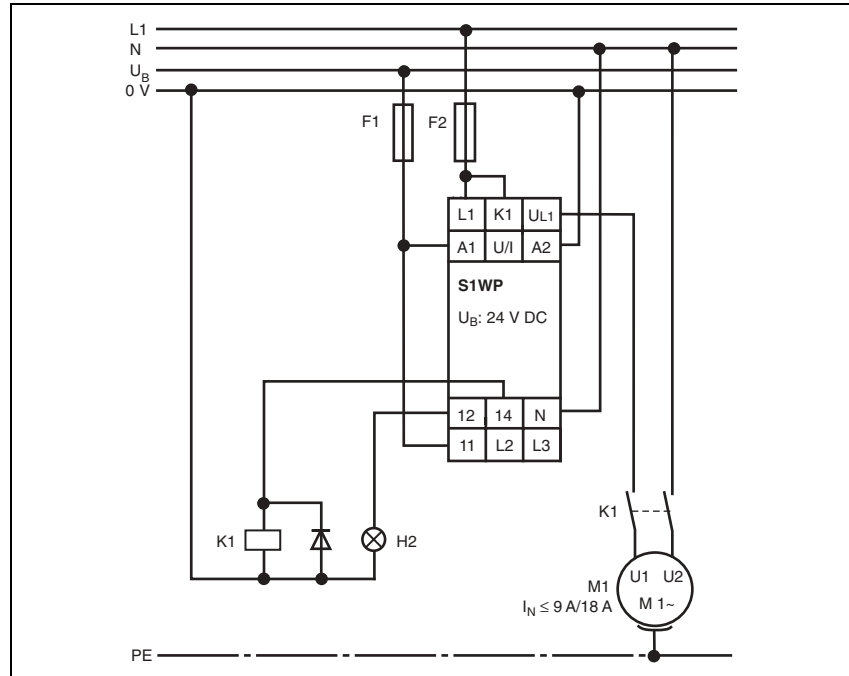
Connection examples

} Example 1
Monitoring a three-phase motor,
 $I_N < 9 \text{ A}/18 \text{ A}$

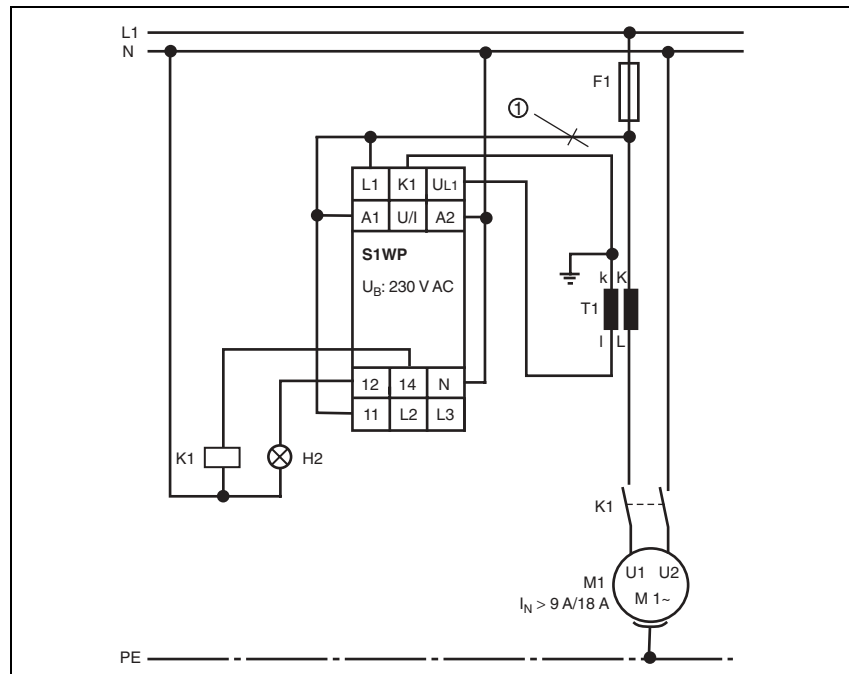


True power monitoring S1WP

- } Example 3
Monitoring a single-phase motor,
 $I_N < 9 \text{ A}/18 \text{ A}$



- } Example 4
Monitoring a single-phase motor;
 $I_N > 9 \text{ A}/18 \text{ A}$
1: Cable cross section max. 4 mm²



True power monitoring S1WP

1.1

Technical details		S1WP
Electrical data		
Supply voltage		DC: 24 V AC/DC: 230 V
Tolerance		DC: 85 ... 125 % AC/DC: 25 ... 115 %
Frequency range		30 ... 400 Hz
Power consumption		DC: 2 W at U_B : 24 V AC: 5 VA at U_B : 230 V
Switching capability to EN 60947-4-1, 10/91		AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91		AC15: 230 V/0.1 ... 1.8 A DC13: 24 V/0.1 ... 1.5 A
Output contacts		1 auxiliary contact (C/O)
Contact material		AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection in accordance with EN 60947-5-1, 10/91		Max. 6 A quick or max. 4 A slow
Analogue measuring output		Voltage: 0 ... ±10 V Current: +4 ... +20 mA
Analogue reaction time		60 ms
Linearity/switching accuracy		< ±2 %
Measuring circuit		
Measuring voltage		3AC/1AC/DC: 0 ... 120, 0 ... 240, 0 ... 415, 0 ... 550 V
Frequency range		0 ... 1000 Hz
Adjustable limit values for measuring ranges		See table
Max. measuring current		22 A at 100 % continuous duty
Max. overload		45 A/max. 3 s
Reaction time		0,1 ... 20 s selectable
Start-up suppression time		0,1 ... 30 s selectable
Current transformer requirements		I = 1 A: 1,5 ... 7.5 VA, Class 3 I = 5 A: 2,5 ... 15 VA, Class 3
Environmental data		
Ambient temperature		0 ... +55 °C
Mechanical data		
Max. external conductor cross-section		1 x 4 mm ² or 2 x 1.5 mm ² Single-core or multi-core with crimp connector
Dimensions (H x W x D)		87 x 22.5 x 122 mm
Weight		DC: 130 g, AC: 150 g

Order reference				
Type	U_B	U_M	I_M	Order no.
S1WP	24 VDC	0 - 120 VAC/DC	9 A	890 000
S1WP	24 VDC	0 - 240 VAC/DC	9 A	890 010
S1WP	24 VDC	0 - 415 VAC/DC	9 A	890 020
S1WP	24 VDC	0 - 550 VAC/DC	9 A	890 030
S1WP	230 VAC/DC	0 - 120 VAC/DC	9 A	890 040
S1WP	230 VAC/DC	0 - 240 VAC/DC	9 A	890 050
S1WP	230 VAC/DC	0 - 415 VAC/DC	9 A	890 060

True power monitoring S1WP

Type	U _B	U _M	I _M	Order no.
S1WP	230 VAC/DC	0 - 550 VAC/DC	9 A	890 070
S1WP	24 VDC	0 - 120 VAC/DC	18 A	890 100
S1WP	24 VDC	0 - 240 VAC/DC	18 A	890 110
S1WP	24 VDC	0 - 415 VAC/DC	18 A	890 120
S1WP	24 VDC	0 - 550 VAC/DC	18 A	890 130
S1WP	230 VAC/DC	0 - 120 VAC/DC	18 A	890 140
S1WP	230 VAC/DC	0 - 240 VAC/DC	18 A	890 150
S1WP	230 VAC/DC	0 - 415 VAC/DC	18 A	890 160
S1WP	230 VAC/DC	0 - 550 VAC/DC	18 A	890 170

U_B: Supply voltage

U_M: Measuring voltage

I_M: Measuring current

Current monitoring S1IM



The S1IM current monitoring relay is used to monitor the maximum current values on heaters, lamps etc.

Approvals

	S1IM
	É
	É

Unit features

- } 12 measurement ranges can be selected from 0.002 to 15 A
- } Reaction time can be set to up to 10 seconds
- } Operates to either normally energised or normally de-energised mode
- } Galvanic isolation between measuring and supply voltage
- } UP version: measuring inputs are not polarity-sensitive

Description

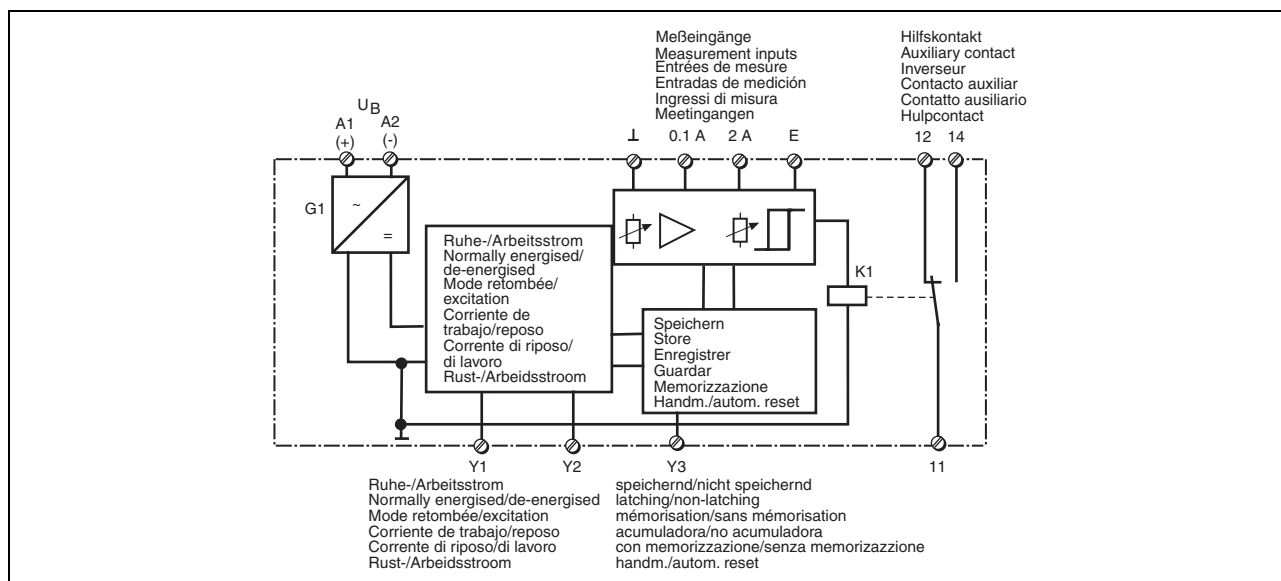
The current monitoring relay is enclosed in an S-95, slimline housing. There are 8 versions available for AC operation and one for DC operation. Features

- } Relay outputs: 1 auxiliary contact (C/O)
- } 3 measuring circuits for 0.1 A, 2 A and E, each with 4 different ranges
- } Response value can be set from 20 % to 100 % of the measuring range limit value

- } Hysteresis factor can be set from 0.6 to $0.9 \times I_{on}$
- } Fault latching or automatic reset
- } LEDs for relay's switch status and for supply voltage

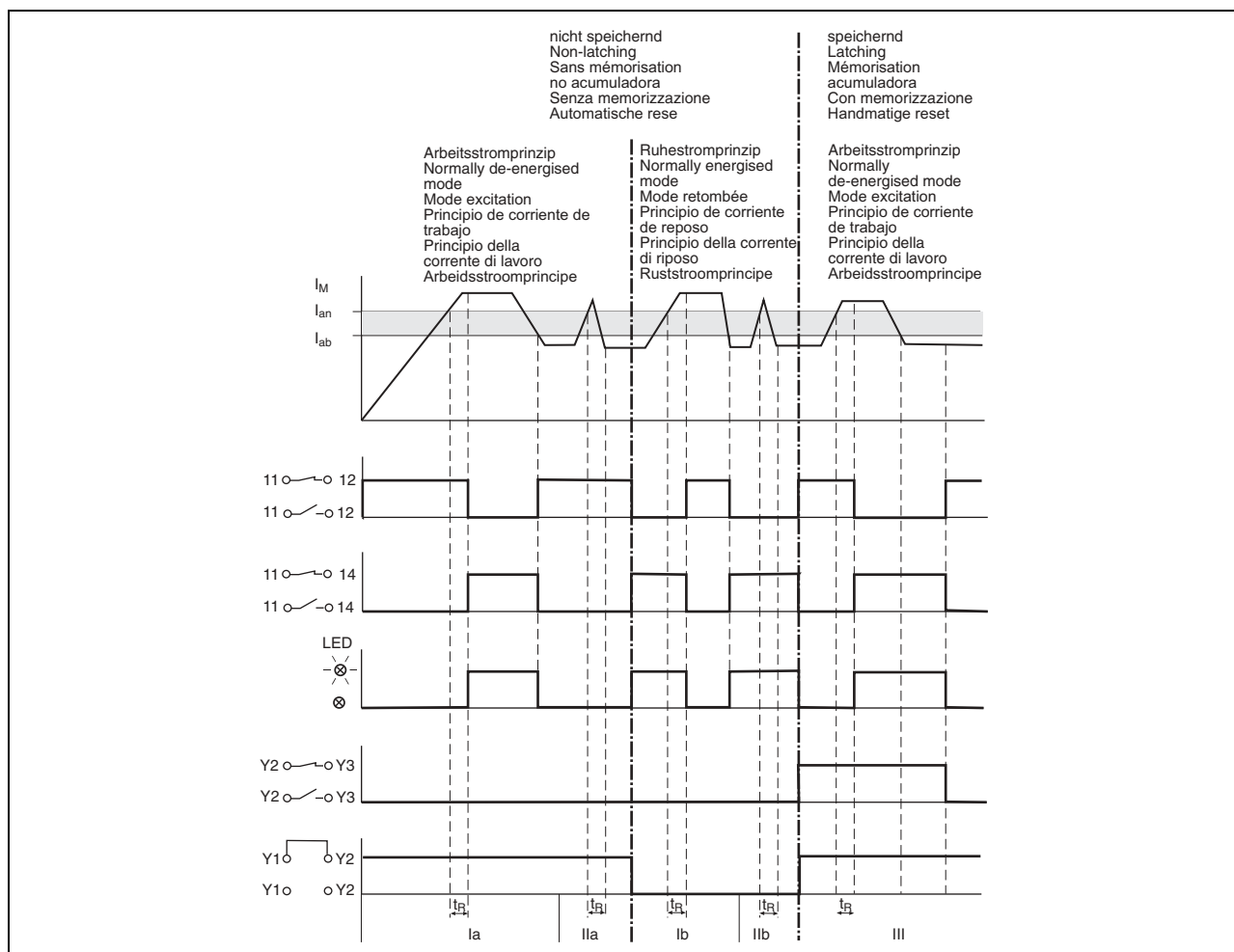
The S1IM monitors for current values exceeding a selectable threshold limit. On the UP version, the measuring inputs are not polarity-sensitive. If the measuring current reaches the response value I_{on} , auxiliary contact 11-14 changes over and the LED lights. If the measured current falls below the hysteresis value I_{off} and automatic reset is selected, the auxiliary contact changes over again and the LED goes out. The unit is ready for operation again. If faults are latched, the unit will not be ready for operation again until an external reset button is operated or the supply voltage has been switched off and then on again.

Internal wiring diagram



Current monitoring S1IM

Timing diagram



Key

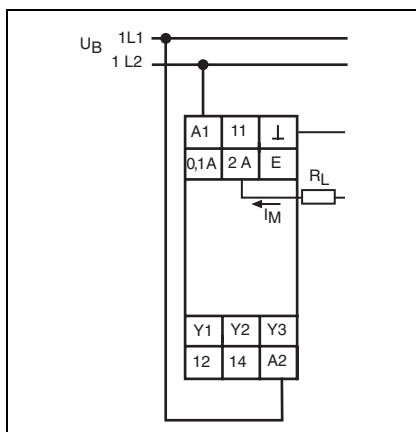
- } Hysteresis (I_{off}): 0.6 to 0.95 x I_{on}
- } Grey area: Adjustable hysteresis
- } t_R : Reaction time
- } I_a : $I_M > I_{on}$: Once t_R has elapsed, the relay energises and the LED "OUT" is lit.
 $I_M < I_{off}$: Relay de-energises and LED goes out.
- } I_{la} : $I_M > I_{on}$ before t_R has elapsed: Relay remains de-energised
- } I_b : $I_M > I_{on}$: As above, but relay de-energises and LED "OUT" goes out.
 $I_M < I_{off}$: Relay energises and LED is lit.
- } I_{lb} : As above, but relay remains energised.
- } III: $I_M > I_{on}$: See above
 $I_M < I_{off}$: Relay does not de-energise until Y2-Y3 is open.

Current monitoring S1IM

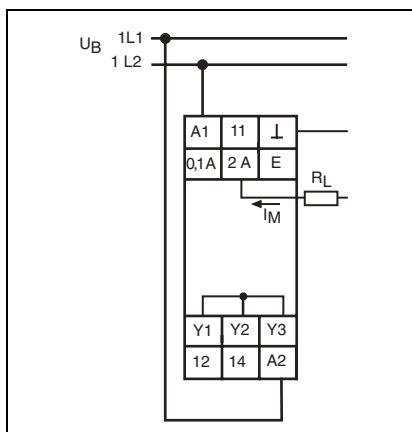
Connection examples

1.1

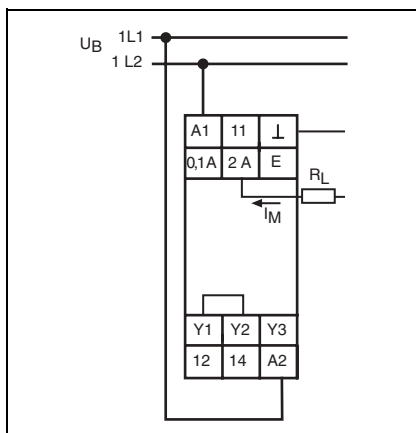
} Example 1
Normally energised, non-latching



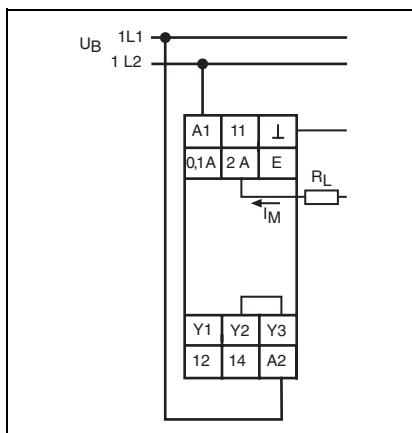
} Example 3
Normally de-energised, latching



} Example 2
Normally de-energised, non-latching



} Example 4
Normally energised, latching



Technical details

S1IM

Electrical data

Supply voltage	AC: 24, 42-48, 110-127, 230-240 V DC: 24 V
Tolerance	85 ... 110 %
Power consumption	AC: 2 VA, DC: 1 W
Switching capability to EN 60947-4-1, 10/91	AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91	AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts	1 auxiliary contact (C/O)
Contact material	AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection in accordance with EN 60947-5-1, 10/91	Max. 6 A quick or max. 4 A slow

Current monitoring S1IM

1.1

Measuring circuit	
Frequency range	40 ... 400 Hz
Adjustable limit values for measuring ranges	0.1 A: 0.1; 0.05; 0.02; 0.01 A 2 A: 2; 1; 0.4; 0.2 A E: 50 A/25 A/10 A/5 A
Hysteresis	60 ... 95 % of response value
Impedance of the measuring inputs	0.1 A: 2.5 T 2 A: 125 mT E: 5 mT
Max. overload	0.1 A: max. 0.2 A 2 A: max. 2.5 A E: 15 A/100 ED, 20 A/10 s, 50 A/2 s
Polarity of the measuring inputs	Polarised: UP version: any status
Reaction time	0,1 ... 10 s
Temperature dependence	± 0.05% per +1°C
Environmental data	
Ambient temperature	-15 ... +55 °C
Mechanical data	
Max. cross section of external conductors	1 x 4 mm ² or 2 x 1.5 mm ² Single-core or multi-core with crimp connector
Dimensions (H x W x D)	87 x 22.5 x 122 mm
Weight	165 g

Order reference			
Type	U _B	I _M	Order no.
S1IM	24 VAC	15 A	828 020
S1IM	42 - 48 VAC	15 A	828 030
S1IM	110 - 130 V AC	15 A	828 040
S1IM	230 - 240 VAC	15 A	828 050
S1IM UP	24 VDC	15 A	828 035

U_B: Supply voltage

I_M: Measuring current

Additional versions on request

Isolation monitoring S1EN

1.1



The S1EN insulation monitoring relay provides protection against insulation faults in galvanically isolated voltage supplies (IT systems). It meets the requirements of DIN EN 61557-8.

Approvals

	S1EN	
	É	
	É	

Unit features

- } For DC and AC supplies
- } Normally energised mode
- } Fault latching or automatic reset
- } Normal/test mode
- } External reset button can be connected

Description

The insulation monitoring relay is enclosed in an S-95, slimline housing. 2 versions are available, with measuring ranges of 50 kT and 200 kT. Its universal power supply operates with all supply voltages.

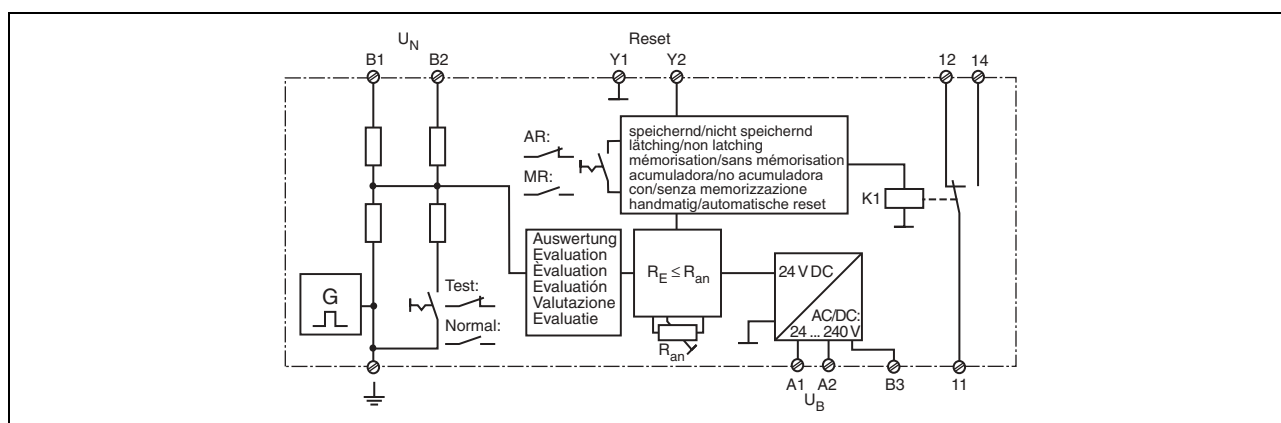
Features:

- } Relay outputs: 1 auxiliary contact (C/O)
- } Two insulation measuring circuits
- } Detects symmetrical insulation faults
- } Switch for function testing
- } LED for supply voltage and fault

The unit measures the insulation resistance between the phases and the operating earth on galvanically isolated voltage supplies. If the insulation

resistance in either of the two measuring circuits drops below the response value R_{on} , the auxiliary contact switches and the "Fault" LED is lit. If the release value R_{off} is then exceeded, the device is ready for operation immediately if automatic reset is selected; if manual reset is selected, it is necessary to operate an external button or the MR/AR switch.

Internal wiring diagram

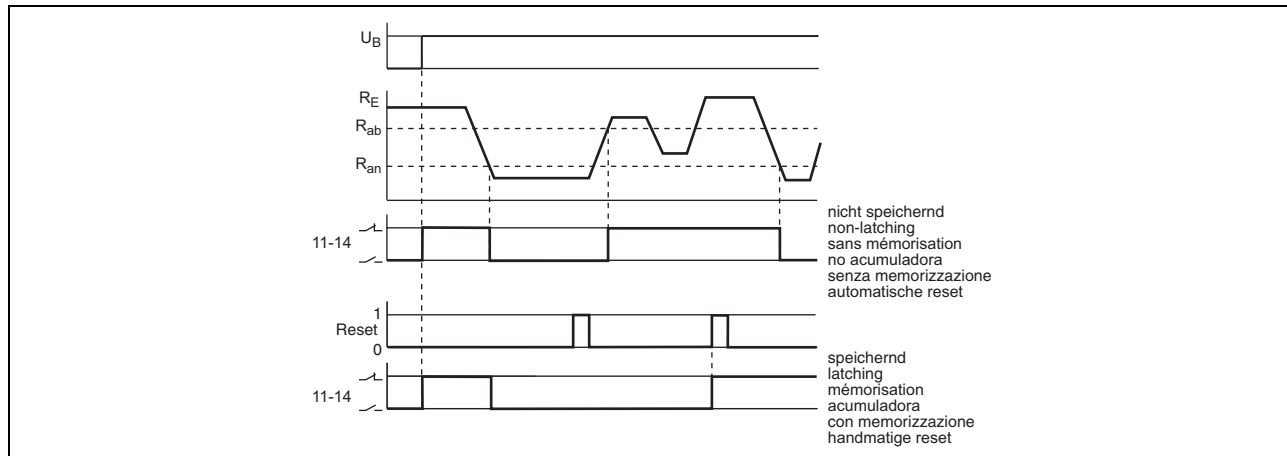


Key

- } U_N : Mains voltage
- } R_{on} : Response value
- } U_B at B3-A2: 24 VAC/DC
- } U_B at A1-A2: 42 -240 VAC/DC

Isolation monitoring S1EN

Timing diagram

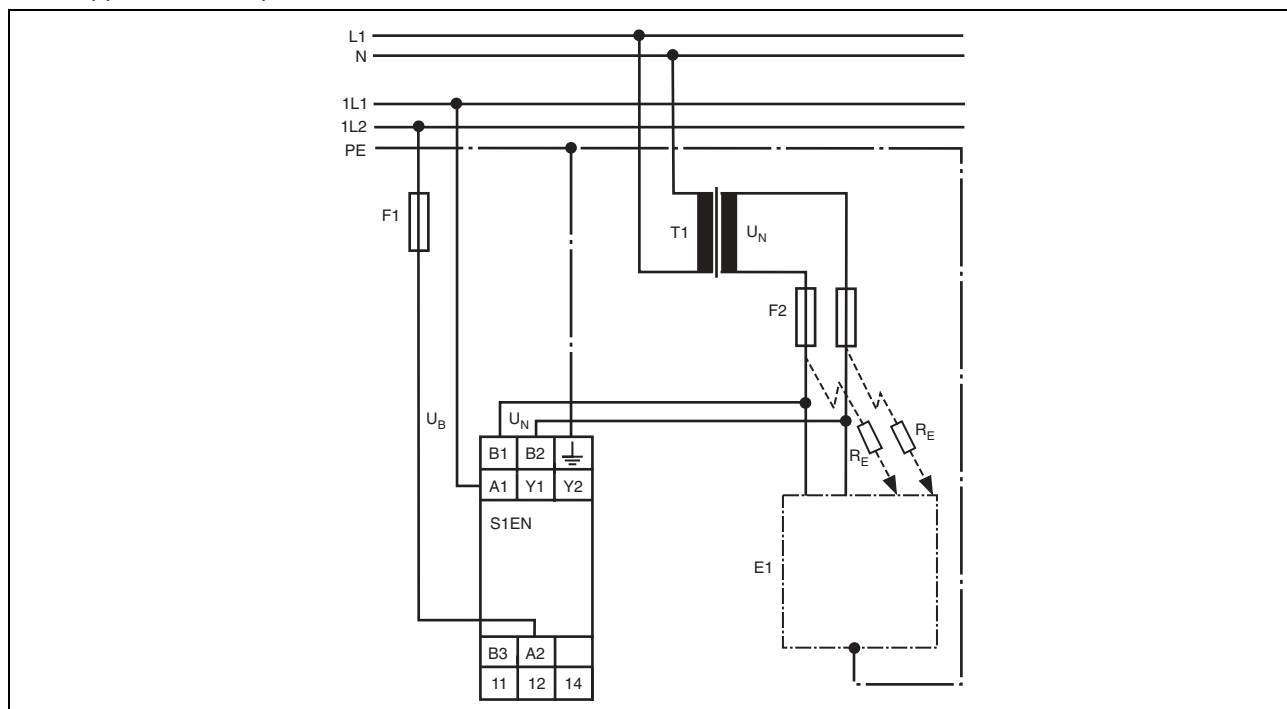


Key

- } U_B : Supply voltage
- } R_{on} : Response value
- } R_{off} : Release value
- } R_E : Insulation resistance

Connection examples

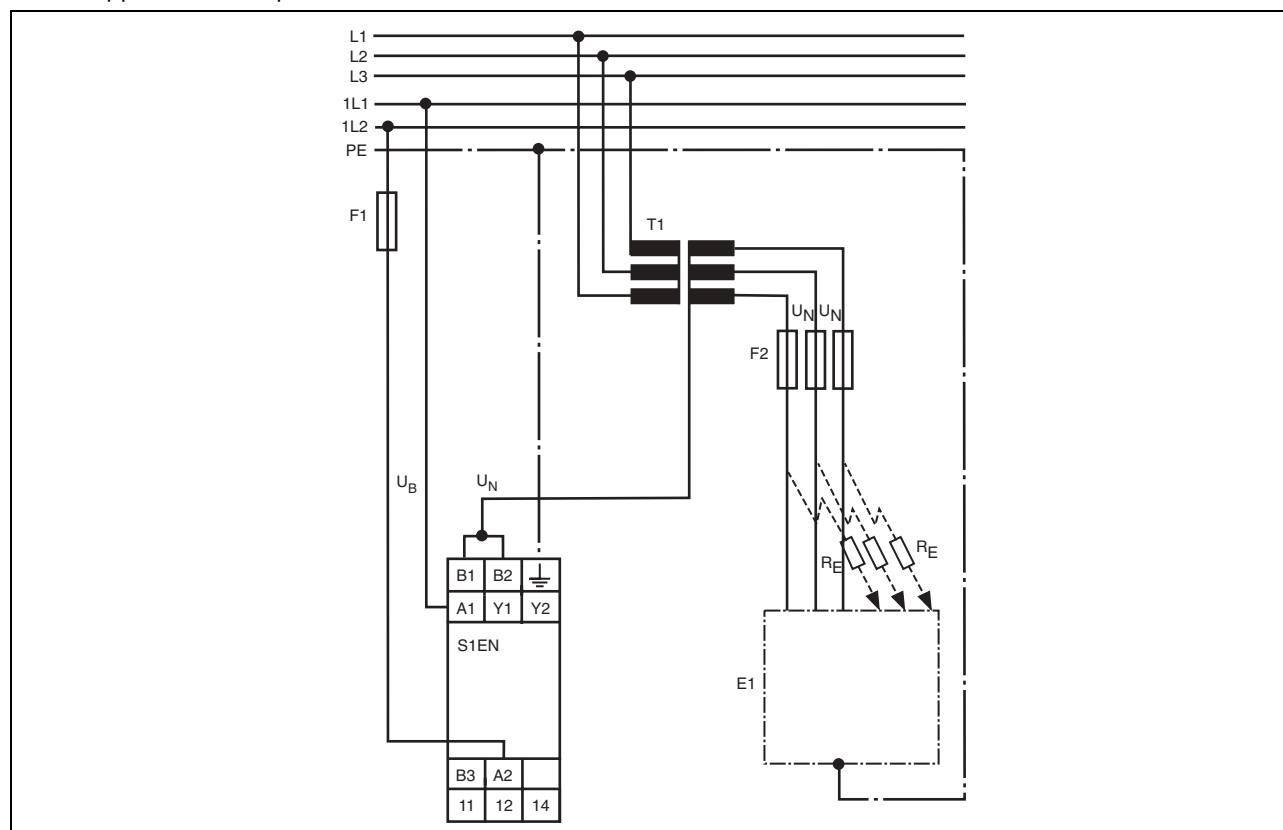
- } Example 1
AC application example



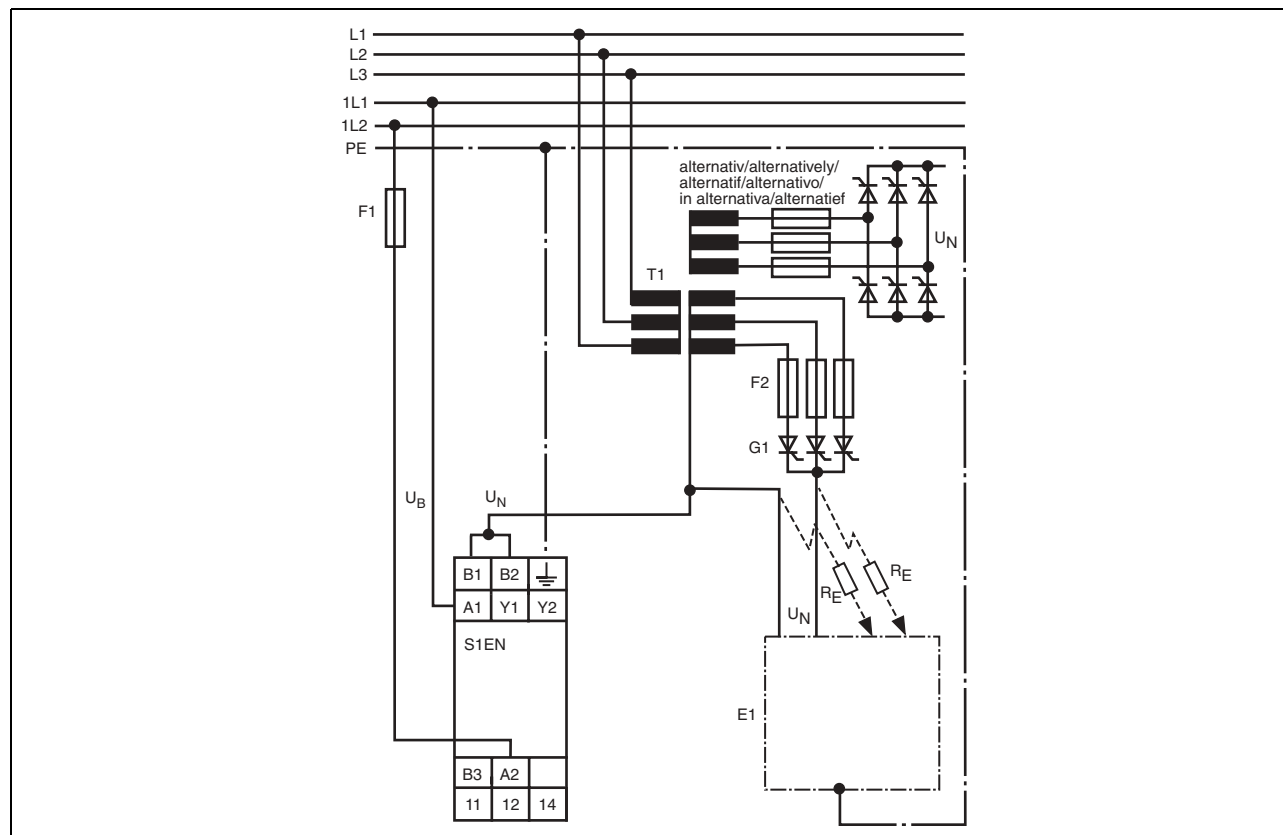
Isolation monitoring S1EN

} Example 2
3AC application example

1.1



} Example 3
3AC/DC application example



- } Example 4
- DC application example

Isolation monitoring S1EN

1.1

Technical details		S1EN
Electrical data		
Supply voltage		AC/DC: 24 ... 240 V
Tolerance		85 ... 110 %
Power consumption		240 VAC: 5 VA, 24 VDC: 1 W
Switching capability to EN 60947-4-1, 10/91		AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91		AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts		1 auxiliary contact (C/O)
Contact material		AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection in accordance with EN 60947-5-1, 10/91		Max. 6 A quick or max. 4 A slow
Measuring circuit		
Rated mains voltage (monitored supply)		50 kT version: AC/DC: 0 ... 240 V 200 kT version: AC/DC: 0 ... 400 V
Response value		50 kT version: 12.5...50 kT, selectable 200 kT version: 50..0.200 kT, selectable
Release value		50 kT version: Response value + ca. 5 kT 200 kT version: Response value + ca. 20 kT
Max. measuring current (DC)		50 kT version: 2.4 mA 200 kT version: 1.0 mA
Max. measuring voltage (DC)		± 17 V
Max. permitted external voltage (AC/DC)		50 kT version: 264 V 200 kT version: 460 V
Min. impedance (AC/DC)		50 kT version: 75 kT 200 kT version: 300 kT
Max. permitted line capacitance		1 µF
Max. response error in accordance with DIN EN 61557-8, 05/98		± 15%
Measuring time		10 s
Environmental data		
Climatic suitability		IEC 60721-3-3, 1995
Condensation and ice formation		Not permitted
Mechanical data		
Max. cross section of external conductors		1 x 4 mm ² or 2 x 1.5 mm ²
Dimensions (H x W x D)		87 x 22.5 x 122 mm
Weight		150 g

Order reference			
Type	U _B	R _{on}	Order no.
S1EN	24 - 240 VAC/DC	50 kT	884 100
S1EN	24 - 240 VAC/DC	200 kT	884 110

U_B: Supply voltage
R_{on}: Response value

Thermistor monitor S1MS

1.1



The S1MS thermistor monitoring relay is used as a protection device in temperature monitoring circuits in accordance with EN 44081, 06/80. It protects motors, generators, storage areas, etc. from overheating.

Approvals

	S1MS	
	É	
	É	

Unit features

- } For DC and AC supplies
- } Normally energised mode
- } Automatic reset

Description

The thermistor monitoring relay is enclosed in an S-95 slimline housing. There are 5 versions available for AC operation and one for AC and DC operation.

Features:

- } Relay outputs: 2 auxiliary contacts (2 C/O)
- } Measuring circuit for connecting a temperature sensor (PTC resistor, up to R_{max} 1.5 kT)
- } Automatic reset
- } LED for supply voltage and fault

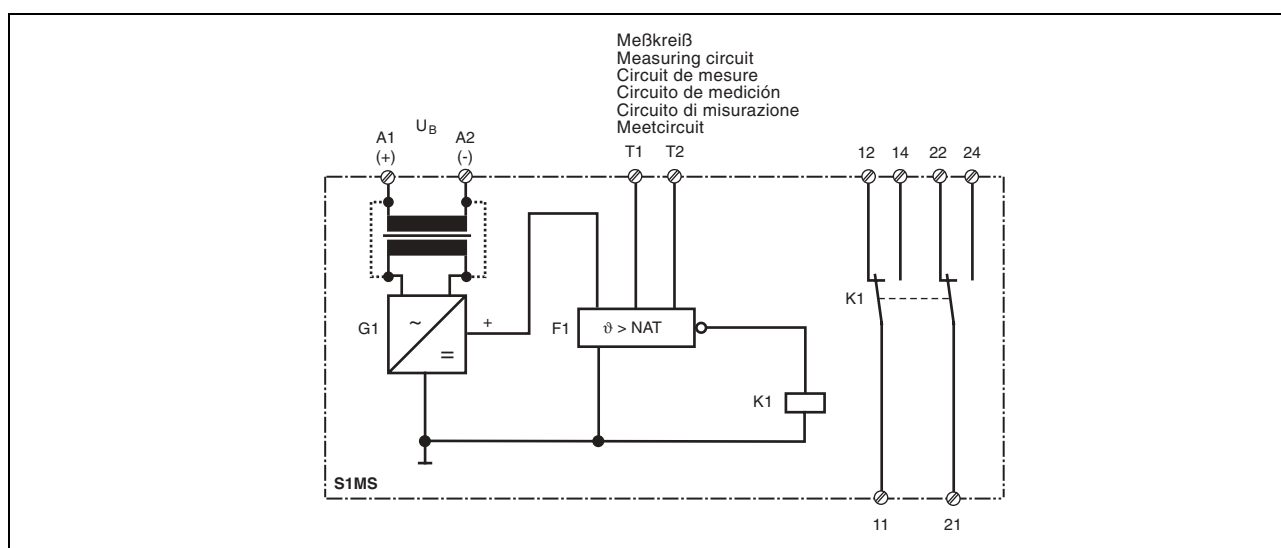
A temperature sensor is connected to the S1MS measuring circuit. If the temperature exceeds a defined value, i.e. the resistance of the temperature sensor reaches the response value, the output contacts switch.

Contacts 11-14 and 21-24 open, contacts 11-12 and 21-22 close. If the temperature then falls again, i.e. the resistance of the temperature sensor reaches the release value, the auxiliary contacts automatically switch again. The unit is ready for operation.

The S1MS unit meets the following safety requirements:

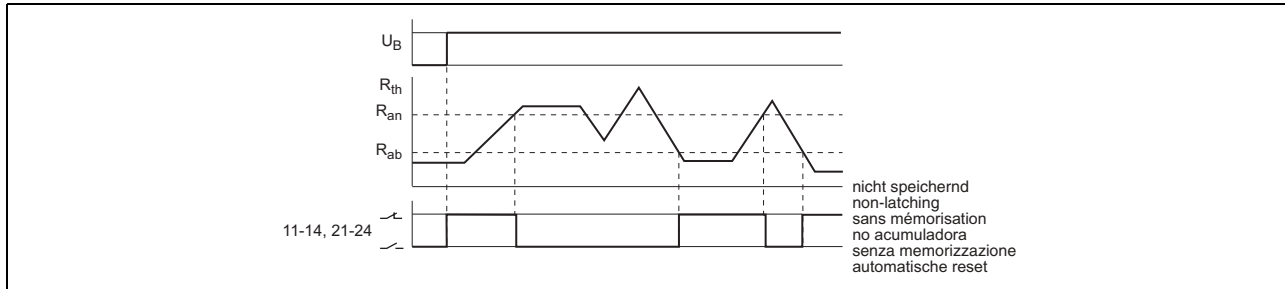
- } Operates to normally energised mode
- } Protection of the monitored unit is guaranteed in the case of:
 - Power supply failure
 - Coil defect
 - Open circuit

Internal wiring diagram



Thermistor monitor S1MS

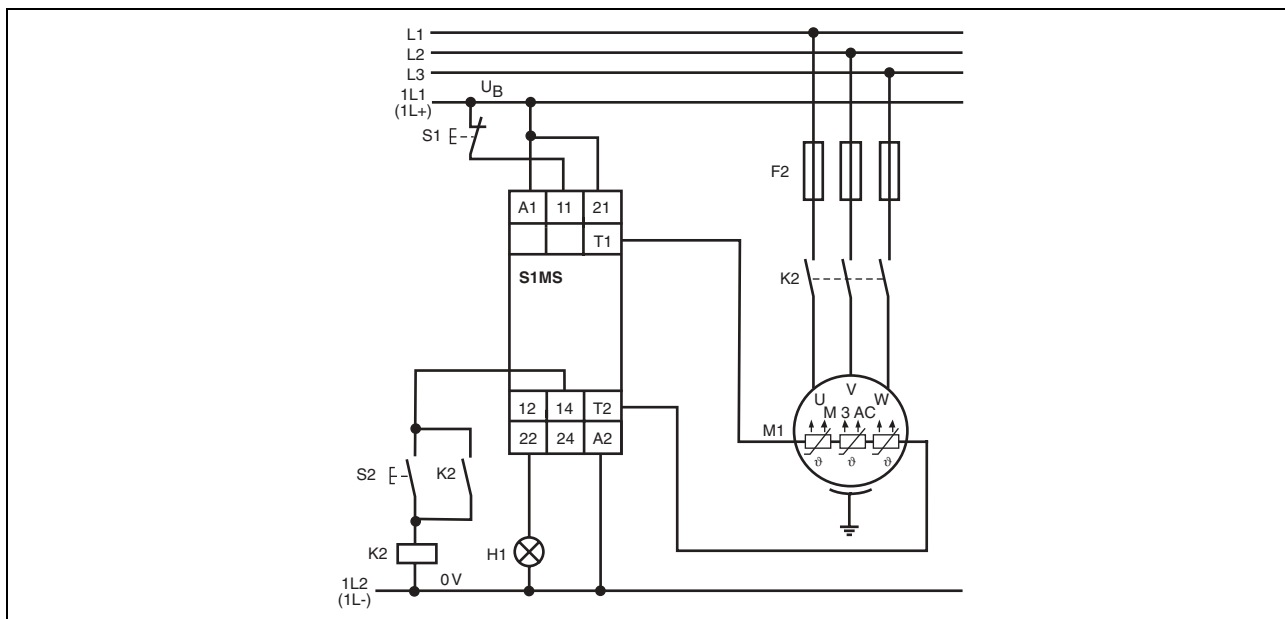
Timing diagram



Key

- } U_B Supply voltage
- } R_{on} Response value
- } R_{off} Release value
- } R_{th} PTC resistor

Connection example



Thermistor monitor S1MS

1.1

Technical details		S1M0
Electrical data		
Supply voltage		AC: 48, 110, 230, 240, 400 V AC/DC: 24 V
Tolerance		85 ... 110 %
Power consumption		AC: ca. 3.5 VA, DC: 2 W
Switching capability to EN 60947-4-1, 10/91		AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91		AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts		2 auxiliary contacts (2 C/O)
Contact material		AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection in accordance with EN 60947-5-1, 10/91		Max. 6 A quick or max. 4 A slow
Measuring circuit		
Delay-on energisation		ca. 500 ms
Response value		3.6 kT ± 10 %
Release value		1.8 kT ± 10 %
Cold resistor at 20 °C		Max. 1.5 kT
Mechanical data		
Max. cross section of external conductors		1 x 4 mm ² or 2 x 1.5 mm ² Single-core or multi-core with crimp connector
Dimensions (H x W x D)		87 x 22.5 x 122 mm
Weight		AC: 180 g; DC: 130 g

Order reference		
Type	U _B	Order no.
S1MS	24 VAC/DC	839 775
S1MS	48 VAC	839 725
S1MS	110 VAC	839 740
S1MS	230 VAC	839 760
S1MS	240 VAC	839 765
S1MS	400 VAC	839 770

U_B: Supply voltage
Additional versions on request

Thermistor monitor S1MN



The S1MN thermistor monitoring relay is used as a protection device in temperature monitoring circuits in accordance with EN 44081, 06/80. It protects motors, generators, storage areas, etc. from overheating.

Approvals

	S1MN	
	É	
	É	

Unit features

- } For DC and AC supplies
- } Normally energised mode
- } Monitors sensor short circuits
- } Fault latching or automatic reset
- } Manual reset via internal or external reset button

Description

The thermistor monitoring relay is enclosed in an S-95 slimline housing. Different versions are available for AC operation and one version is available for AC and DC operation.

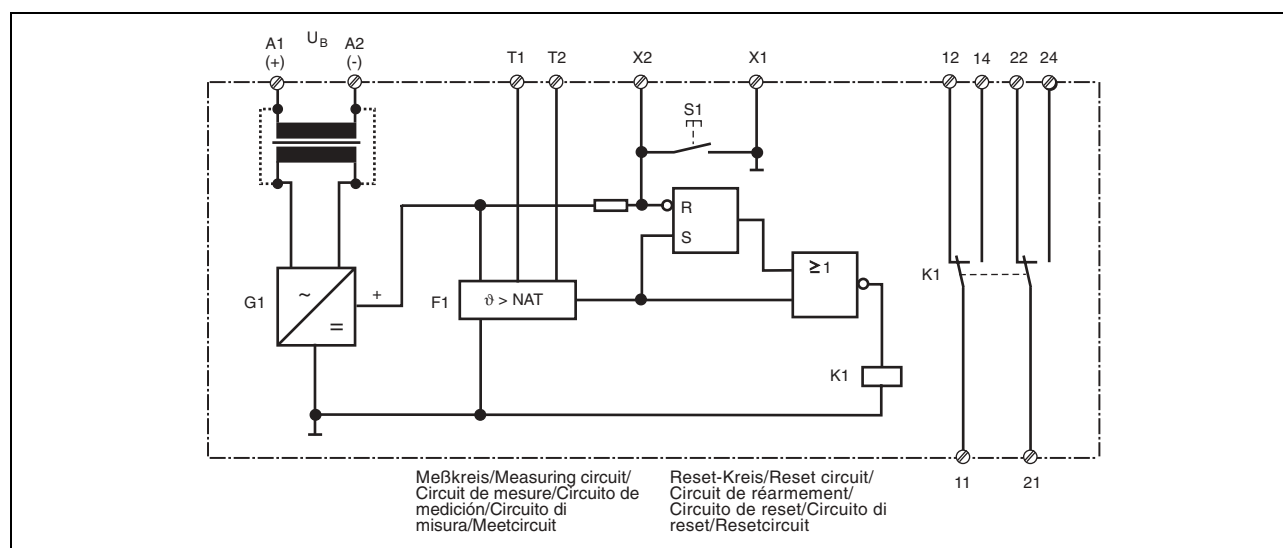
Features:

- } Relay outputs: 2 auxiliary contacts (2 C/O)
- } Measuring circuit for connecting a temperature sensor (PTC resistor)
- } Monitors the temperature sensor for short circuit
- } LED for supply voltage and fault

A temperature sensor is connected to the S1MN measuring circuit. If the temperature exceeds a defined value, i.e. the resistance of the temperature sensor reaches the response value,

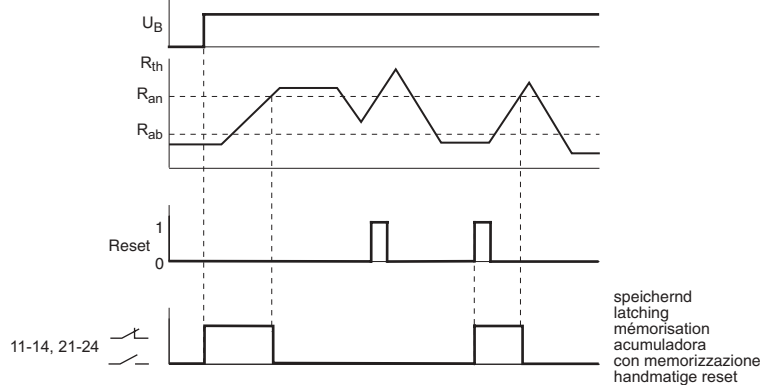
the output contacts switch. If the temperature then falls again, i.e. the resistance of the temperature sensor reaches the release value, the auxiliary contacts switch again if automatic reset is selected. The unit is ready for operation. If manual reset is selected, an internal/external button must be operated. The unit can also be reset by interrupting the supply voltage.

Internal wiring diagram



Thermistor monitor S1MN

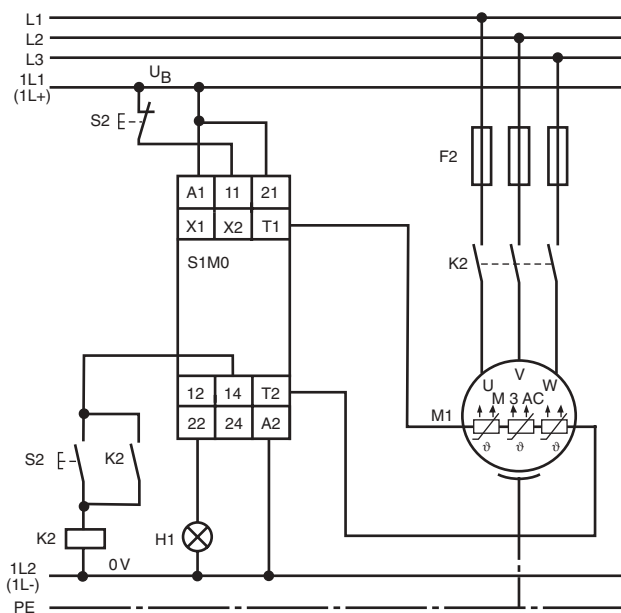
Timing diagram



Key

- } U_B Supply voltage
- } R_{on} Response value
- } R_{off} Release value
- } R_{th} PTC resistor

Connection example



Thermistor monitor S1MN

1.1

Technical details		S1MN
Electrical data		
Supply voltage		AC: 48, 110, 230, 240, 400 V AC/DC: 24 V
Tolerance		85 ... 110 %
Power consumption		AC: ca. 3.5 VA, DC: 2 W
Switching capability to EN 60947-4-1, 10/91		AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91		AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts		2 auxiliary contacts (2 C/O)
Contact material		AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection in accordance with EN 60947-5-1, 10/91		Max. 6 A quick or max. 4 A slow
Measuring circuit		
Response value in the case of sensor short circuit		ca. 25 T
Delay-on energisation		ca. 500 ms
Response value		3.6 kT ± 10 %
Release value		1.8 kT ± 10 %
Cold resistor at 20 °C		Max. 1.5 kT
Mechanical data		
Max. cross section of external conductors		1 x 4 mm ² or 2 x 1.5 mm ² Single-core or multi-core with crimp connector
Dimensions (H x W x D)		87 x 22.5 x 122 mm
Weight		AC: 180 g; DC: 130 g

Order reference		
Type	U _B	Order no.
S1MN	24 VAC/DC	839 400
S1MN	48 VAC	839 405
S1MN	110 VAC	839 410
S1MN	230 VAC	839 415
S1MN	240 VAC	839 420
S1MN	400 VAC	839 425

U_B: Supply voltage
Additional versions on request

Thermistor monitor S1M0

1.1



The S1M0 thermistor monitoring relay is used as a protection device in temperature monitoring circuits in accordance with EN 44081, 06/80. It protects motors, generators, storage areas, etc. from overheating.

Approvals

	S1M0
	É
	É

Unit features

- } For DC and AC supplies
- } Normally energised mode
- } Monitors sensor short circuits
- } Non-volatile fault latching
- } Manual reset via internal or external reset button

Description

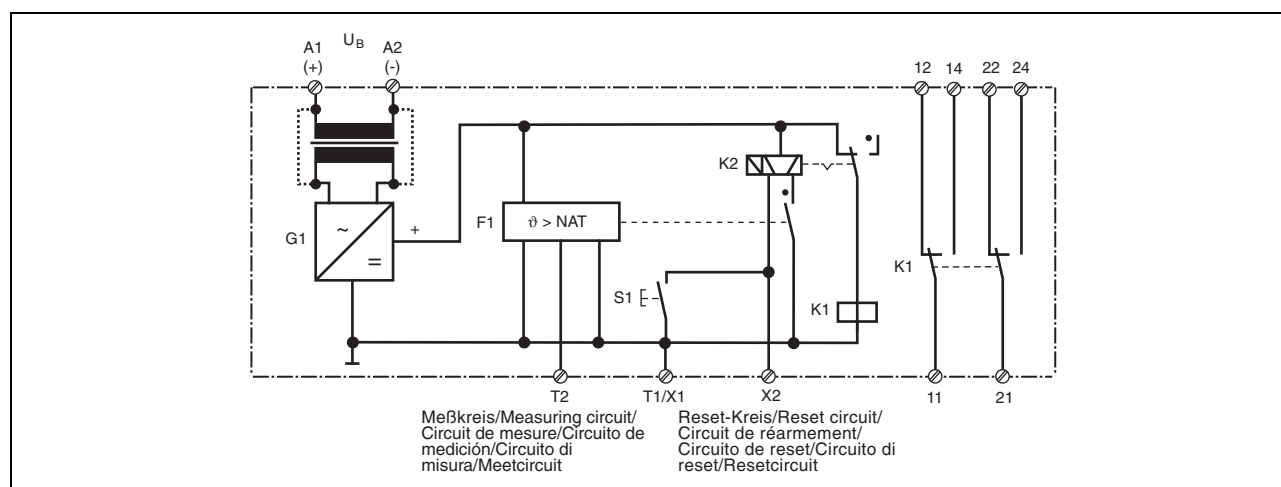
The thermistor monitoring relay is enclosed in an S-95 slimline housing. There are 5 versions available for AC operation and one for AC and DC operation.

Features:

- } Relay outputs: 2 auxiliary contacts (2 C/O)
- } Measuring circuit for connecting a temperature sensor (PTC resistor)
- } Monitors the temperature sensor for short circuit
- } Reset button
- } Connection option for external reset button
- } Manual reset with non-volatile reset latch
- } LED for supply voltage and fault

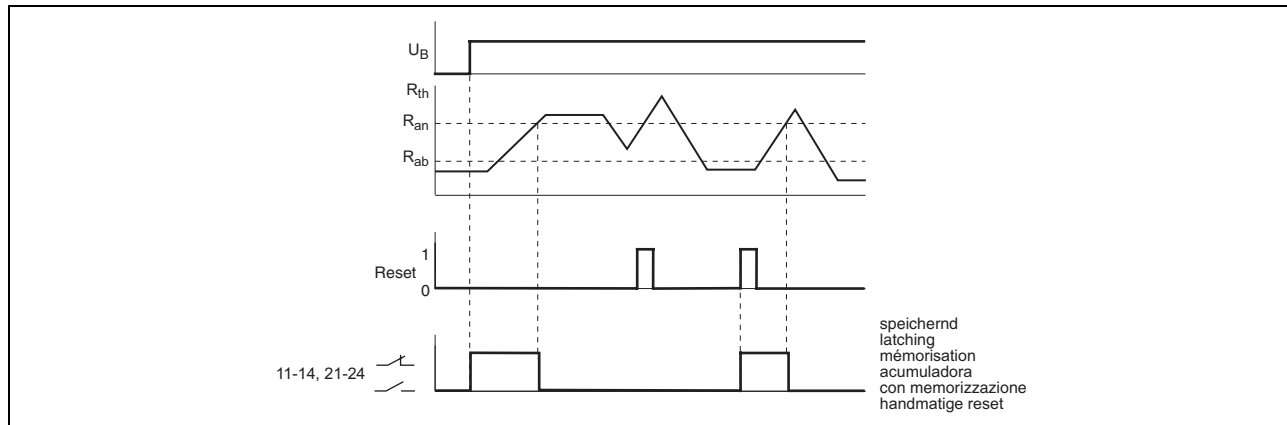
A temperature sensor is connected to the S1M0 measuring circuit. If the temperature exceeds a defined value, i.e. the resistance of the temperature sensor reaches the response value, the output contacts switch. Contacts 11-14 and 21-24 open, contacts 11-12 and 21-22 close. If the temperature then falls, i.e. the resistance of the temperature sensor reaches the release value, the unit can only be switched back on by pressing the reset button S1 (or the external reset button). The non-volatile reset latch prevents the unit from starting up again automatically after a fault, when the voltage fails and is then restored.

Internal wiring diagram



Thermistor monitor S1M0

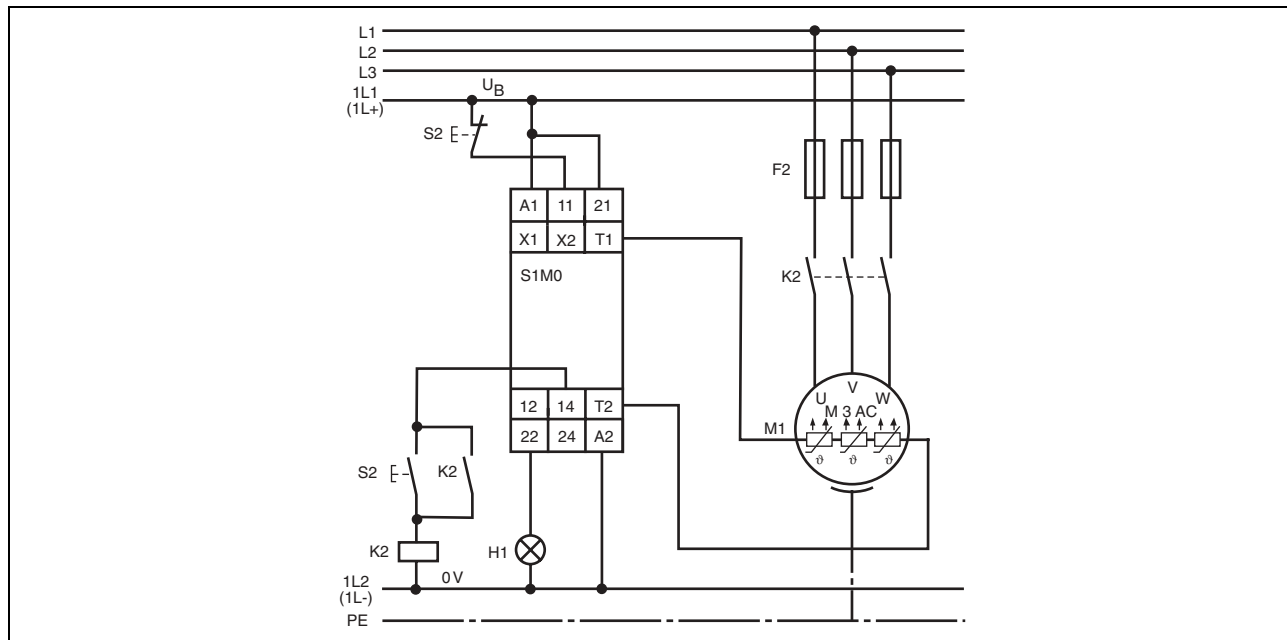
Timing diagram



Key

- } U_B Supply voltage
- } R_{on} Response value
- } R_{off} Release value
- } R_{th} PTC resistor

Connection example



Thermistor monitor S1M0

1.1

Technical details		S1M0
Electrical data		
Supply voltage		AC: 48, 110, 230, 240, 400 V AC/DC: 24 V
Tolerance		85 ... 110 %
Power consumption		AC: ca. 3.5 VA, DC: 2 W
Switching capability to EN 60947-4-1, 10/91		AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91		AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts		2 auxiliary contacts (2 C/O)
Contact material		AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection in accordance with EN 60947-5-1, 10/91		Max. 6 A quick or max. 4 A slow
Measuring circuit		
Response value in the case of sensor short circuit		ca. 25 T
Delay-on energisation		ca. 500 ms
Response value		3.6 kT ± 10 %
Release value		1.8 kT ± 10 %
Cold resistor at 20 °C		Max. 1.5 kT
Mechanical data		
Max. cross section of external conductors		1 x 4 mm ² or 2 x 1.5 mm ² Single-core or multi-core with crimp connector
Dimensions (H x W x D)		87 x 22.5 x 122 mm
Weight		AC: 180 g; DC: 130 g

Order reference		
Type	U _B	Order no.
S1M0	24 VAC/DC	839 600
S1M0	48 VAC	839 620
S1M0	110 VAC	839 630
S1M0	230 VAC	839 650
S1M0	240 VAC	839 655
S1M0	400 VAC	839 660

U_B: Supply voltage
Additional versions on request

Standstill monitoring S1SW P



The S1SW P standstill monitoring relay is used to monitor standstill on DC and three-phase motors.

Approvals

	S1SW P
	É

Unit features

- } Standstill monitoring with and without run-down time
- } Standstill threshold can be set
- } Run-down monitoring time can be set
- } Normally de-energised mode
- } Measuring circuits are galvanically isolated
- } No speed sensor is required
- } Suitable for use with a frequency converter

Description

The standstill monitoring relay is enclosed in an S-99 slimline housing with plug-in terminals.

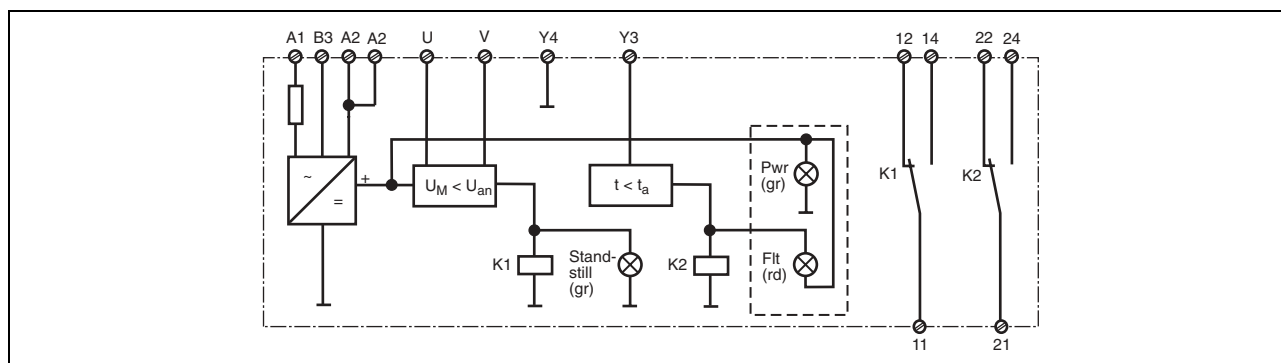
Features:

- } Relay outputs:
Standstill: 1 auxiliary contact (C/O)
Fault: 1 auxiliary contact (C/O)
- } Operating modes:
 - Standstill monitoring without rundown monitoring

- Standstill and rundown monitoring
- } Potentiometer to adjust the switch-on threshold and monitoring time
- } Slide switch to double the measuring range
- } LEDs for relay's switch status, fault status and supply voltage

The S1SW P monitors the rundown on a three-phase asynchronous machine with standstill detection. The regenerated voltage induced from the motor is measured; standstill is signalled (relay contact) if the value falls below a set threshold. A second relay signals a fault if the value does not fall below the set threshold within the set run-down monitoring time. The time measurement is started by closing a voltage-free start contact (N/C contact on the motor contactor at Y3, Y4). The slide switches can be used to switch the measuring ranges.

Internal wiring diagram



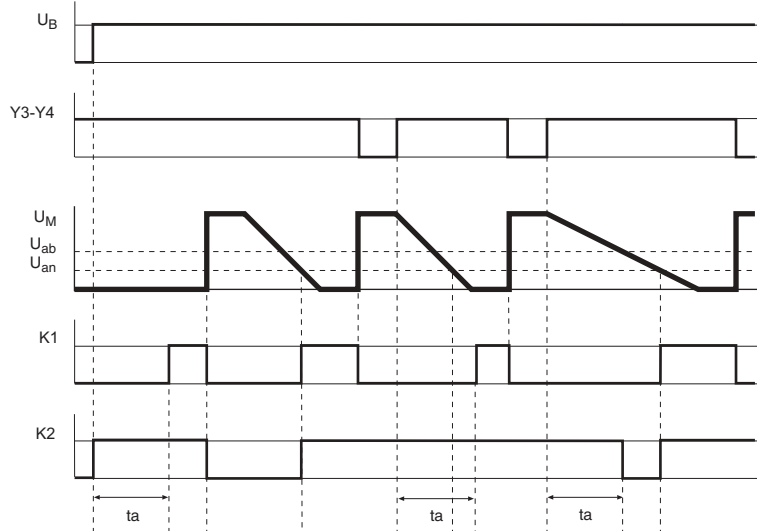
Key

- } U_B at B3-A2: 24 VAC/DC
- } U_B at A1-A2: 42 ... 240 VAC/DC

Standstill monitoring S1SW P

Timing diagram

1.1



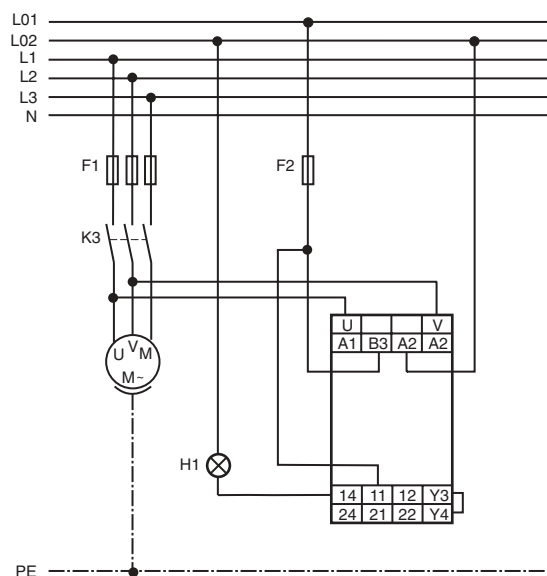
Key

- } U_B Supply voltage
- } Y3-Y4 Start contact

Connection examples

Example 1

Rundown time is not monitored,
supply voltage 24 V

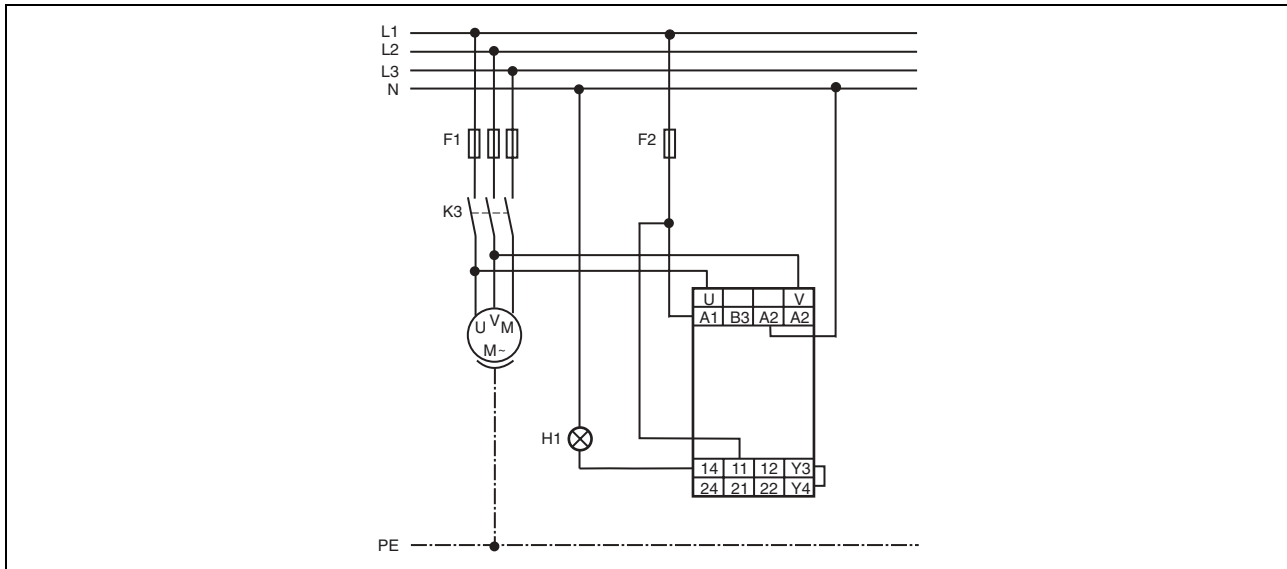


Standstill monitoring S1SW P

Example 2

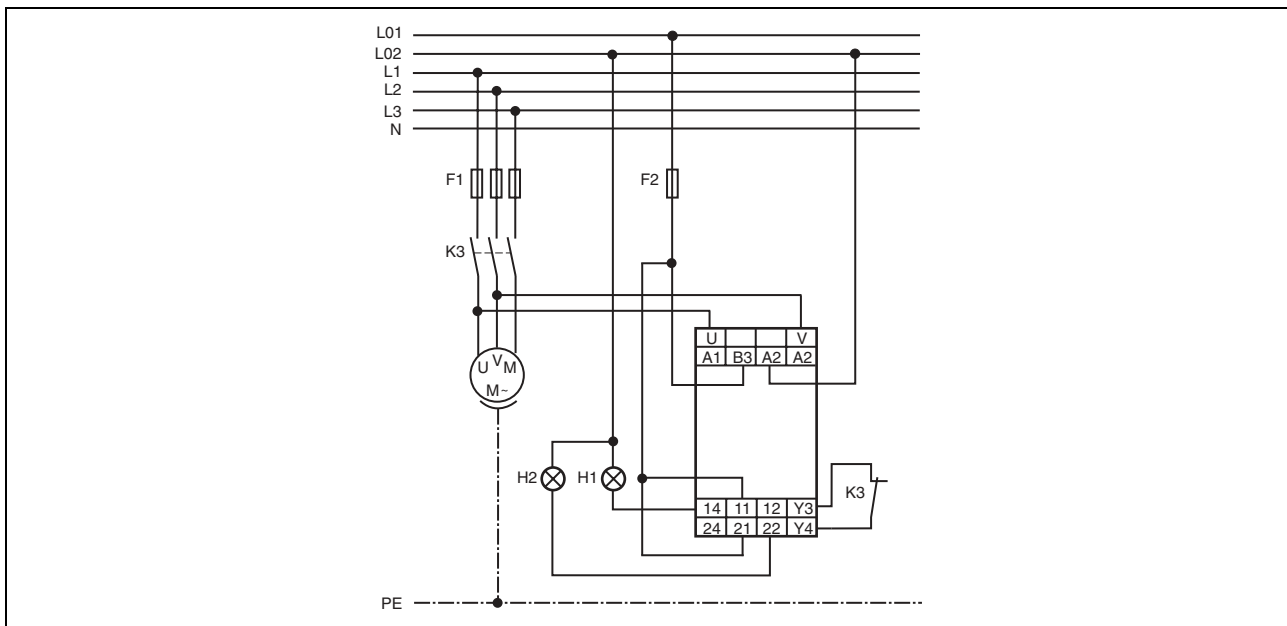
Rundown time is not monitored,
supply voltage 42 V and higher

1.1



Example 3

Rundown time is monitored,
supply voltage 24 V

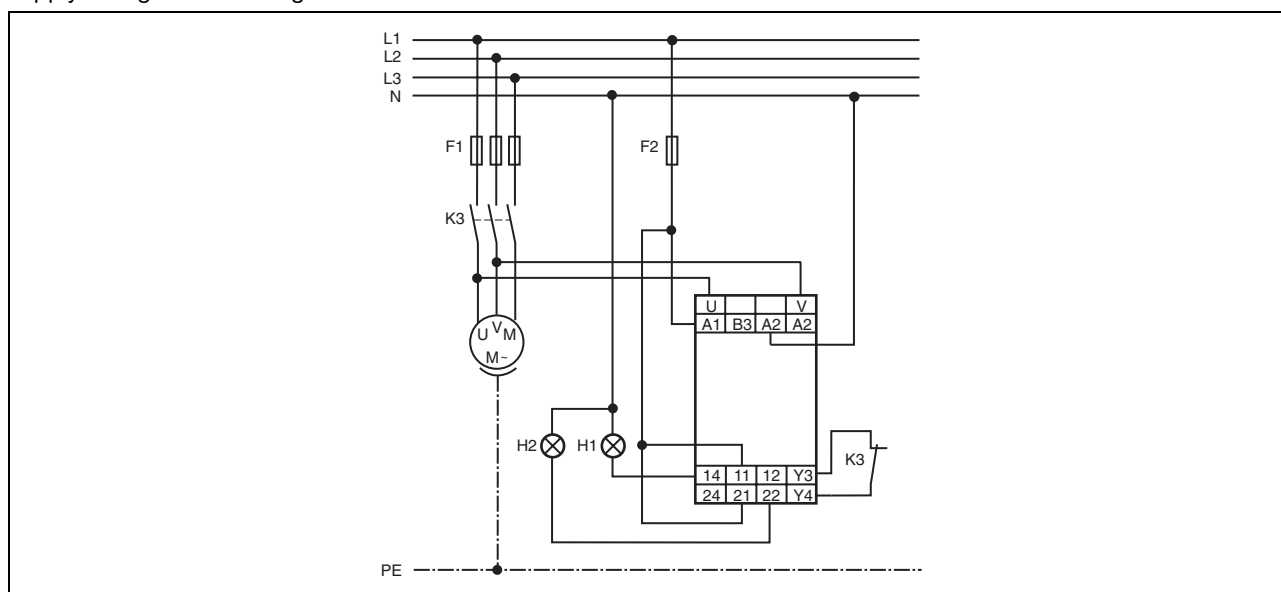


Standstill monitoring S1SW P

1.1

Example 4

Rundown time is monitored,
supply voltage 42 V and higher



Technical details		S1SW P
Electrical data		
Supply voltage		AC/DC: 24 ... 240 V
Tolerance		85 ... 110 %
Power consumption		ca. 5 VA
Switching capability to EN 60947-4-1, 10/91		AC1: 240 V/0.1 ... 5 A/1200 VA DC1: 24 V/0.1 ... 5 A/120 W
EN 60947-5-1, 10/91		AC15: 230 V/2 A; DC13: 24 V/1.5 A
Output contacts		2 auxiliary contacts (2 C/O)
Contact material		AgCdO, 3 µm gold plating for low load range 1-50 V/1-100 mA
Contact fuse protection in accordance with EN 60947-5-1, 10/91		Max. 6 A quick or max. 4 A slow
Measuring circuit		
Frequency range		0 ... 1000 Hz
Adjustable limit values for measuring ranges		0,02 ... 3 V 0,04 ... 6 V
Max. input voltage		AC/DC: 690 V
Impedance of the measuring inputs		5 MΩ
Rundown monitoring time		0 ... 30 s
Environmental data		
Ambient temperature		-10 ... +55 °C

Standstill monitoring S1SW P

1.1

Mechanical data

Max. external conductor cross-section	Flexible without crimp connectors: 0,2 ... 2.5 mm ²
Single-core	Flexible with crimp connectors: 0,25 ... 2.5 mm ²
Multi-core (2 core with the same cross section)	Flexible with crimp connectors, no plastic sleeve: 0,25 ... 1 mm ² Flexible, with TWIN crimp connectors, with plastic sleeve: 0,5 ... 1.5 mm ²
Dimensions (H x W x D)	94 x 22.5 x 121 mm
Weight	200 g

Order reference

Type	U _B	U _M	Order no.
S1SW P	24 - 230 VAC/DC	690 VAC/DC	407 710

U_B: Supply voltage

U_M: Measuring voltage

General details

General details

Content	Page
General details	
Technical details	1.2-2
Dimensioned drawings, housing features	1.2-3

General details

Technical details

1.2



Technical details

Unless stated otherwise in the unit-specific data

Electrical data

Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Contact material	AgCdO
Continuous duty	100 %

Environmental data

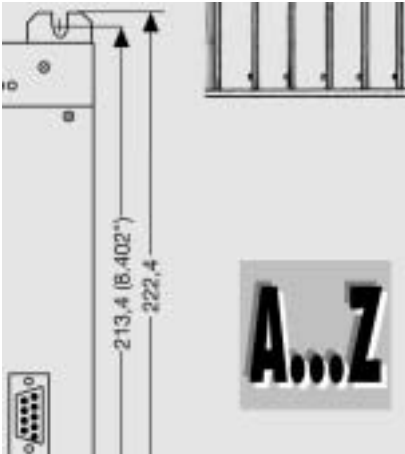
EMC	EN 50081-1, 01/92; EN 50082-2, 03/95
Vibration in accordance with EN 60068-2-6, 04/95	Frequency: 10 - 55 Hz, Amplitude: 0.35 mm
Climatic suitability	IEC 60068-2-3, 1969
Airgap creepage	DIN VDE 0110-1 (04/97), 4 kV/3
Ambient temperature	-10...+55 °C
Storage temperature	-40...+85 °C

Mechanical data

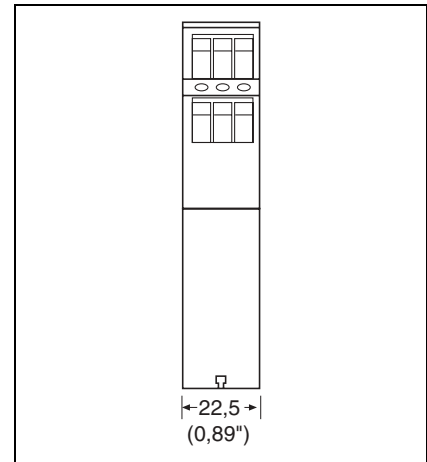
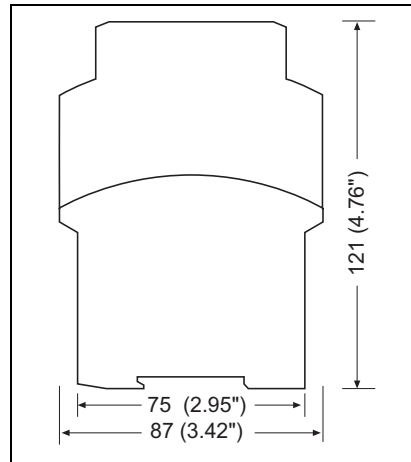
Torque setting for connection terminals	0.6 Nm (screws)
Mounting position	Any
Housing material	Thermoplastic Noryl SE 100
Protection types	Mounting: IP54 Housing: IP40 Terminals: IP20

General details

Dimensioned drawings, housing features



Dimensioned drawings (in mm)



Housing features

Housing material: Noryl SE 100

- } In accordance with UL 94 V1
- } Fire-resistant
- } Non-drip
- } Self-extinguishing

Installation

- } Can be clipped on to a DIN rail in accordance with DIN EN 50022 (DIN 46277-3)

Wiring connection

- } Print terminals with pozidrive screws for
- } Single-core
- } Multi-core with crimp connectors

Fig.: S-95 housing: 22.5 mm wide

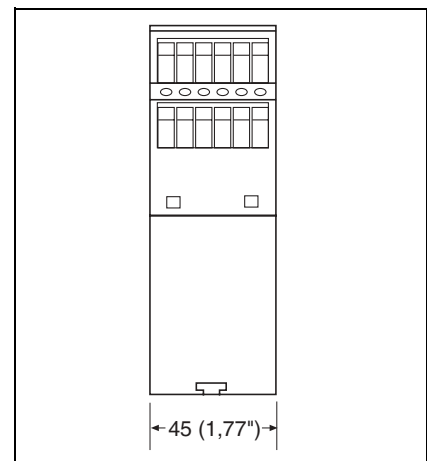
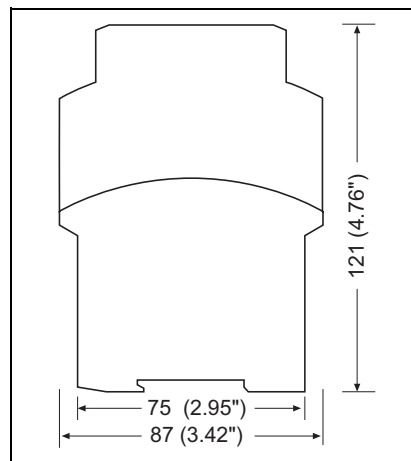


Fig.: P-93 housing: 45 mm wide

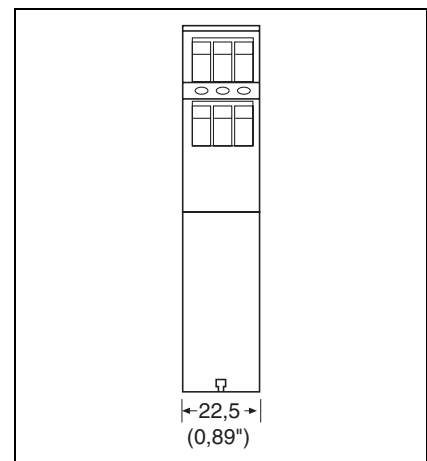
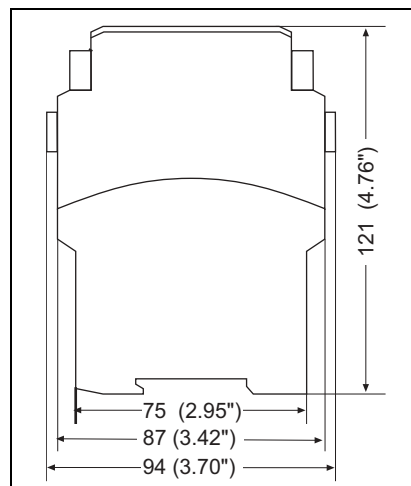


Fig.: S-99 housing: 22.5 mm wide

Content	Page
Selection guide	from 2.1-1
Safety relays PNOZ XP – with plug-in terminals	from 2.2-1
Safety relays PNOZ X – with screw terminals	from 2.3-1

Selection guide

Content	Page
Selection guide	
Safety relays PNOZ XP – with plug-in terminals	2.1-2
Safety relays PNOZ X – with screw terminals	2.1-4

Selection guide

Safety relays PNOZ XP – with plug-in terminals

Type	Application						Category (EN 954-1)		
							2	3	4
PNOZ X1P	É	É					É		
PNOZ X2P	É	É					É		É
PNOZ X2.1VP	É	É					É		É
PNOZ X2.3P	É	É					É		É
PNOZ X2.7P	É	É	É				É	É	É
PNOZ X2.8P	É	É	É				É	É	É
PNOZ X2.9P	É	É	É				É	É	É
PNOZ X3P	É	É	É				É	É	É
PNOZ X3.10P	É	É	É				É	É	É
PNOZ X7P	É	É					É		
PNOZ X8P	É	É	É				É	É	É
PNOZ X9P	É	É	É				É	É	É
PNOZ X10.11P	É	É	É				É	É	É
PNOZ X11P	É	É					É		É
PNOZ XV1P	É	É	É				É	É	É
PNOZ XV2P	É	É					É		É
PNOZ XV2.1P	É	É					É		É
PNOZ XV3P	É	É	É				É	É	É
PNOZ XV3.1P	É	É	É				É	É	É
PMUT X1P	É	É	É		É		É	É	É
P2HZ X1P				É			EN 574, Type IIIC		
P2HZ X1.10P				É			EN 574, Type IIIC		
P2HZ X4P				É			EN 574, Type IIIC		
PSWZ X1P						É	É	É	
PZE X4P	Contact expansion						As base unit		
PZE X4.1P	Contact expansion						As base unit		
PZE X4VP	Contact expansion						As base unit		
PZE X4VP4	Contact expansion						As base unit		
PZE X4VP8	Contact expansion						As base unit		
PZE X5P	Contact expansion						As base unit		
PZE 9P	Contact expansion						As base unit		

É Can be installed in this category

Selection guide

Safety relays PNOZ XP – with plug-in terminals

Type	Output contacts					Universal power supply	Housing width in mm	Page
	safe		not safe					
								
PNOZ X1P	3			1			22,5	2.2-2
PNOZ X2P	2					É	22,5	2.2-9
PNOZ X2.1VP	2	É			1		22,5	2.2-17
PNOZ X2.3P	3						22,5	2.2-25
PNOZ X2.7P	3			1		É	22,5	2.2-33
PNOZ X2.8P	3			1		É	22,5	2.2-41
PNOZ X2.9P	3			1			22,5	2.2-49
PNOZ X3P	3			1	1	É	45	2.2-57
PNOZ X3.10P	3			1	1		45	2.2-65
PNOZ X7P	2						22,5	2.2-73
PNOZ X8P	3			2	2		45	2.2-80
PNOZ X9P	7			2	2	É	90	2.2-88
PNOZ X10.11P	6			4			90	2.2-96
PNOZ X11P	7			1	2		90	2.2-104
PNOZ XV1P	3	É					22,5	2.2-112
PNOZ XV2P	4	É					45	2.2-120
PNOZ XV2.1P	4	É				É	90	2.2-128
PNOZ XV3P	5	É					45	2.2-137
PNOZ XV3.1P	5	É				É	90	2.2-145
PMUT X1P	3			1	5		90	2.2-155
P2HZ X1P	3			1	2		45	2.2-163
P2HZ X1.10P	3			1	2		45	2.2-170
P2HZ X4P	3			1			22,5	2.2-177
PSWZ X1P	2			1	1	É	45	2.2-184
PZE X4P	4						22,5	2.2-191
PZE X4.1P	4						22,5	2.2-197
PZE X4VP	4						22,5	2.2-203
PZE X4VP4	4						45	2.2-210
PZE X4VP8	4						45	2.2-217
PZE X5P	5				2		45	2.2-224
PZE 9P	8			1		É	90	2.2-231

É Can be installed in this category

Selection guide

Safety relays PNOZ X – with screw terminals

2.1

Type	Application						Category (EN 954-1)			
								2	3	4
PNOZ X1	É	É						É		
PNOZ X2	É	É						É		É
PNOZ X2.1	É	É						É		É
PNOZ X2C	É	É						É		É
PNOZ X3	É	É						É		É
PNOZ X4	É	É	É					É	É	É
PNOZ X5	É	É	É					É	É	
PNOZ X6	É	É	É					É	É	
PNOZ X7	É	É						É		
PNOZ X9	É	É	É					É	É	É
PNOZ X10.1	É	É	É					É	É	É
PNOZ 11	É	É						É		É
PNOZ X13	É	É						É		É
PNOZ 16	É	É			É			É		É
PNOZ 16S	É	É			É			É		É
PNOZ Ex	É	É						É	É	É
PNOZ XV2	É	É						É		É
PNOZ XV3	É	É						É		É
PNOZ 2VQ	É	É						É	É	É
P1HZ X1*				É				EN 574, Type IIIA		
P2HZ X1				É				EN 574, Type IIIC		
P2HZ X2				É				EN 574, Type IIIC		
P2HZ X3				É				EN 574, Type IIIC		
PU3Z							É	Â	Â	É
PZA					É			As base unit		
PZW					É			As base unit		
PZE X4	Contact expansion							As base unit		
PZE X4V	Contact expansion							As base unit		
PZE X5	Contact expansion							As base unit		
PZE X5V	Contact expansion							As base unit		
PZE 9	Contact expansion							As base unit		

É Can be installed in this category

Â Can be achieved through installation of the next highest category

* Depends on base unit

Selection guide

Safety relays PNOZ X – with screw terminals

Type	Output contacts					Universal power supply	Housing width in mm	Page
	safe		not safe					
								
PNOZ X1	3			1			22,5	2.3-2
PNOZ X2	2						22,5	2.3-9
PNOZ X2.1	2						22,5	2.3-16
PNOZ X2C	2						45	2.3-23
PNOZ X3	3			1	1		45	2.3-30
PNOZ X4	3			1			45	2.3-38
PNOZ X5	2						22,5	2.3-47
PNOZ X6	3						45	2.3-54
PNOZ X7	2						22,5	2.3-62
PNOZ X9	7			2	2		90	2.3-70
PNOZ X10.1	6			4			90	2.3-78
PNOZ 11	7			1	2		90	2.3-86
PNOZ X13	5			1			45	2.3-95
PNOZ 16	2						45	2.3-103
PNOZ 16S	2				2		45	2.3-111
PNOZ Ex	3		2	1			112,5	2.3-119
PNOZ XV2	4	É					45	2.3-127
PNOZ XV3	5	É					45	2.3-135
PNOZ 2VQ	5	É		1			112,5	2.3-143
P1HZ X1*	2						22,5	2.3-151
P2HZ X1	3			1	2		45	2.3-157
P2HZ X2	2						22,5	2.3-164
P2HZ X3	2			1			22,5	2.3-170
PU3Z	3			1	6		112,5	2.3-176
PZA	1			2			45	2.3-185
PZW	1			2			45	2.3-192
PZE X4	4						22,5	2.3-199
PZE X4V	4						22,5	2.3-205
PZE X5	5						45	2.3-212
PZE X5V	5						45	2.3-218
PZE 9	8			1			90	2.3-224

É Can be installed in this category

* Depends on base unit

Content	Page
Safety relays PNOZ XP – with plug-in terminals	
E-STOP relays, safety gate monitors	
PNOZ X1P	2.2-2
PNOZ X2P	2.2-9
PNOZ X2.1VP	2.2-17
PNOZ X2.3P	2.2-25
PNOZ X2.7P	2.2-33
PNOZ X2.8P	2.2-41
PNOZ X2.9P	2.2-49
PNOZ X3P	2.2-57
PNOZ X3.10P	2.2-65
PNOZ X7P	2.2-73
PNOZ X8P	2.2-80
PNOZ X9P	2.2-88
PNOZ X10.11P	2.2-96
PNOZ X11P	2.2-104
PNOZ XV1P	2.2-112
PNOZ XV2P	2.2-120
PNOZ XV2.1P	2.2-128
PNOZ XV3P	2.2-137
PNOZ XV3.1P	2.2-145
Muting controller	
PMUT X1P	2.2-155
Two-hand control devices	
P2HZ X1P	2.2-163
P2HZ X1.10P	2.2-170
P2HZ X4P	2.2-177
Safe monitoring relays	
PSWZ X1P	2.2-184
Contact expansion	
PZE X4P	2.2-191
PZE X4.1P	2.2-197
PZE X4VP	2.2-203
PZE X4VP4	2.2-210
PZE X4VP8	2.2-217
PZE X5P	2.2-224
PZE 9P	2.2-231

Up to Category 2, EN 954-1 PNOZ X1P



Safety relay for monitoring E-STOP pushbuttons.

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)

Safety features

- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Approvals

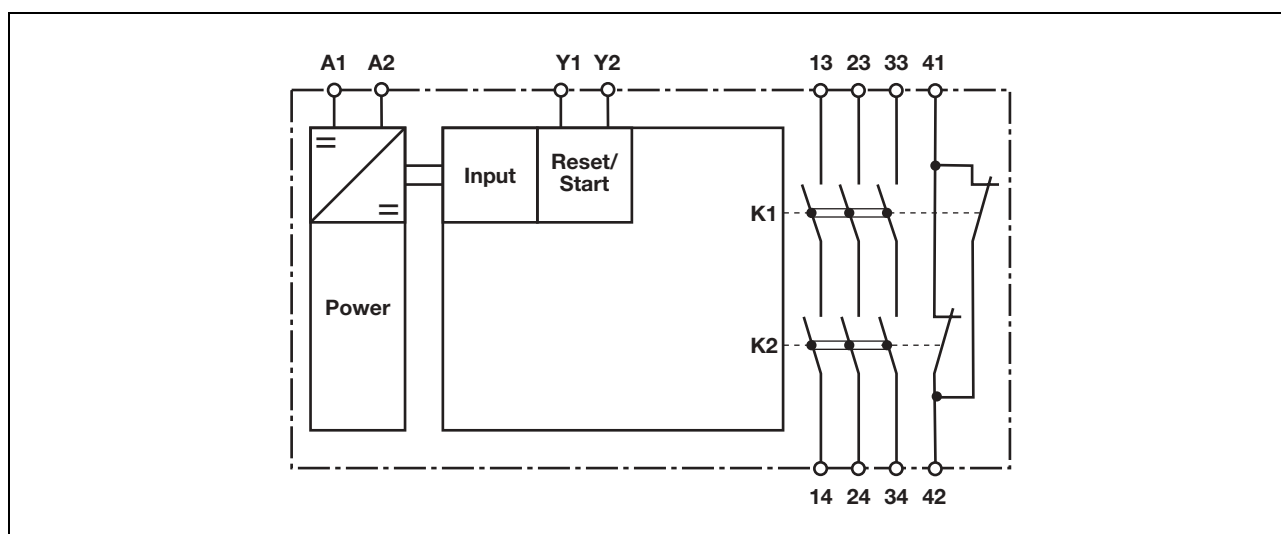
	PNOZ X1P
	É
	É
	É

Unit description

The safety relay is not suitable for non-contact barriers because

- } a dynamic start is not possible
- The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with
- } E-STOP pushbuttons
 - } Safety gates

Block diagram

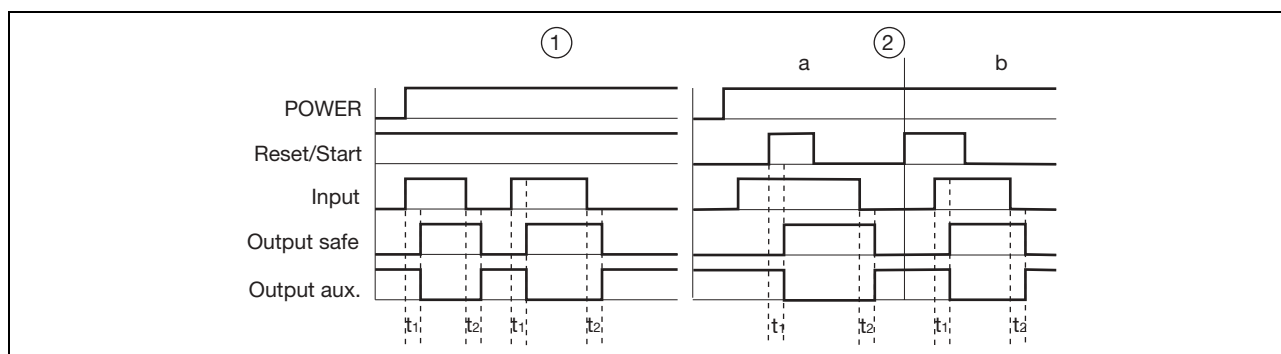


Up to Category 2, EN 954-1 PNOZ X1P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit Y1-Y2
- } Input: Input circuits A1
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } i : Automatic reset
- } c : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

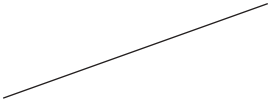
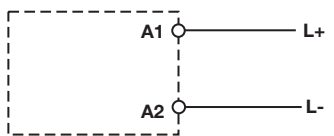
R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

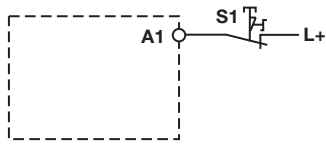
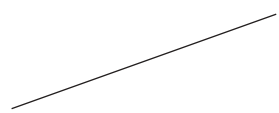
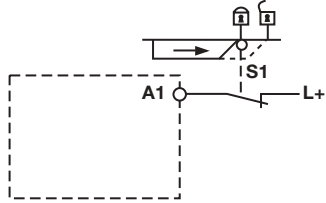
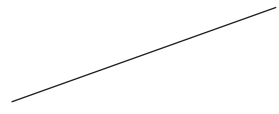
Up to Category 2, EN 954-1 PNOZ X1P

Preparing for operation

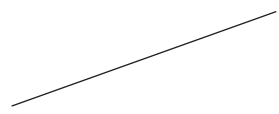
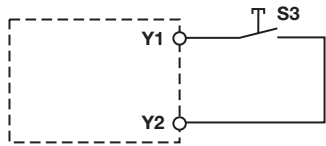
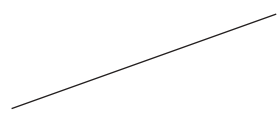
} Supply voltage

Supply voltage	AC	DC
		

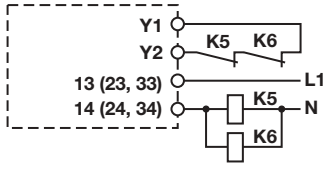
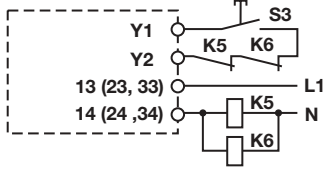
} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
Safety gate without detection of shorts across contacts		

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		

} Feedback loop

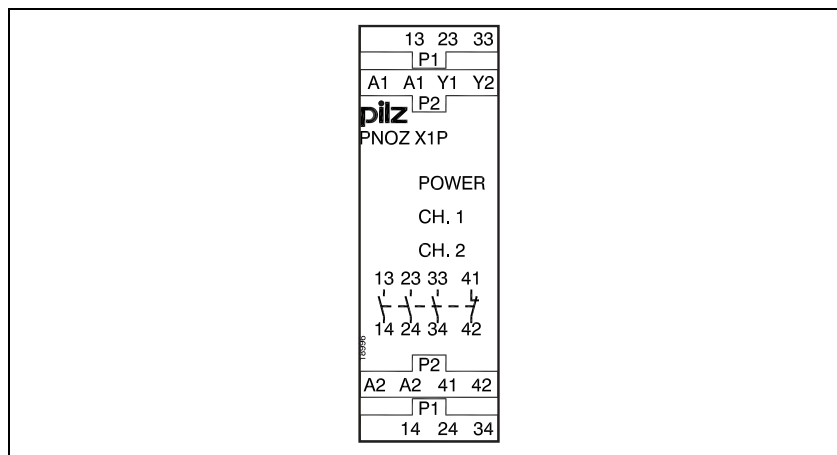
Feedback loop	Automatic reset	Manual reset
Contacts from external contactors		

Up to Category 2, EN 954-1 PNOZ X1P

} Key

S1	E-STOP pushbutton
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Terminal configuration

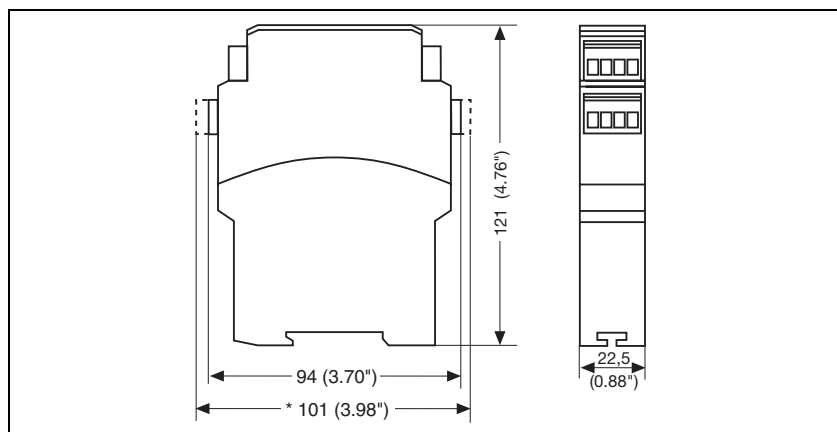


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

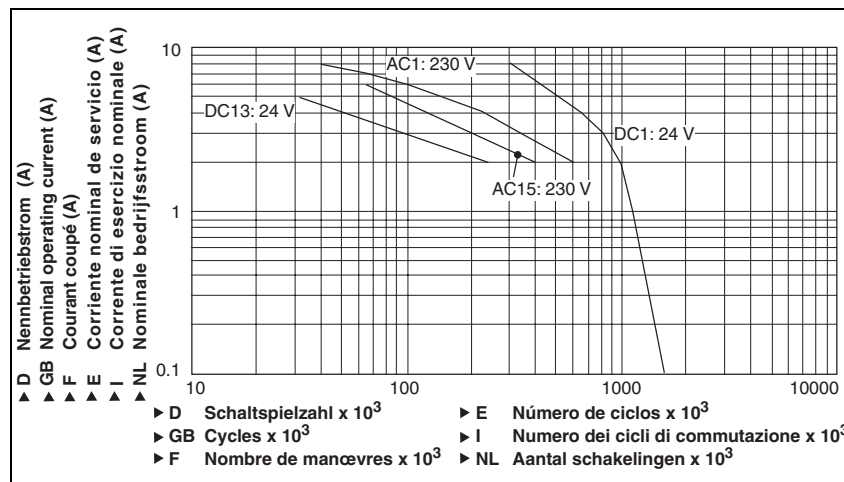


Up to Category 2, EN 954-1 PNOZ X1P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B DC	1.5 W
Residual ripple DC	160 %
Voltage and current at	
Input circuit: 24 VDC	45 mA
Reset circuit: 24 VDC	45 mA
Feedback loop: 24 VDC	45 mA
Output contacts in accordance with EN 954-1, Category 2	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	$I_{min}: 0.01 A, I_{max}: 6.0 A$ $P_{max}: 1500 VA$
DC1: 24 V	$I_{min}: 0.01 A, I_{max}: 6.0 A$ $P_{max}: 150 W$
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	$I_{max}: 5.0 A$
DC13 (6 cycles/min): 24 V	$I_{max}: 4.0 A$
Contact material	AgSnO ₂ + 0.2 μ m Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B DC	30 Ohm

Up to Category 2, EN 954-1 PNOZ X1P

Times	
Switch-on delay	
with automatic reset typ.	60 ms
with automatic reset max.	120 ms
with manual reset typ.	50 ms
with manual reset max.	120 ms
Delay-on de-energisation	
with E-STOP typ.	55 ms
with E-STOP max.	90 ms
with power failure typ.	55 ms
with power failure max.	90 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	150 ms
after power failure	150 ms
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 – 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 – 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 1.50 mm ²
Torque setting with screw terminals	0.50 Nm
Max. cross section of external conductors with cage clamp terminals	
Flexible without crimp connectors	0.20 – 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	94.0 mm x 22.5 mm x 121.0 mm
With cage clamp terminals	101.0 mm x 22.5 mm x 121.0 mm
Weight	205 g

The standards current on 05/03 apply.

Max. continuous current	
Number of contacts	I _{max} (A) at U _B DC
1	6.00 A
2	6.00
3	4.50

Up to Category 2, EN 954-1 PNOZ X1P

Order reference

Type	Features	Terminals	Order no.
PNOZ X1P C	24 VDC	Cage clamp terminals	787 100
PNOZ X1P	24 VDC	Screw terminals	777 100

Up to Category 4, EN 954-1
PNOZ X2P



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ X2P	
	É	
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	É	

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Unit Description

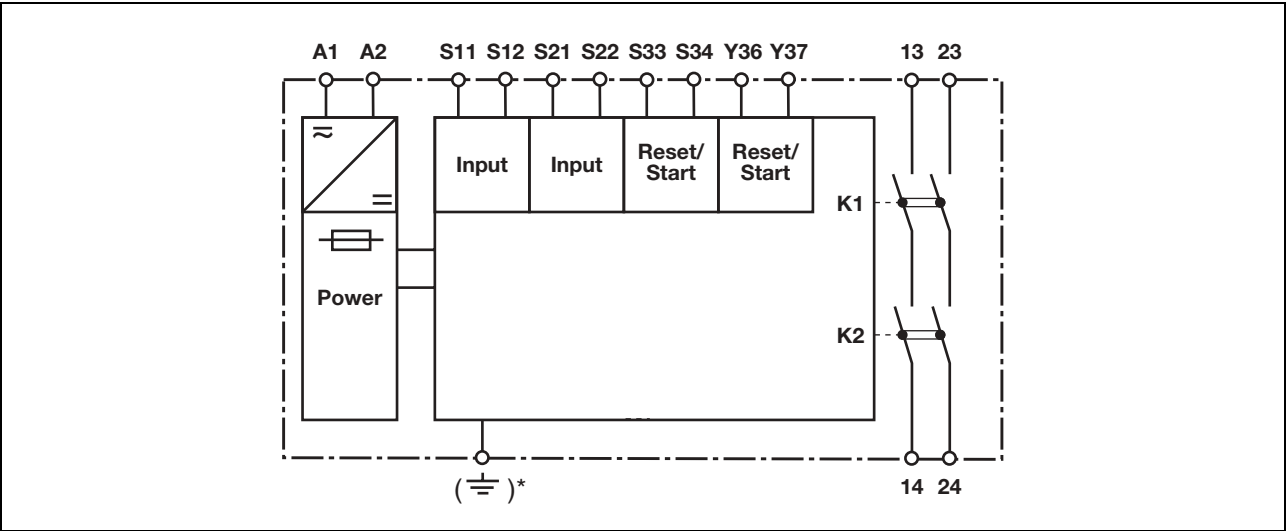
The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

Safety features

The relay conforms to the following safety criteria:

Block diagram



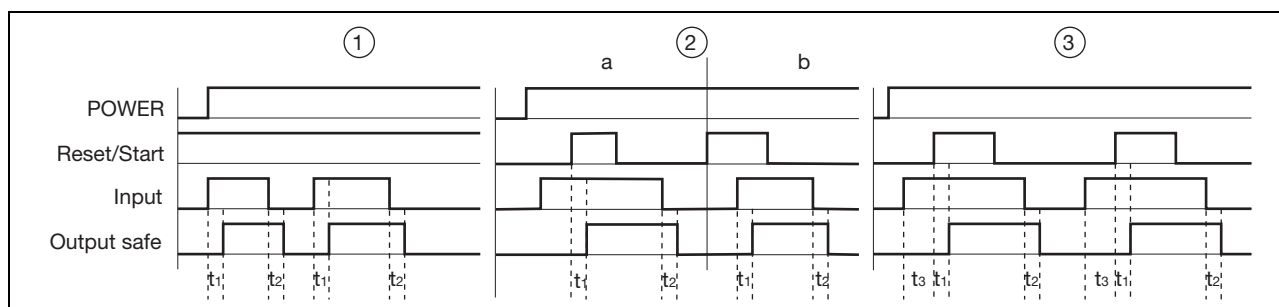
*only applicable for U_B 48 – 240 VAC/DC

Up to Category 4, EN 954-1 PNOZ X2P

Function Description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
- short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
- shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34, Y36-Y37
- } Input: Input circuits S11-S12, S21-S22
- } Output safe: Safety outputs 13-14, 23-24
- } $\bar{i}$: Automatic reset
- } $\bar{c}$: Manual reset
- } $\bar{e}$: Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ X2P

Preparing for operation

} Supply Voltage

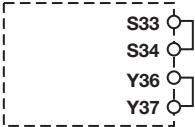
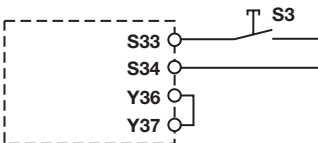
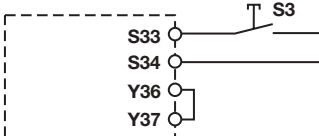
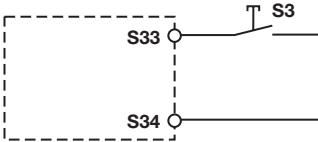
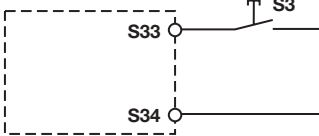
Supply voltage	AC	DC
U_B 24 VAC/DC		
U_B 48 - 240 VAC/DC		

} Input circuit

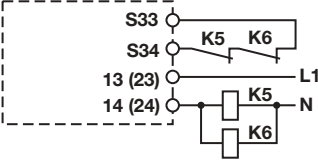
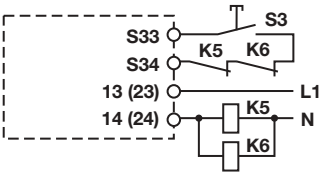
Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts	(only when U_B 24 VAC/DC) 	
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts	(only when U_B 24 VAC/DC) 	
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ X2P

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (single-channel) Safety gate (dual-channel)
Automatic reset	(only when U_B 24 VAC/DC) 	
Manual reset	(only when U_B 24 VAC/DC) 	
Monitored reset	(only when U_B 24 VAC/DC) 	

} feedback loop

feedback loop	Automatic reset	Monitored reset
Contacts of external contactors		

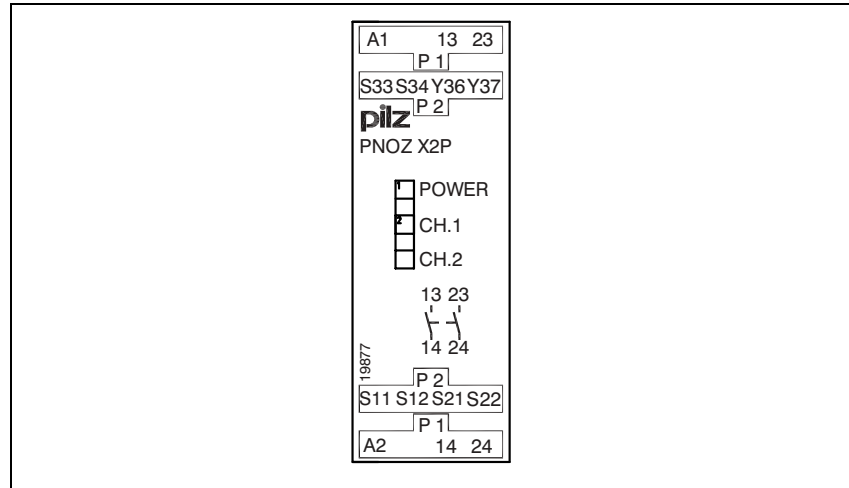
} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

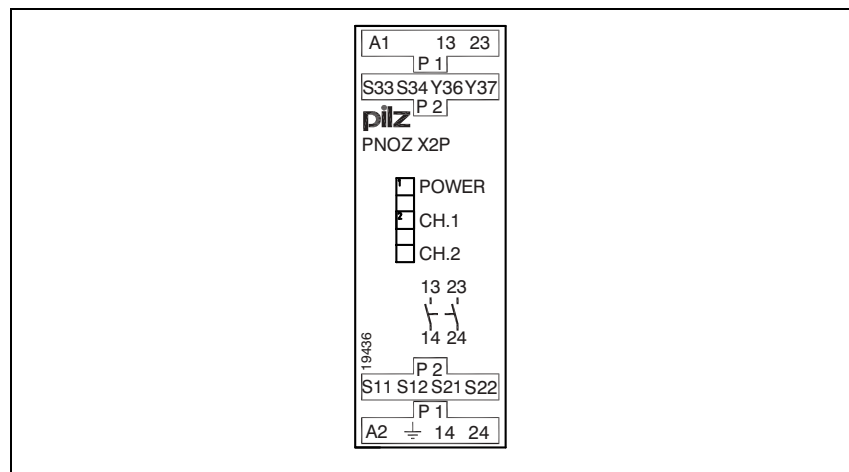
Up to Category 4, EN 954-1 PNOZ X2P

Terminal configuration

U_B 24 VAC/DC



U_B 48 - 240 VAC/DC

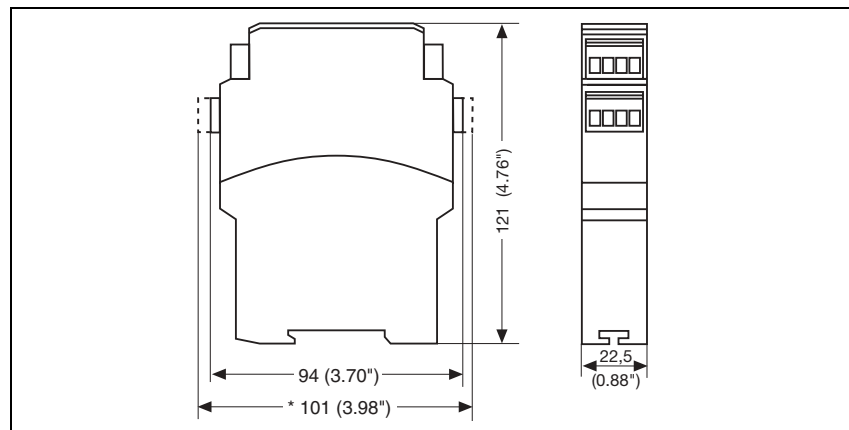


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

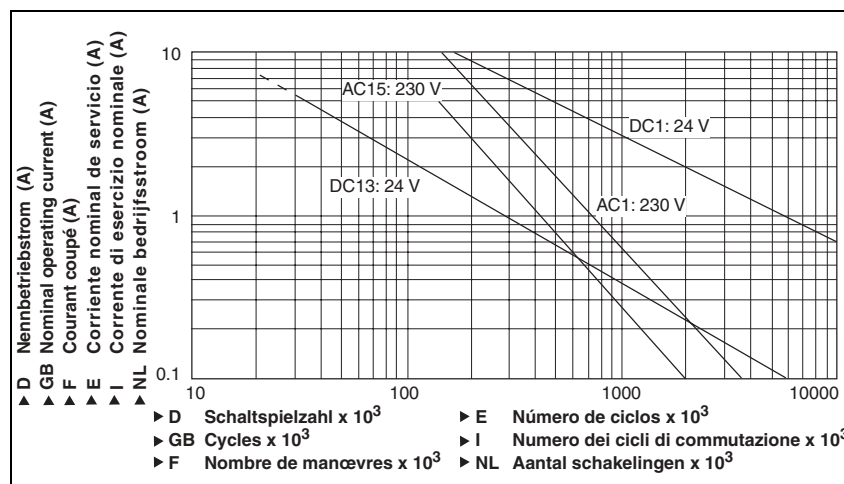


Up to Category 4, EN 954-1 PNOZ X2P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life trend



Technical details

Electrical data

Supply voltage	24 V
Supply voltage U _B AC/DC	48 - 240 V
Supply voltage U _B AC/DC	48 - 240 V
Voltage tolerance	-15 - 10 %
Power consumption at U _B	4.5 VA / 777307, 787307: 3.5 VA 2.0 W / 777307, 787307: 1.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	25 mA / 777307, 787307: 15 mA
reset circuit DC: 24.0 V	50 mA / 777307, 787307: 25 mA
feedback loop DC: 24.0 V	50 mA / 777307, 787307: 25 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 2
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I _{min} : 0.01 A, I _{max} : 6.0 A P: 1500 A
DC1: 24 V	I _{min} : 0.01 A, I _{max} : 6.0 A P: 150 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	5.0 A
DC13: 24 V	4.0 A / 777307, 787307: 3.0 A
(DC13: 6 cycles/min)	
Contact material	AgSnO ₂ + 0.2 µm Au
External contact fuse protection in accordance with EN 60947-5-1	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	24 VAC/DC: 4 A, characteristic B/C
Max. overall cable resistance R _{lmax} input circuits, reset circuits	
Single-channel at U _B DC	
Single-channel at U _B AC	150 Ohm / 777307, 787307: 100 Ohm
Dual-channel with detect. of shorts across contacts at U _B DC	150 Ohm / 777307, 787307: 100 Ohm
Dual-channel with detect. of shorts across contacts at U _B AC	15 Ohm / 777307, 787307: 100 Ohm 30 Ohm / 777307, 787307: 100 Ohm

Up to Category 4, EN 954-1 PNOZ X2P

Times	
Switch-on delay	
with automatic reset typ.	60 ms / 777307, 787307: 120 ms
with automatic reset max.	90 ms / 777307, 787307: 150 ms
with manual reset typ.	38 ms
with manual reset max.	90 ms / 777307, 787307: 150 ms
with monitored reset typ.	38 ms
with monitored reset max.	50 ms
Delay-on de-energisation	
with dual-channel E-STOP typ.	17 ms / 777307, 787307: 12 ms
with dual-channel E-STOP max.	30 ms
with power failure or single-channel E-STOP typ.	70 ms / 777307, 787307: $U_B = 48\text{ V}$: 40 ms, $U_B = 240\text{ V}$: 320 ms
with power failure or single-channel E-STOP max.	110 ms / 777307, 787307: $U_B = 48\text{ V}$: 70 ms, $U_B = 240\text{ V}$: 500 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	150 ms / 777307, 787307: 550 ms
Waiting period with a monitored reset	180 ms
Simultaneity	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency:	10 – 55 Hz
Amplitude:	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals:	
1 core flexible	0.20 - 2.5 mm ²
2 core with the same cross section, flexible with crimp connectors, no plastic sleeve	0.20 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.5 Nm
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors:	0.20 – 1.50 mm ²
Cage clamp terminals:	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D) with screw terminals	94 x 22.5 x 121 mm
Dimensions (H x W x D) with cage clamp terminals	101 x 22.5 x 121 mm
Weight	200 g

The standards current on **11/01** apply.

Up to Category 4, EN 954-1 PNOZ X2P

Order reference

Type	Features		Terminals	Order no.
PNOZ X2P C	24 VAC	24 VDC	Cage clamp terminals	787 303
PNOZ X2P	24 VAC	24 VDC	Screw terminals	777 303
PNOZ X2P C	48 - 240 VAC	48 - 240 VDC	Cage clamp terminals	787 307
PNOZ X2P	48 - 240 VAC	48 - 240 VDC	Screw terminals	777 307

Up to Category 4, EN 954-1

PNOZ X2.1VP



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ X2.1VP
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), delay-on de-energisation
- } 1 semiconductor output
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Semiconductor output
- } Semiconductor output signals:
 - Switch status channel 1/2
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Safety features

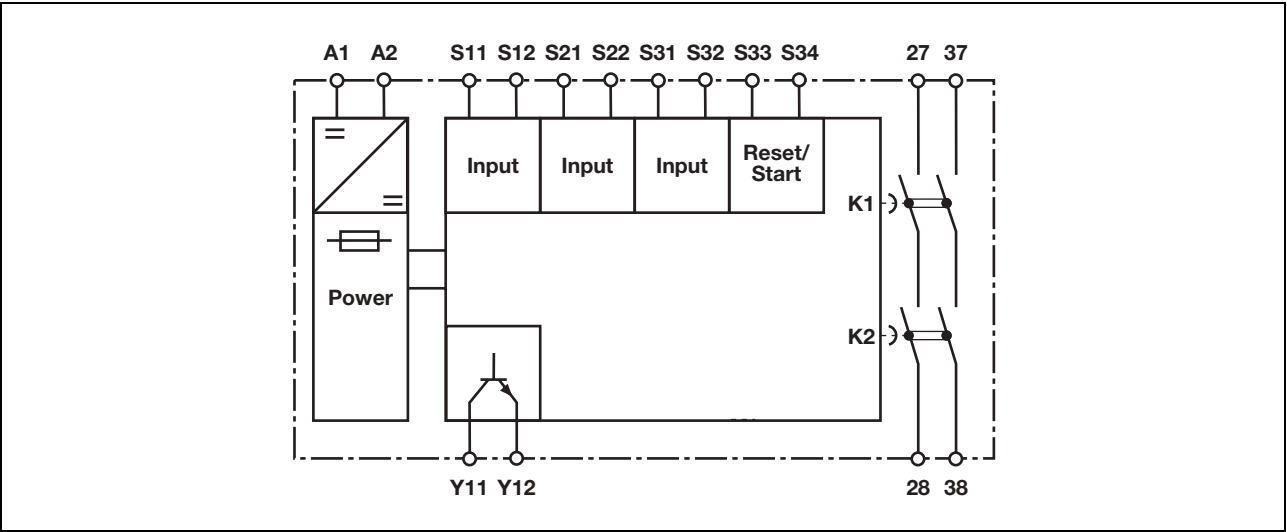
- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
 - } The unit has an electronic fuse.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

Block diagram

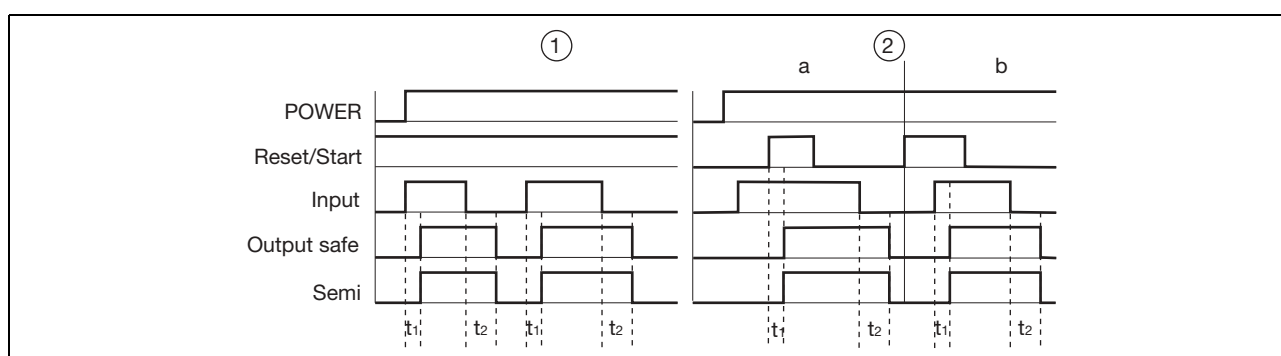


Up to Category 4, EN 954-1 PNOZ X2.1VP

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits and shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts, delayed 27-28, 37-38
- } Semi: Semiconductor output
- } i : Automatic reset
- } c : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 27-28, 37-38 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

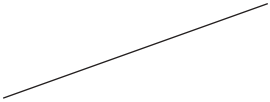
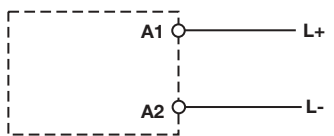
R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

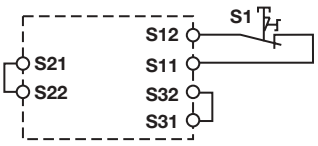
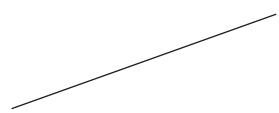
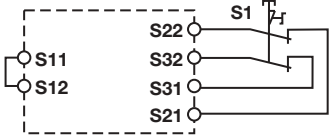
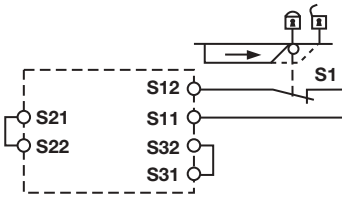
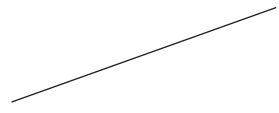
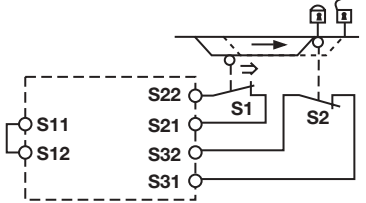
Up to Category 4, EN 954-1 PNOZ X2.1VP

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ X2.1VP

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		

} Feedback loop

Feedback loop	Automatic reset	Manual reset
Contacts from external contactors		

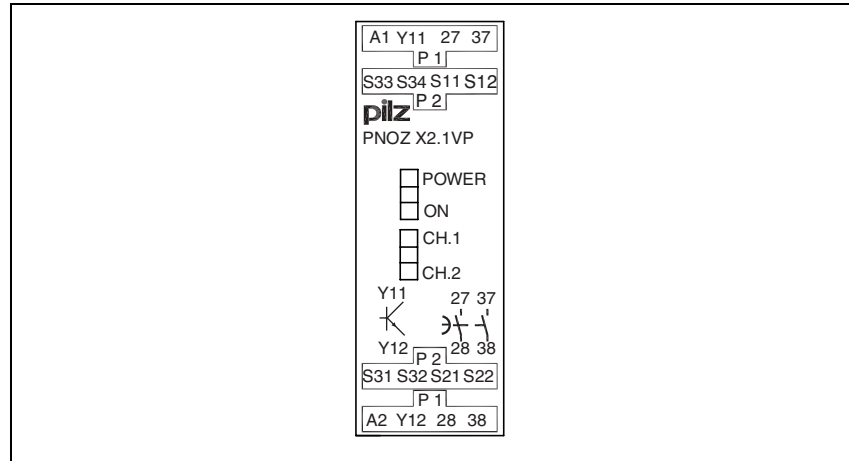
} Semiconductor output

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X2.1VP

Terminal configuration

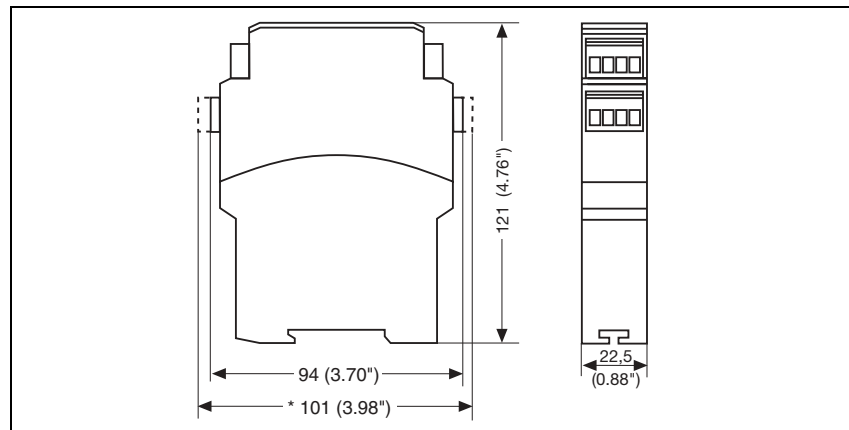


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

*with cage clamp terminals

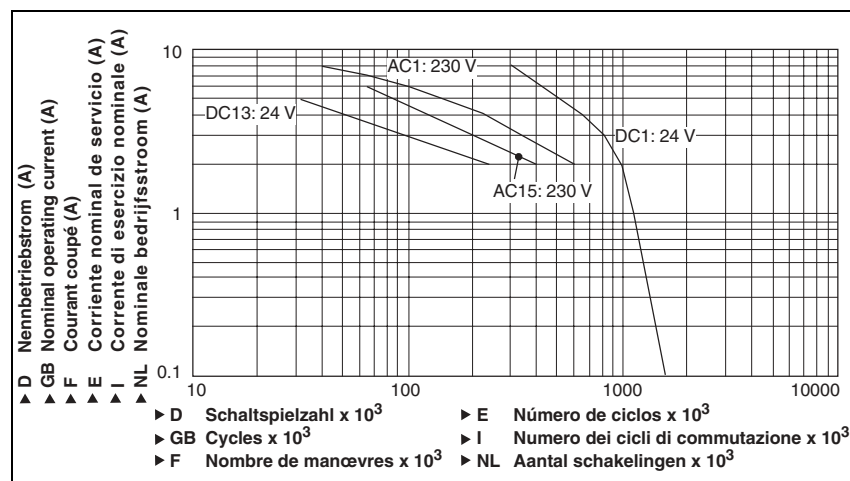


Up to Category 4, EN 954-1 PNOZ X2.1VP

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U_B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B DC	1.5 W
Residual ripple DC	20 %
Voltage and current at input circuit DC: 24.0 V	25.0 mA
reset circuit DC: 24.0 V	50.0 mA
feedback loop DC: 24.0 V	50.0 mA
Output contacts in accordance with EN 954-1 Category 3	Safety contacts (N/O), delayed: 2 Delay time <30 s
Utilisation category in accordance with EN 60947-4-1	
Safety contacts, delayed: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 1500 VA
Safety contacts, delayed: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 150 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts, delayed: AC15 at 230 V	I_{max} : 5.0 A
Safety contacts, delayed: DC13 at 24 V (6 cycles/min)	I_{max} : 4.0 A
Contact material	AgSnO2 + 0.2 µm Au
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts, delayed:	6 A
Blow-out fuse, slow	
Safety contacts, delayed:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts, delayed:	4 A
Semiconductor outputs (short circuit proof)	24.0 V DC, 100 mA
External supply voltage	24.0 V DC
Voltage tolerance	-20 %/+20 %
Max. overall cable resistance R_{lmax}	
input circuits, reset circuits	
single-channel at U_B DC	40 Ohm
dual-channel with detect. of shorts across contacts at U_B DC	20 Ohm

Up to Category 4, EN 954-1 PNOZ X2.1VP

Times	
Switch-on delay	
with automatic reset typ.	90 ms
with automatic reset max.	170 ms
with automatic reset after power on typ.	100 ms
with automatic reset after power on max.	180 ms
with manual reset typ.	35 ms
with manual reset max.	170 ms
Delay-on de-energisation	
Recovery time at max. switching frequency 1/s after E-STOP	1550 ms
after power failure	1550 ms
Delay time t_V : fixed	0.75 s
Time accuracy	-30 %/+100 %
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	10 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG Order no.: 777600
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG Order no.: 777600
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 777600
Torque setting with screw terminals	0.50 Nm Order no.: 777600
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 787600
Cage clamp terminals: terminal points per connection	2 Order no.: 787600
Stripping length	8 mm Order no.: 787600
Dimensions	
Height	101.0 mm Order no.: 787600 94.0 mm Order no.: 777600
Width	22.5 mm
Depth	121.0 mm
Weight	195 g Order no.: 787600 200 g Order no.: 777600

The standards current on 09/02 apply.

Up to Category 4, EN 954-1 PNOZ X2.1VP

Order reference

Type	Features	Terminals	Order no.
PNOZ X2.1VP C	24 VDC	Cage clamp terminals	787 600
PNOZ X2.1VP	24 VDC	Screw terminals	777 600

Up to Category 4, EN 954-1
PNOZ X2.3P



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - } Plug-in connection terminals (either cage clamp terminal or screw terminal)
 - } See order reference for unit types
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
 - } The unit has an electronic fuse.

Approvals

	PNOZ X2.3P
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	É
	É

Unit description

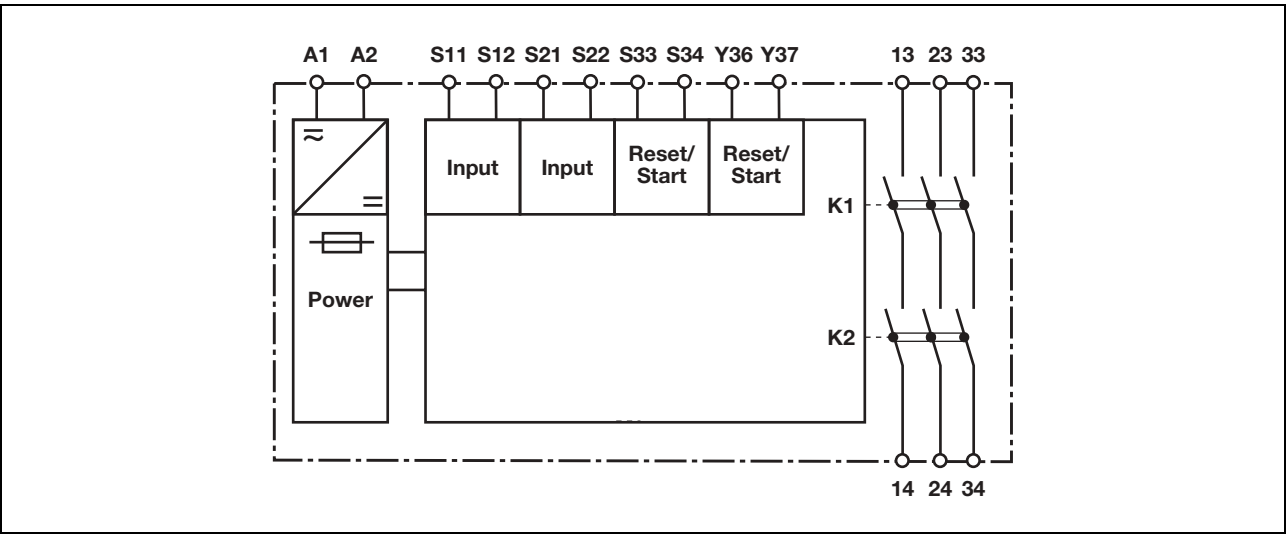
The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

Safety features

The relay conforms to the following safety criteria:

Block diagram

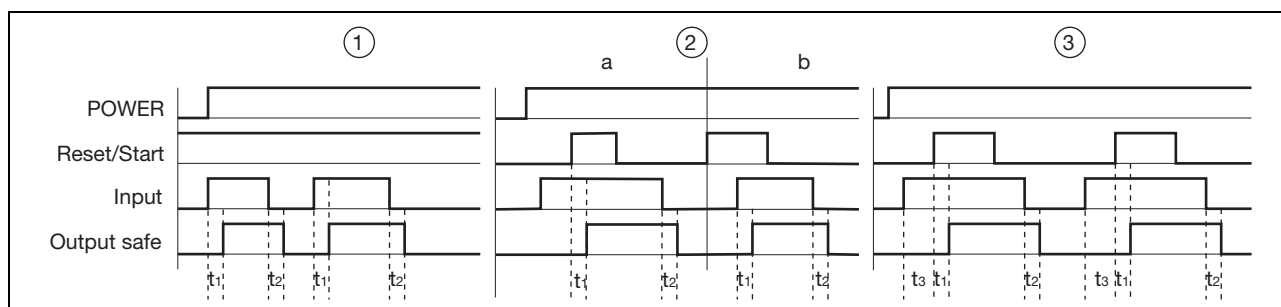


Up to Category 4, EN 954-1 PNOZ X2.3P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
- short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
- shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34
- } Input: Input circuits S11-S12, S21-S22
- } Output safe: Safety outputs 13-14, 23-24, 33-34
- } i : Automatic reset
- } c : Manual reset
- } E : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs $I_{\max}$ in the input circuit:

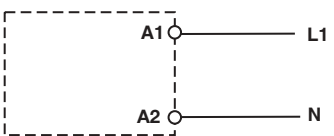
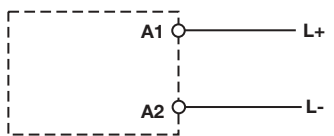
$$I_{\max} = \frac{R_{I\max}}{R_l / \text{km}}$$

$R_{I\max}$ = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

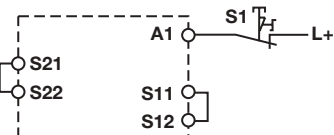
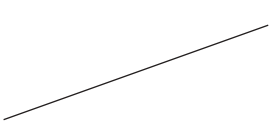
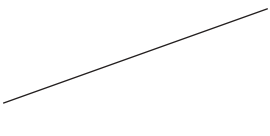
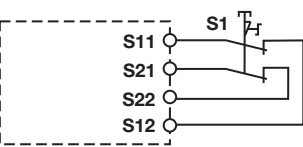
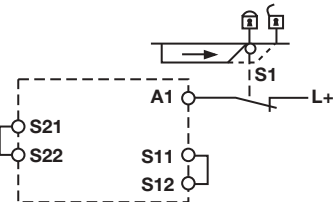
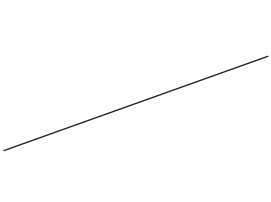
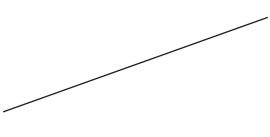
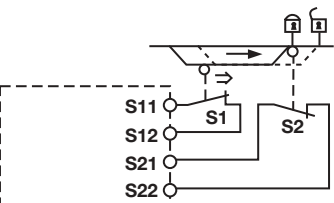
Up to Category 4, EN 954-1 PNOZ X2.3P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ X2.3P

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

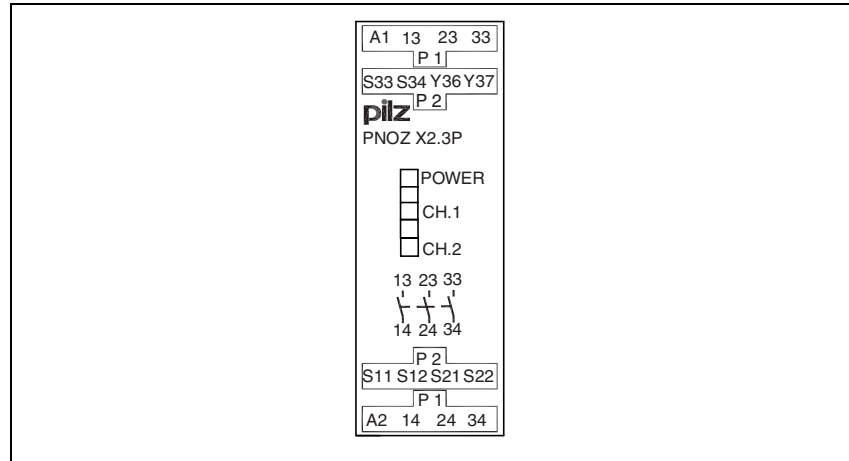
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X2.3P

Terminal configuration

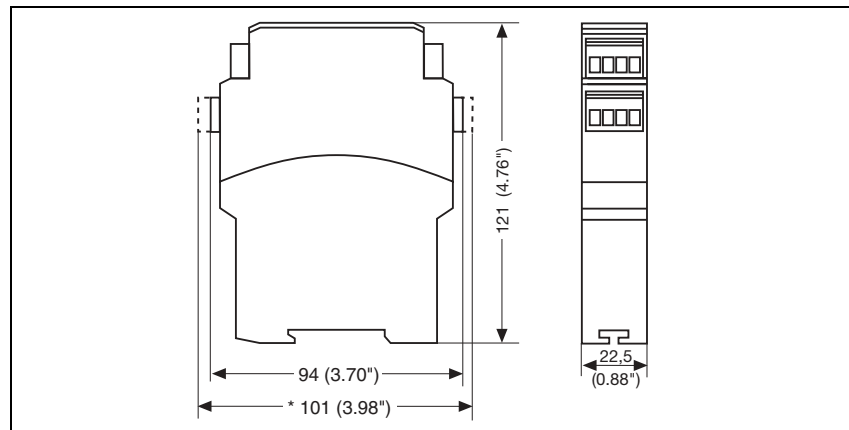


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

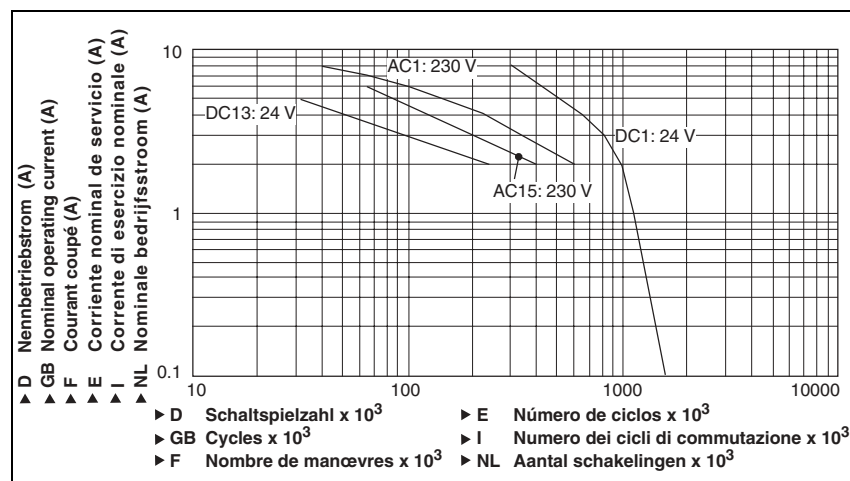


Up to Category 4, EN 954-1 PNOZ X2.3P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U_B AC	24 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B AC	4.0 VA
Power consumption at U_B DC	2.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	25 mA
reset circuit DC: 24.0 V	25 mA
feedback loop DC: 24.0 V	25 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 3
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 1500 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 150 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : 5.0 A
DC13: 24 V	I_{max} : 4.0 A
(DC13: 6 cycles/min)	
Contact material	AgSnO₂ + 0.2 σm Au
External contact fuse protection in accordance with EN 60947-5-1	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	24 VAC/DC: 4 A , characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single channel at U_B DC	30 Ohm
Single channel at U_B AC	30 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	20 Ohm
Dual-channel with detect. of shorts across contacts at U_B AC	40 Ohm

Up to Category 4, EN 954-1 PNOZ X2.3P

Times	
Switch-on delay	
with automatic reset typ.	50 ms
with automatic reset max.	90 ms
with manual reset typ.	40 ms
with manual reset max.	90 ms
with monitored reset typ.	40 ms
with monitored reset max.	70 ms
Delay-on de-energisation	
with E-STOP typ.	12 ms
with E-STOP max.	30 ms
with power failure typ.	60 ms
with power failure max.	100 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	150 ms
Waiting period with a monitored reset	210 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1 / EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors on screw terminals	
1 core flexible	0.25 – 2.50 mm ²
2 core with the same cross section, flexible	
with crimp connectors, no plastic sleeve	0.25 – 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.5 Nm
Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.20 – 1.50 mm ²
Cage clamp terminals:	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D) with screw terminals	94 mm x 22.5 mm x 121 mm
Dimensions (H x W x D) with cage clamp terminals	101 mm x 22.5 mm x 121 mm
Weight	205 g

The standards current on 05/03 apply.

Max. continuous current			
Number of contacts	1	2	3
I _{max} (A) at U _B DC	6.00	6.00	5.00
I _{max} (A) at U _B AC	6.00	6.00	5.00

Up to Category 4, EN 954-1 PNOZ X2.3P

Order reference

Type	Features	Terminals	Order no.
PNOZ X2.3P C	24 VAC/DC	Cage clamp terminals	787 304
PNOZ X2.3P	24 VAC/DC	Screw terminals	777 304

Up to Category 4, EN 954-1 PNOZ X2.7P



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Approvals

PNOZ X2.7P	
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	É

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Safety features

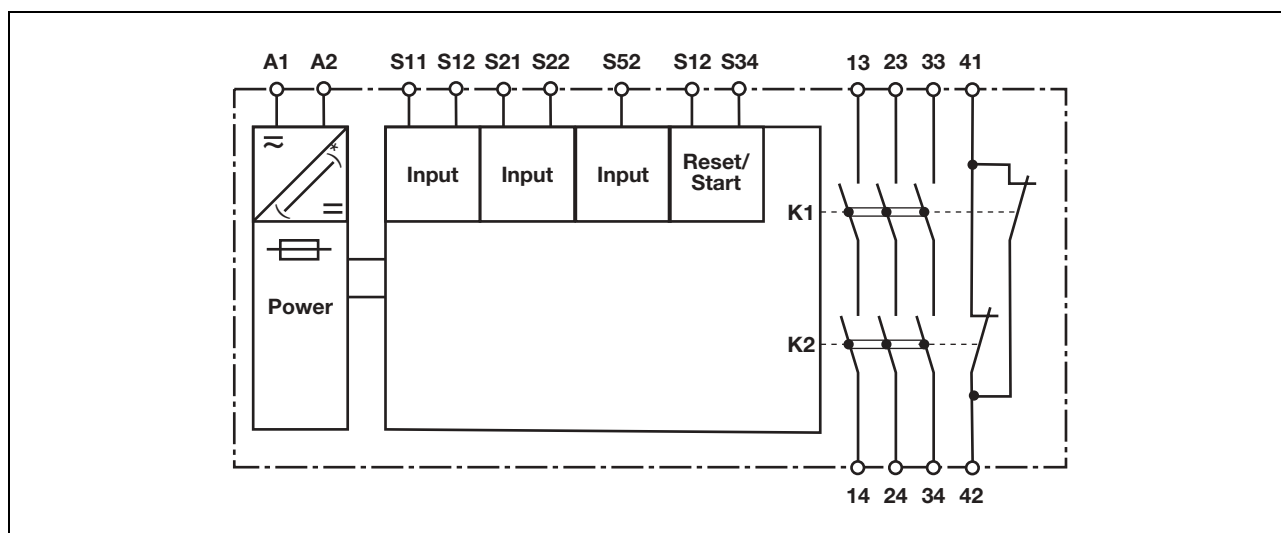
- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates
- } Light barriers

Block diagram



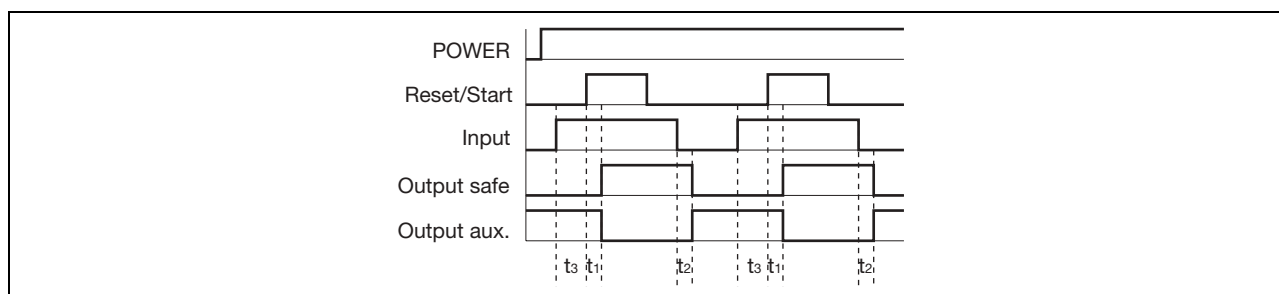
*only with U_B 24 – 240 VAC/DC

Up to Category 4, EN 954-1 PNOZ X2.7P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
- short circuits in the input circuit and, with a monitored reset, in the reset circuit too.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
- shorts between contacts in the input circuit.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S12-S34
- } Input: Input circuits S11-S12, S21-S22, S52
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs l_{max} in the input circuit:

$$l_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ X2.7P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Light barrier with detection of shorts across contacts via ESPE		

Up to Category 4, EN 954-1
PNOZ X2.7P

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Monitored reset		

} Feedback loop

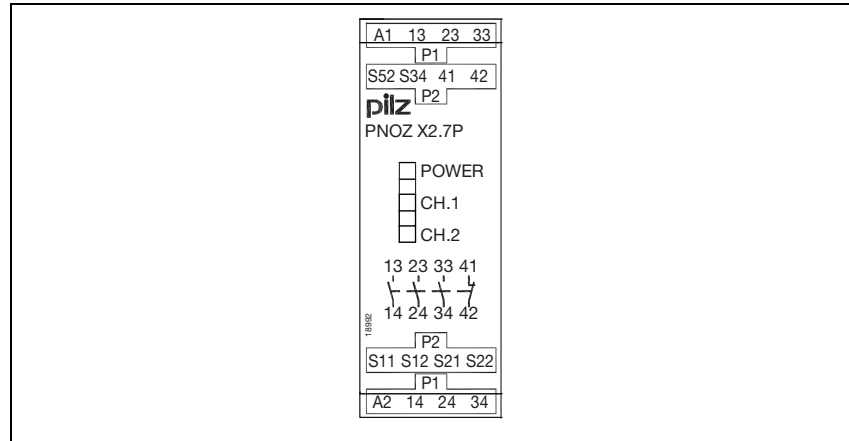
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X2.7P

Terminal configuration

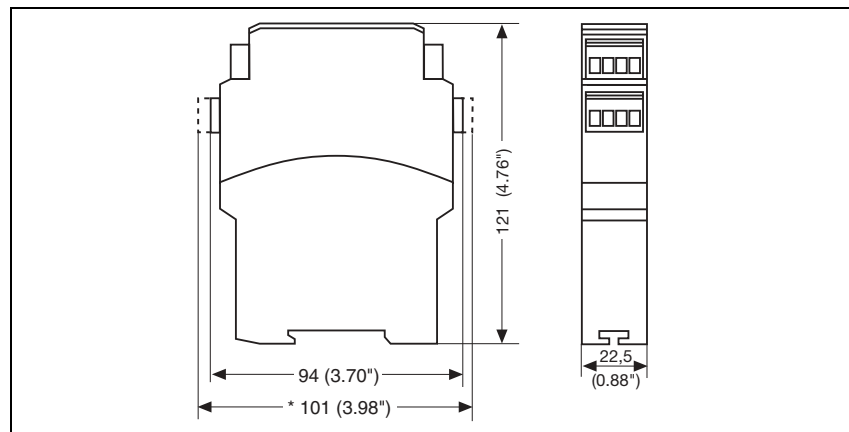


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals



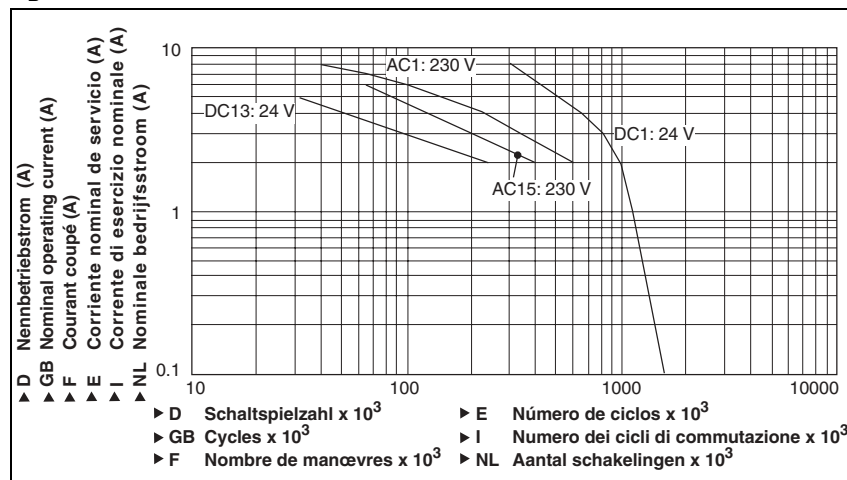
Up to Category 4, EN 954-1 PNOZ X2.7P

Notice

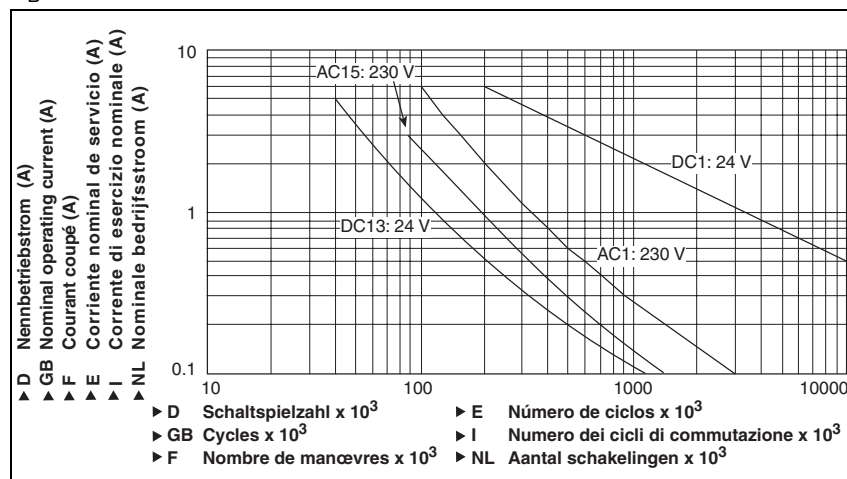
This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph

U_B 24 VAC/DC



U_B 24 - 240 VAC/DC



Technical details

Electrical data

Supply voltage	
Supply voltage U_B AC:	24 V, 24 - 240 V
Supply voltage U_B DC:	24 V, 24 - 240 V
Voltage tolerance	-15% - 10%
Power consumption at U_B AC	Order no. 777305, 787305: 3.5 VA Order no. 777306, 787306: 4.5 VA
Power consumption at U_B DC	2.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at Input circuit DC: 24.0 V	Order no. 777305, 787305: 30 mA Order no. 777306, 787306: 25 mA
Reset circuit DC: 24.0 V	50 mA
Feedback loop DC: 24.0 V	50 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 3
Output contacts in accordance with EN 954-1 , Category 3	Auxiliary contacts (N/C): 1

Up to Category 4, EN 954-1 PNOZ X2.7P

Electrical data	
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	I_{min} : 0.01 A , I_{min} : 6.0 A P_{max} : 1500 VA
DC1: 24 V	I_{min} : 0.01 A , I_{min} : 6.0 A P_{max} : 150 W
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V	I_{max} : Order no. 777305, 787305: 5.0 A Order no. 777306, 787306: 3.0 A
DC13: 24 V (DC13: 6 cycles/min)	I_{max} : 4.0 A
Contact material	Order no. 777305, 787305: AgSnO₂ + 0.2 σm Au Order no. 777306, 787306: AgCuNi+ 0.2 σm Au
External contact fuse protection in accordance with EN 60947-5-1 Blow-out fuse, quick Blow-out fuse, slow Circuit breaker	6 A 4 A 24 VAC/DC, 4 A , characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits single-channel at U_B DC	Order no. 777305, 787305: 50 Ohm Order no. 777306, 787306: 45 Ohm
single-channel at U_B AC	Order no. 777305, 787305: 200 Ohm Order no. 777306, 787306: 45 Ohm
dual-channel without detect. of shorts across contacts at U_B DC	Order no. 777305, 787305: 100 Ohm Order no. 777306, 787306: 80 Ohm
dual-channel without detect. of shorts across contacts U_B AC	Order no. 777305, 787305: 320 Ohm Order no. 777306, 787306: 80 Ohm
dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm
dual-channel with detect. of shorts across contacts U_B AC	Order no. 777305, 787305: 25 Ohm Order no. 777306, 787306: 15 Ohm
Times	
Switch-on delay with monitored reset typ. with monitored reset max.	30 ms Order no. 777305, 787305: 50 ms Order no. 777306, 787306: 40 ms
Delay-on de-energisation with E-STOP typ.	Order no. 777305, 787305: 12 ms Order no. 777306, 787306: 10 ms
with E-STOP max.	Order no. 777305, 787305: 30 ms Order no. 777306, 787306: 20 ms
with power failure typ.	Order no. 777305, 787305: 50 ms
with power failure max.	Order no. 777305, 787305: 80 ms
With power failure typ. $U_B = 24 V$	Order no. 777306, 787306: 180 ms
with power failure max. $U_B = 24 V$	Order no. 777306, 787306: 230 ms
with power failure typ. $U_B = 240 V$	Order no. 777306, 787306: 1100 ms
with power failure max. $U_B = 240 V$	Order no. 777306, 787306: 1500 ms
Recovery time at max. switching frequency 1/s after E-STOP after power failure	50 ms Order no. 777305, 787305: 150 ms Order no. 777306, 787306: 250 ms
Waiting period with a monitored reset	300 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	Order no. 777305, 787305: 10 ms Order no. 777306, 787306: 20 ms
Environmental data	
EMC	Order no. 777305, 787305: EN 60947-5-1, EN 61000-6-2 Order no. 777306, 787306: EN 60947-5-1, EN 61000-6-2, EN 61000-6-4
Vibration in accordance with EN 60068-2-6 Frequency:	10 - 55 Hz
Amplitude:	0.35 mm
Climatic suitability	EN 60068-2-78

Up to Category 4, EN 954-1 PNOZ X2.7P

2.2

Environmental data	
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals:	
1 core flexible	0.25 - 2.5 mm ²
2 core, same cross section, flexible	
with crimp connectors, without insulating sleeve	0.25 - 1 mm ²
without crimp connectors or with TWIN crimp connectors	0.2 - 1.5 mm ²
Torque setting with screw terminals	0.5 Nm
Max. cross section of external conductors with cage clamp terminals:	
Flexible without crimp connectors	0.2 - 1.5 mm ²
Cage clamp terminals:	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	94 x 22.5 x 121 mm
With cage clamp terminals	101 x 22.5 x 121 mm
Weight	Order no. 777305, 787305: 190 g Order no. 777306, 787306: 210 g

The standards current on 11/03 apply.

Max. continuous current		
Number of contacts	I _{max} (A) at U _B DC	I _{max} (A) at U _B AC
1	6.00	6.00
2	6.00	6.00
3	Order no.: 777305, 787305: 5.00 Order no.: 777306, 787306: 4.50	Order no.: 777305, 787305: 5.00 Order no.: 777306, 787306: 4.500

Order reference				
Type	Features		Terminals	Order no.
PNOZ X2.7P C	24 VAC	24 VDC	Cage clamp terminals	787 305
PNOZ X2.7P	24 VAC	24 VDC	Screw terminals	777 305
PNOZ X2.7P C	24 - 240 VAC	24 - 240 VDC	Cage clamp terminals	787 306
PNOZ X2.7P	24 - 240 VAC	24 - 240 VDC	Screw terminals	777 306

Up to Category 4, EN 954-1
PNOZ X2.8P



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } See order reference for unit types

Safety features

- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Approvals

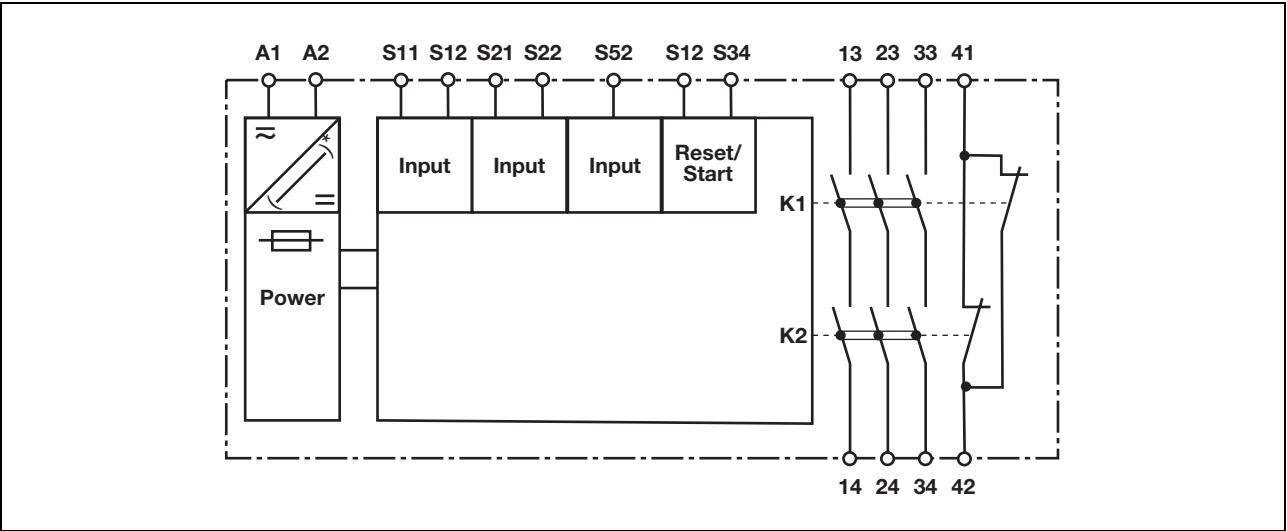
	PNOZ X2.8P
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Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates
- } Light barriers

Block diagram



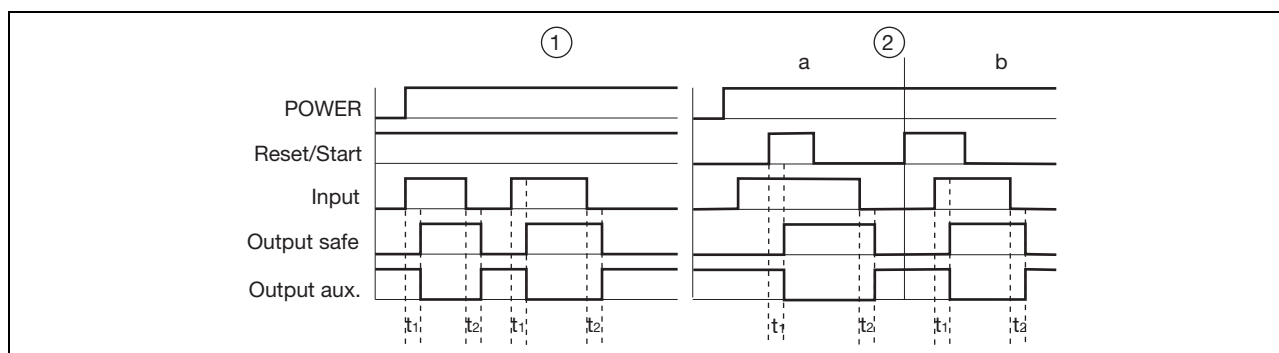
*only with UB 24 - 240 VAC/DC

Up to Category 4, EN 954-1 PNOZ X2.8P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
- short circuits in the input circuit and, with a monitored reset, in the reset circuit too.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits and shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S12-S34
- } Input: Input circuits S11-S12, S21-S22, S52
- } Output safe: Safety contacts 13-14, 23-24, 33-34,
- } Output aux: Auxiliary contacts 41-42
- } i : Automatic reset
- } ☉ : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34, are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{I_{max}}}{R_l / km}$$

$R_{I_{max}}$ = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.

- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ X2.8P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Light barrier with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ X2.8P

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		

} Feedback loop

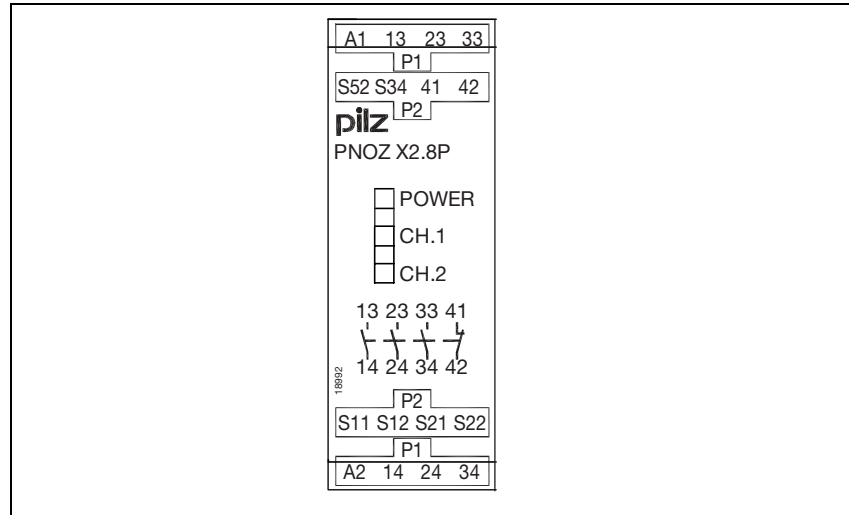
Feedback loop	Automatic reset	Manual reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X2.8P

Terminal configuration

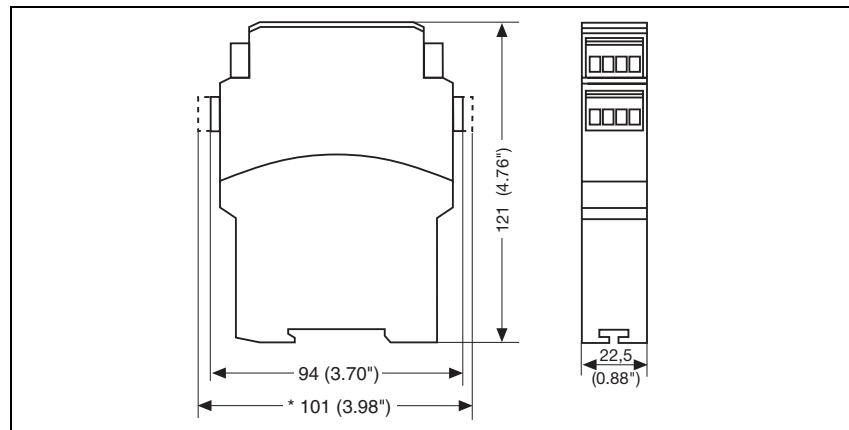


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals



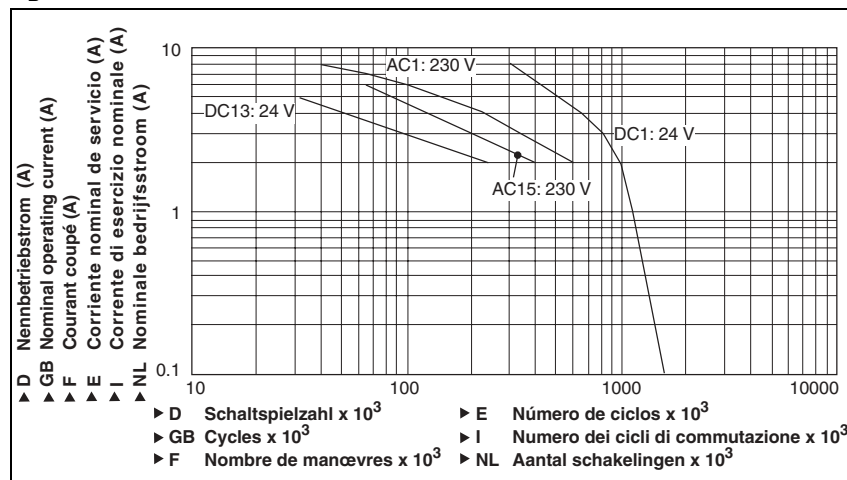
Up to Category 4, EN 954-1 PNOZ X2.8P

Notice

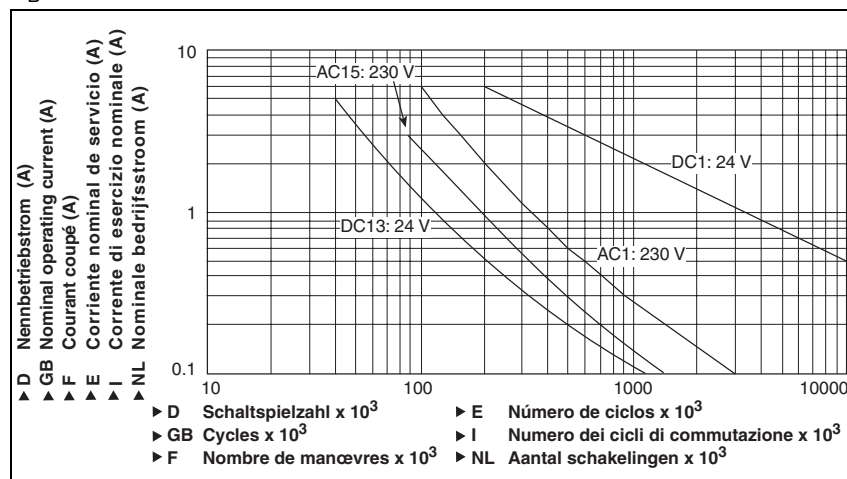
This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph

U_B 24 VAC/DC



U_B 24 - 240 VAC/DC



Technical details

Electrical data

Supply voltage	24 - 240 V
Supply voltage U_{BAC} :	24 - 240 V
Supply voltage U_{BDC} :	24 - 240 V
Voltage tolerance	-15% - 10%
Power consumption at U_B AC	Order no. 777301, 787301: 3.5 VA Order no. 777302, 787302: 4.5 VA
Power consumption at U_B DC	2.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	Order no. 777301, 787301: 30 mA Order no. 777302, 787302: 25 mA
reset circuit DC: 24.0 V	50 mA
feedback loop DC: 24.0 V	50 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 3
Output contacts in accordance with EN 954-1 , Category 3	Auxiliary contacts (N/C): 1

Up to Category 4, EN 954-1 PNOZ X2.8P

Electrical data	
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A , I_{min} : 6.0 A P_{max} : 1500 VA
DC1: 24 V	I_{min} : 0.01 A , I_{min} : 6.0 A P_{max} : 150 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : Order no. 777301, 787301: 5.0 A Order no. 777302, 787302: 3.0 A
DC13: 24 V (DC13: 6 cycles/min)	I_{max} : 4.0 A
Contact material	Order no. 777301, 787301: AgSnO₂ + 0.2 σAu Order no. 777302, 787302: AgCuNi + 0.2 σAu
External contact fuse protection in accordance with EN 60947-5-1	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	24 VAC/DC, 4 A , characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits single-channel at U_B DC	Order no. 777301, 787301: 50 Ohm Order no. 777302, 787302: 45 Ohm
single-channel at U_B AC	Order no. 777301, 787301: 200 Ohm Order no. 777302, 787302: 45 Ohm
dual-channel without detect. of shorts across contacts at U_B DC	Order no. 777301, 787301: 100 Ohm Order no. 777302, 787302: 80 Ohm
dual-channel without detect. of shorts across contacts U_B AC	Order no. 777301, 787301: 320 Ohm Order no. 777302, 787302: 80 Ohm
dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm
dual-channel with detect. of shorts across contacts U_B AC	Order no. 777301, 787301: 25 Ohm Order no. 777302, 787302: 15 Ohm
Times	
Switch-on delay with automatic reset typ.	Order no. 777301, 787301: 200 ms Order no. 777302, 787302: 340 ms
with automatic reset max.	Order no. 777301, 787301: 350 ms Order no. 777302, 787302: 400 ms
with automatic reset after power on typ.	Order no. 777301, 787301: 210 ms Order no. 777302, 787302: 600 ms
with automatic reset after power on max.	Order no. 777301, 787301: 400 ms Order no. 777302, 787302: 800 ms
with manual reset typ.	Order no. 777301, 787301: 100 ms Order no. 777302, 787302: 180 ms
with manual reset max.	Order no. 777301, 787301: 350 ms Order no. 777302, 787302: 400 ms
Delay-on de-energisation with E-STOP typ.	Order no. 777301, 787301: 12 ms Order no. 777302, 787302: 10 ms
with E-STOP max.	Order no. 777301, 787301: 30 ms Order no. 777302, 787302: 20 ms
with power failure typ.	Order no. 777301, 787301: 50 ms
with power failure max.	Order no. 777301, 787301: 80 ms
with power failure typ. $U_B = 24$ VAC/DC	Order no. 777302, 787302: 180 ms
with power failure max. $U_B = 24$ VAC/DC	Order no. 777302, 787302: 230 ms
with power failure typ. $U_B = 240$ VAC/DC	Order no. 777302, 787302: 1100 ms
with power failure max. $U_B = 240$ VAC/DC	Order no. 777302, 787302: 1500 ms
Recovery time at max. switching frequency 1/s after E-STOP	50 ms
after power failure	Order no. 777301, 787301: 150 ms Order no. 777302, 787302: 250 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	Order no. 777301, 787301: 10 ms Order no. 777302, 787302: 20 ms

Up to Category 4, EN 954-1 PNOZ X2.8P

2.2

Environmental data

EMC	Order no. 777301, 787301: EN 60947-5-1, EN 61000-6-2 Order no. 777302, 787302: EN 60947-5-1, EN 61000-6-2, EN 61000-6-4
Vibration in accordance with EN 60068-2-6	
Frequency:	10 - 55 Hz
Amplitude:	0.35 mm
Climatic suitability	IEC 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20

Mechanical data

Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors on screw terminals	
1 core flexible	0.25 - 2.5 mm²
2 core with the same cross section, flexible	
with crimp connectors, no plastic sleeve	0.25 - 1 mm²
without crimp connectors or with TWIN crimp connectors	0.2 - 1.5 mm²
Torque setting with screw terminals	0.5 Nm
Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.2 - 1.5 mm²
Cage clamp terminals:	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	94 x 22.5 x 121 mm
With cage clamp terminals	101 x 22.5 x 121 mm
Weight	Order no. 777301, 787301: 190 g Order no. 777302, 787302: 210 g

The standards current on **11/03** apply.

Max. continuous current

Number of contacts	I_{max} (A) at U_B DC	I_{max} (A) at U_B AC
1	6.00	6.00
2	6.00	6.00
3	Order no.: 777301, 787301: 5.00 Order no.: 777302, 787302: 4.50	Order no.: 777301, 787301: 5.00 Order no.: 777302, 787302: 4.50

Order reference

Type	Features		Terminals	Order no.
PNOZ X2.8P C	24 VAC	24 VDC	Cage clamp terminals	787 301
PNOZ X2.8P	24 VAC	24 VDC	Screw terminals	777 301
PNOZ X2.8P C	24 - 240 VAC	24 - 240 VDC	Cage clamp terminals	787 302
PNOZ X2.8P	24 - 240 VAC	24 - 240 VDC	Screw terminals	777 302

Up to Category 3, EN 954-1
PNOZ X2.9P



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Approvals

	PNOZ X2.9P
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Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- } LED indicator for:
 - Supply voltage
 - Switch status channel 1/2
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Safety features

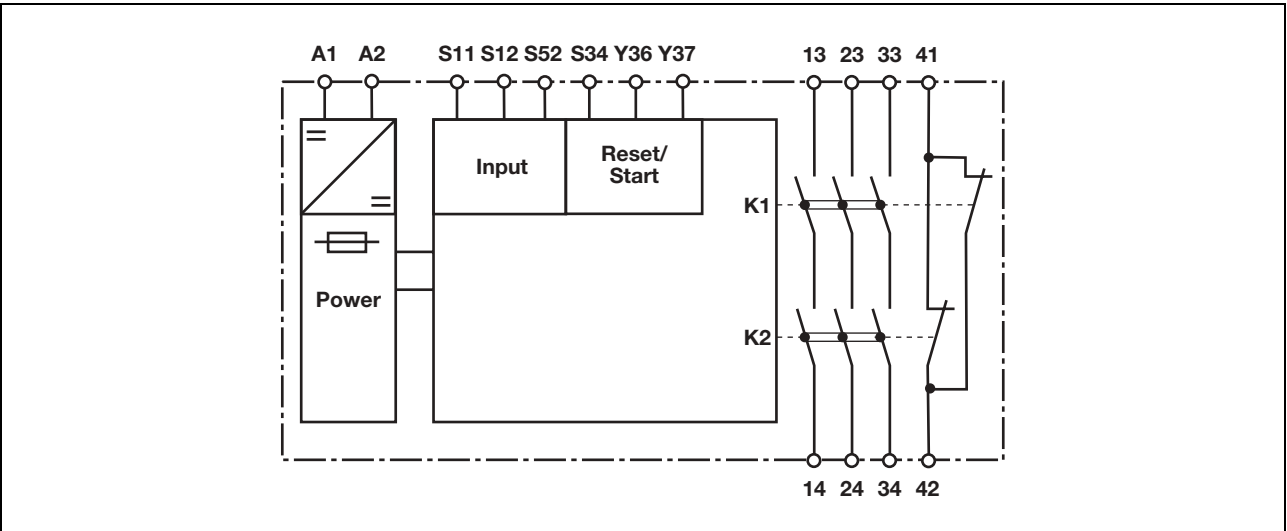
- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
 - } No galvanic isolation between supply voltage and input circuit

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates
- } Light barriers

Block diagram

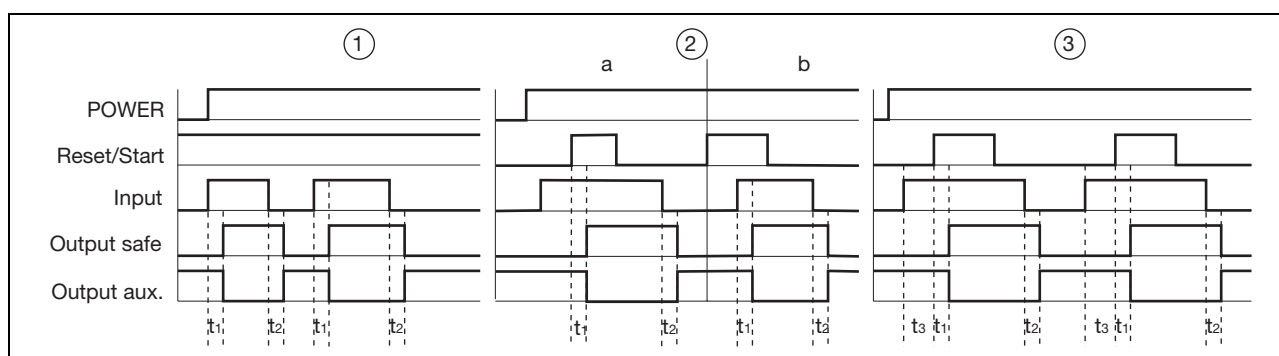


Up to Category 3, EN 954-1 PNOZ X2.9P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S12-S34, Y36-Y37
- } Input: Input circuits S11, S12, S52
- } Output safe: Safety outputs 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } i : Automatic reset
- } c : Manual reset
- } £ : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation
- } t₃: Waiting period

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 3, EN 954-1 PNOZ X2.9P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Light barrier with detection of shorts across contacts via ESPE		

Up to Category 3, EN 954-1
PNOZ X2.9P

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

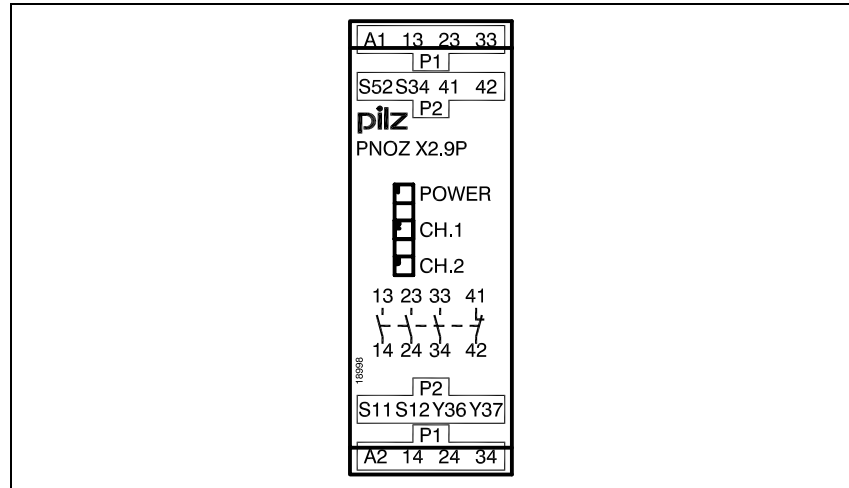
Feedback loop	Automatic reset	Manual reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 3, EN 954-1 PNOZ X2.9P

Terminal configuration

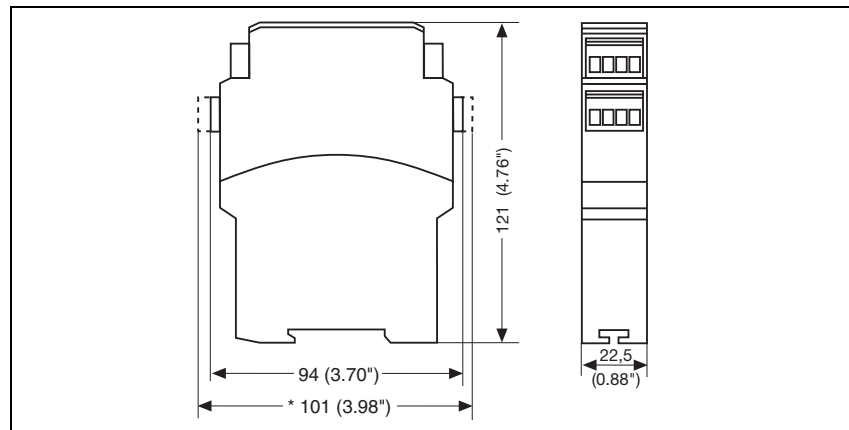


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

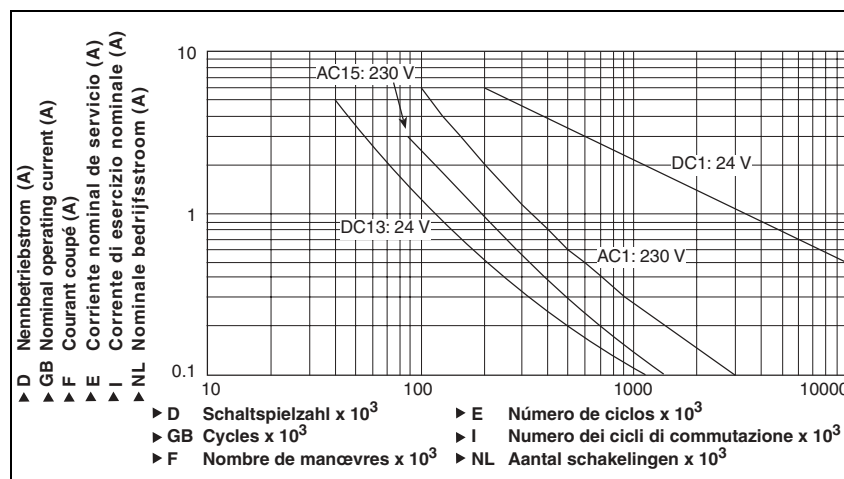


Up to Category 3, EN 954-1 PNOZ X2.9P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B DC	2.0 W
Residual ripple DC	160 %
Voltage and current at input circuit: 24.0 V DC	30.0 mA
reset circuit: 24.0 V DC	60.0 mA
Feedback loop: 24.0 V DC	60.0 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 1500 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 150 W
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V	I_{max} : 3.0 A
DC13 (6 cycles/min): 24 V	I_{max} : 4.0 A
Contact material	AgSnO₂ + 0.2 μm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A , 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B DC	50 Ohm
Dual-channel without detect. of shorts across contacts at U_B DC	100 Ohm

Up to Category 3, EN 954-1 PNOZ X2.9P

Times	
Switch-on delay	
With automatic reset typ.	200 ms
with automatic reset max.	400 ms
with automatic reset after power on typ.	200 ms
with automatic reset after power on max.	400 ms
with manual reset typ.	100 ms
with manual reset max.	400 ms
with monitored reset typ.	30 ms
with monitored reset max.	50 ms
Delay-on de-energisation	
with E-STOP typ.	10 ms
with E-STOP max.	20 ms
with power failure typ.	50 ms
with power failure max.	80 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	150 ms
Waiting period with a monitored reset	200 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.50 Nm
Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.20 - 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	121.0 mm x 22.5 mm x 94.0 mm
With cage clamp terminals	121.0 mm x 22.5 mm x 101.0 mm
Weight	180 g

The standards current on 11/03 apply.

Up to Category 3, EN 954-1 PNOZ X2.9P

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC

1	6.00 A

2	6.00 A

3	4.50 A

Order reference

Type	Features	Terminals	Order no.
PNOZ X2.9P C	24 VDC	Cage clamp terminals	787 300
PNOZ X2.9P	24 VDC	Screw terminals	777 300

Up to Category 4, EN 954-1

PNOZ X3P



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Approvals

	PNOZ X3P
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } 1 semiconductor output
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Semiconductor output signals:
 - Switch status channel 1/2
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)

Safety features

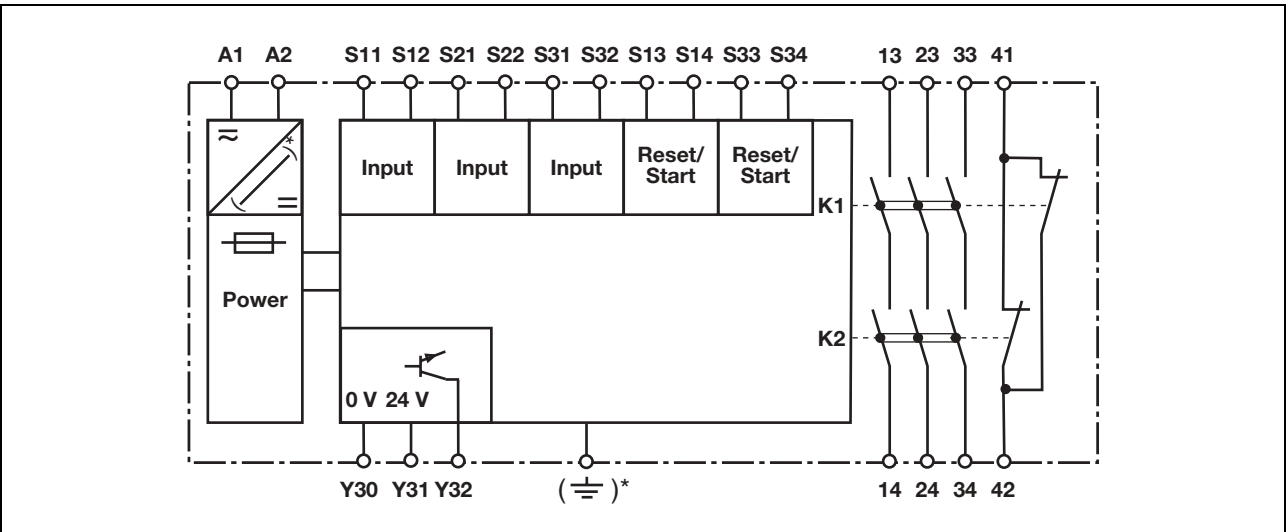
- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates
- } Light barriers

Block diagram



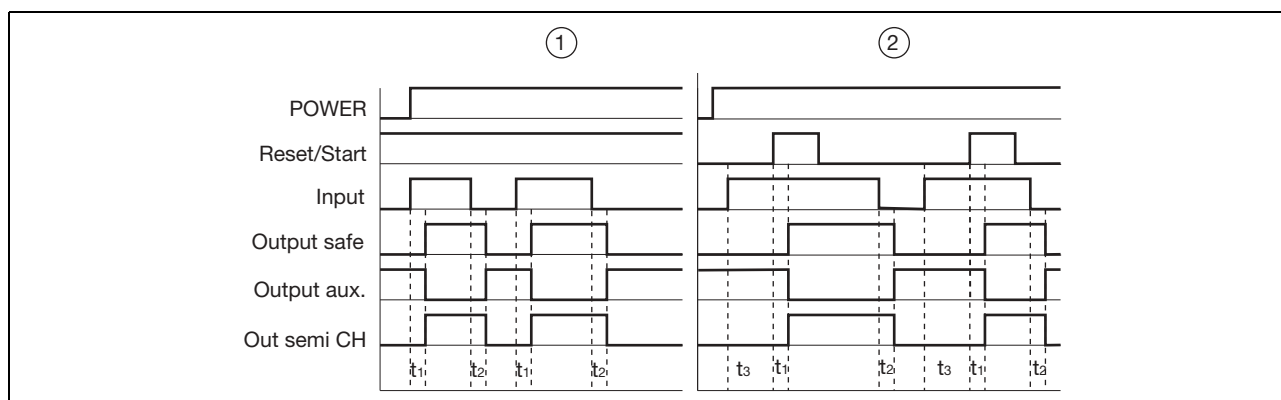
*only with U_B 24 - 240 VAC/DC

Up to Category 4, EN 954-1 PNOZ X3P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit
- and, with a monitored reset, in the reset circuit too.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S13-S14, S33-S34
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } Output aux.: Auxiliary contacts 41-42
- } Out semi CH: Semiconductor output switch status channel 1/2
- } ; : Automatic reset
- } ¢ : Monitored reset
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

Up to Category 4, EN 954-1 PNOZ X3P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Light barrier with detection of shorts across contacts via ESPE		

Up to Category 4, EN 954-1
PNOZ X3P

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Monitored reset		

} Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Semiconductor output

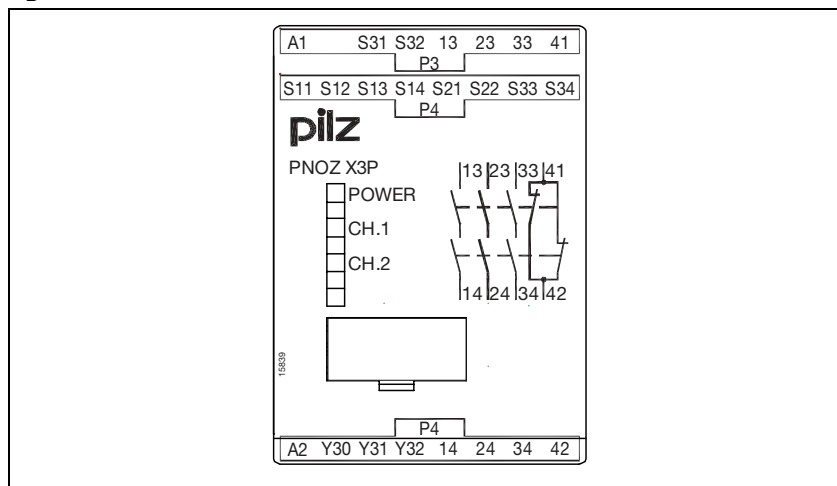
} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

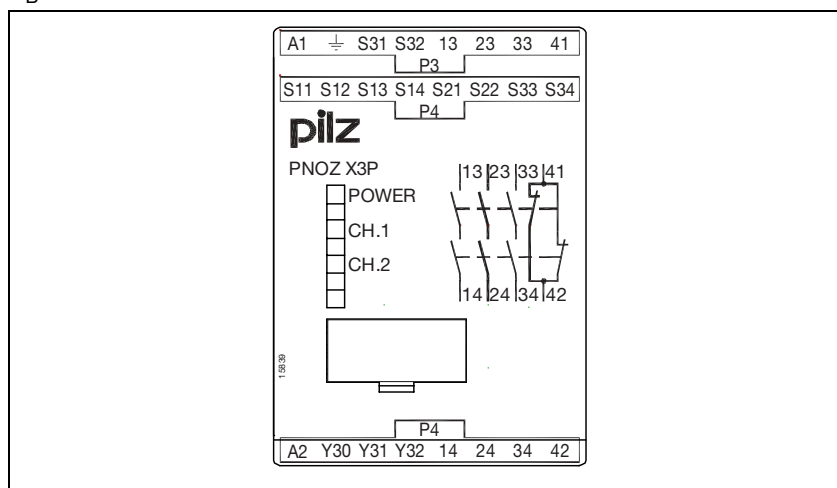
Up to Category 4, EN 954-1 PNOZ X3P

Terminal configuration

U_B 24 VAC/DC



U_B 24 -240 VAC/DC

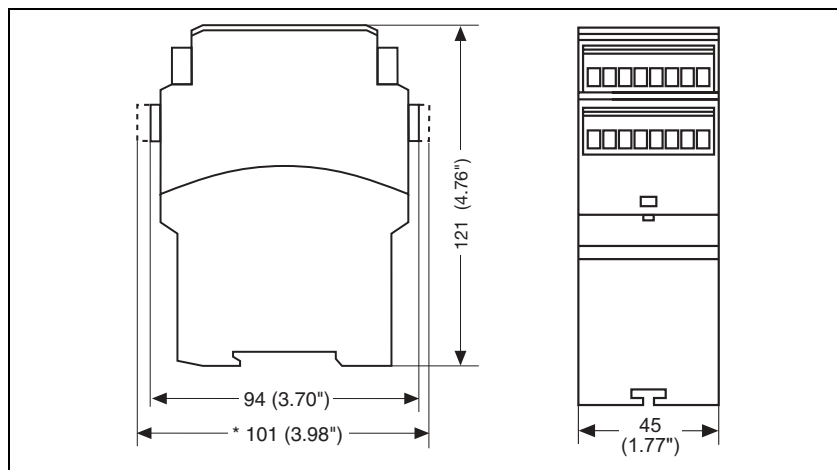


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

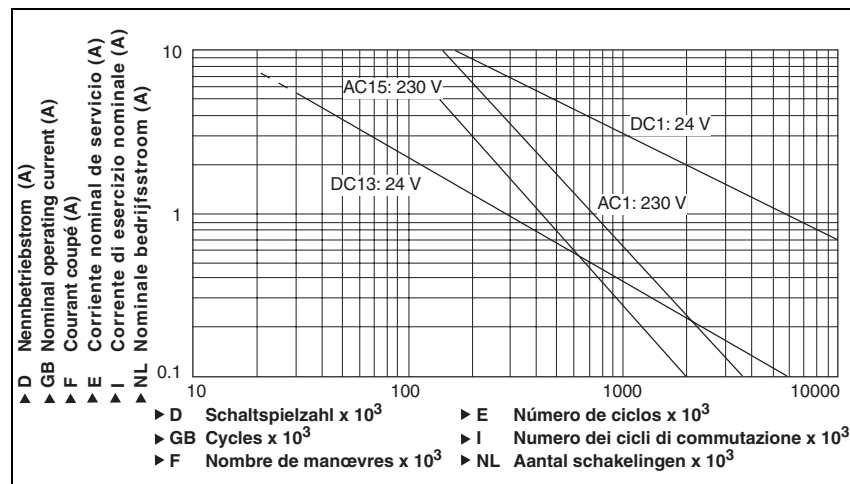


Up to Category 4, EN 954-1 PNOZ X3P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B AC	24 V, 24 - 240 V
Supply voltage U_B DC	24 V, 24 - 240 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B AC	5.0 VA
Power consumption at U_B DC	2.5 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 % Order no.: 787310, 777310
Voltage and current at input circuit: 24.0 V DC	40 mA Order no.: 787310, 777310 35 mA Order no.: 787313, 777313
reset circuit: 24.0 V DC	70.0 mA Order no.: 787310, 777310 50.0 mA Order no.: 787313, 777313
feedback loop: 24.0 V DC	20.0 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 2000 VA
DC1: 24 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V DC13 (6 cycles/min): 24 V	I_{max} : 5.0 A I_{max} : 6.0 A
Contact material	AgSnO ₂ + 0.2 μ m Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A, 24 VAC/DC, characteristic B/C
Semiconductor outputs (short circuit proof)	24 V DC, 20 mA
External supply voltage	24 VDC
Voltage tolerance	-20 % / +20 %

Up to Category 4, EN 954-1 PNOZ X3P

Max. overall cable resistance R_{lmax} input circuits,

reset circuits

Single-channel at U_B DC

200 Ohm Order no.: 787313, 777313

150 Ohm Order no.: 787310, 777310

Single-channel at U_B AC

200 Ohm Order no.: 787313, 777313

180 Ohm Order no.: 787310, 777310

Dual-channel without detect. of shorts across contacts at U_B DC

400 Ohm Order no.: 787313, 777313

300 Ohm Order no.: 787310, 777310

Dual-channel without detect. of shorts across contacts at U_B AC

400 Ohm Order no.: 787313, 777313

360 Ohm Order no.: 787310, 777310

Dual-channel with detect. of shorts across contacts at U_B DC

30 Ohm Order no.: 787313, 777313

15 Ohm Order no.: 787310, 777310

Dual-channel with detect. of shorts across contacts at U_B AC

30 Ohm

Times

Switch-on delay

with automatic reset typ.

330 ms Order no.: 787313, 777313

250 ms Order no.: 787310, 777310

with automatic reset max.

500 ms Order no.: 787310, 777310

450 ms Order no.: 787313, 777313

with automatic reset after power on typ.

750 ms Order no.: 787313, 777313

280 ms Order no.: 787310, 777310

with automatic reset after power on max.

550 ms Order no.: 787310, 777310

1,000 ms Order no.: 787313, 777313

with monitored reset typ.

35 ms

with monitored reset max.

50 ms

Delay-on de-energisation

with E-STOP typ.

25 ms Order no.: 787313, 777313

15 ms Order no.: 787310, 777310

30 ms

with E-STOP max.

with power failure typ.

50 ms Order no.: 787310, 777310

with power failure max.

70 ms Order no.: 787310, 777310

with power failure typ. $U_B = 24$ VAC/DC

150 ms Order no.: 787313, 777313

with power failure max. $U_B = 24$ VAC/DC

180 ms Order no.: 787313, 777313

with power failure typ. $U_B = 240$ VAC/DC

1,500 ms Order no.: 787313, 777313

with power failure max. $U_B = 240$ VAC/DC

2,200 ms Order no.: 787313, 777313

Recovery time at max. switching frequency 1/s

after E-STOP

50 ms

after power failure

200 ms Order no.: 787313, 777313

100 ms Order no.: 787310, 777310

Waiting period with a monitored reset

300 ms Order no.: 787310, 777310

200 ms Order no.: 787313, 777313

Min. start pulse duration with a monitored reset

30 ms

Simultaneity, channel 1 and 2

←

Supply interruption before de-energisation

20 ms

Environmental data

EMC

EN 60947-5-1, EN 61000-6-2

EN 61000-6-3 Order no.: 777313, 787313

Vibration in accordance with **EN 60068-2-6**

Frequency

10 - 55 Hz

Amplitude

0.35 mm

Climatic suitability

EN 60068-2-78

Airgap creepage

VDE 0110-1

Ambient temperature

-20 - 55 °C

Storage temperature

-40 - 85 °C

Protection type

Mounting (e.g. cabinet)

IP54

Housing

IP40

Terminals

IP 20

Up to Category 4, EN 954-1 PNOZ X3P

2.2

Mechanical data

Housing material	PPO UL 94 V0
Housing	ABS UL 94 V0
Front	
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.50 Nm
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
with screw terminals	94.0 mm x 45.0 mm x 121.0 mm
with cage clamp terminals	101.0 mm x 45.0 mm x 121.0 mm
Weight	310 g Order no.: 777313
	300 g Order no.: 787313
	280 g Order no.: 777310
	270 g Order no.: 787310

The standards current on 11/03 apply.

Max. continuous current

Number of contacts	I _{max} (A) at U _B DC	I _{max} (A) at U _B AC
1	8.00 A	8.00 A
2	8.00 A Order no.: 787310, 777310 7.00 A Order no.: 787313, 777313	7.00 A
3	7.00 A Order no.: 787310, 777310 6.00 A Order no.: 787313, 777313	6.00 A

Order reference

Type	Features	Terminals	Order no.
PNOZ X3P C	24 VAC/DC	Cage clamp terminals	787 310
PNOZ X3P	24 VAC/DC	Screw terminals	777 310
PNOZ X3P C	24 - 240 VAC/DC	Cage clamp terminals	787 313
PNOZ X3P	24 - 240 VAC/DC	Screw terminals	777 313

Up to Category 4, EN 954-1 PNOZ X3.10P



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Approvals

PNOZ X3.10P	
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } 1 semiconductor output
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Semiconductor output signals:
 - Switch status channel 1/2
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

} Light barriers

Safety features

The relay conforms to the following safety criteria:

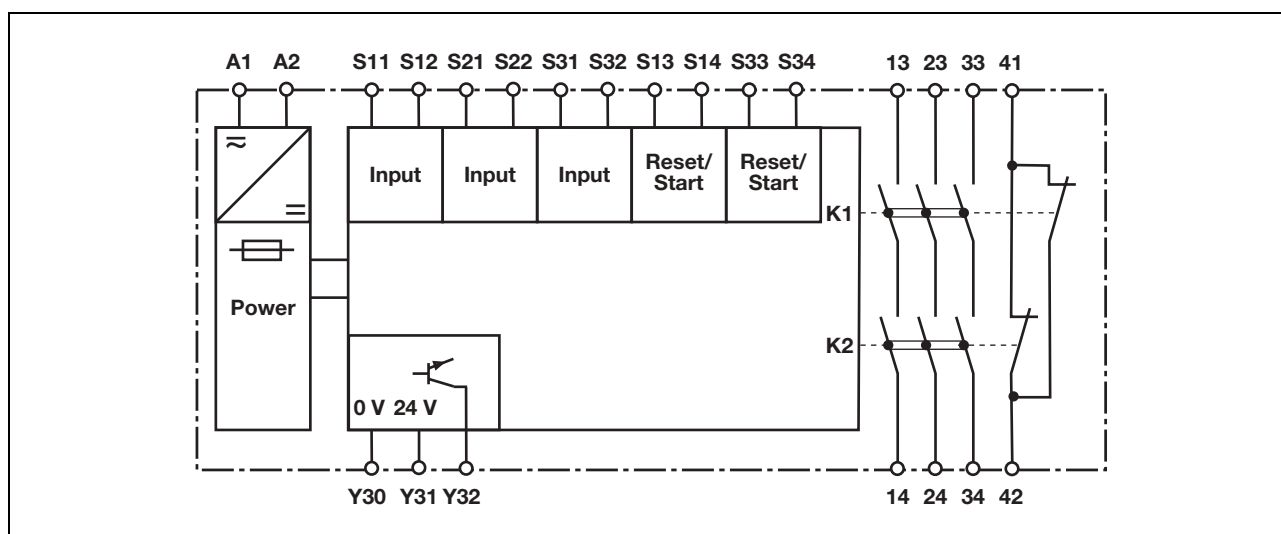
- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

Block diagram

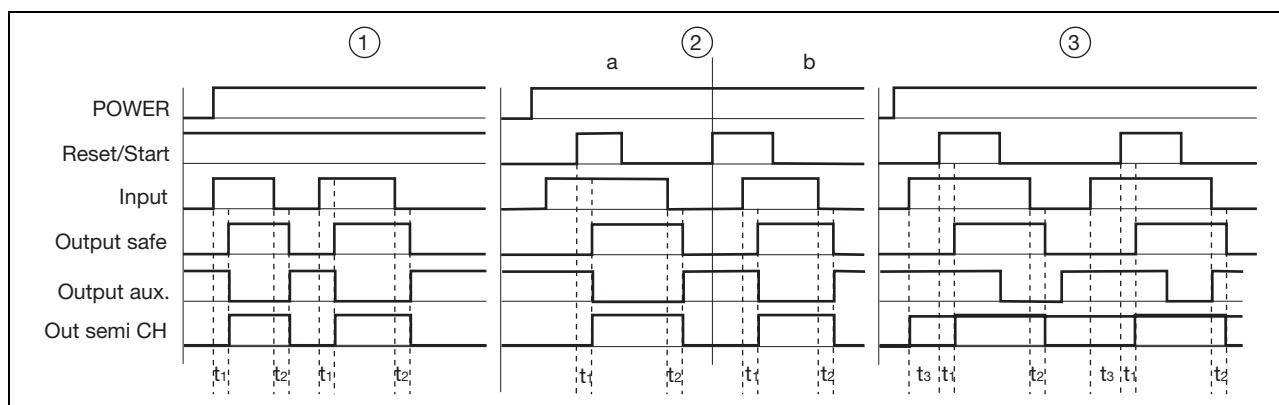


Up to Category 4, EN 954-1 PNOZ X3.10P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
- short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
- shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S13-S14, S33-S34
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } Out semi CH: Semiconductor output switch status Y32
- } i : Automatic reset
- } ¢ : Manual reset
- } £ : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation
- } t₃: Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ X3.10P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Light barrier with detection of shorts across contacts via ESPE		

Up to Category 4, EN 954-1
PNOZ X3.10P

} Reset circuit

Reset circuit	E-STOP wiring, safety gate	Safety gate (dual-channel)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

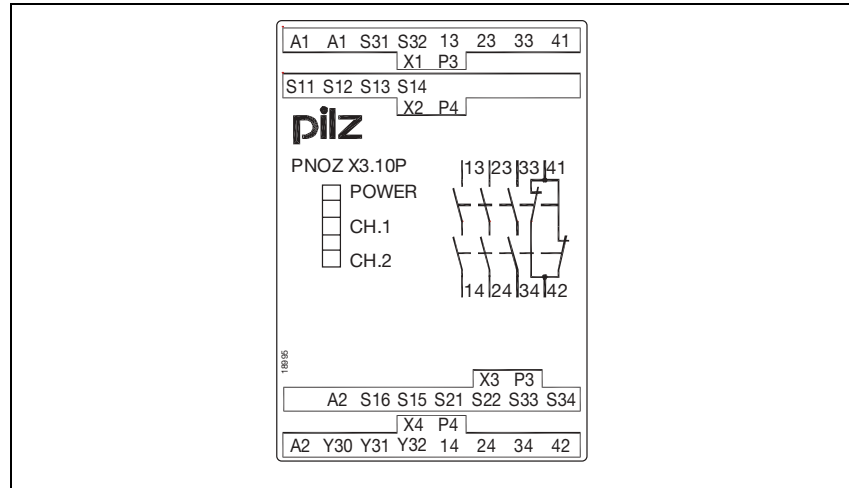
} Semiconductor output

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X3.10P

Terminal configuration

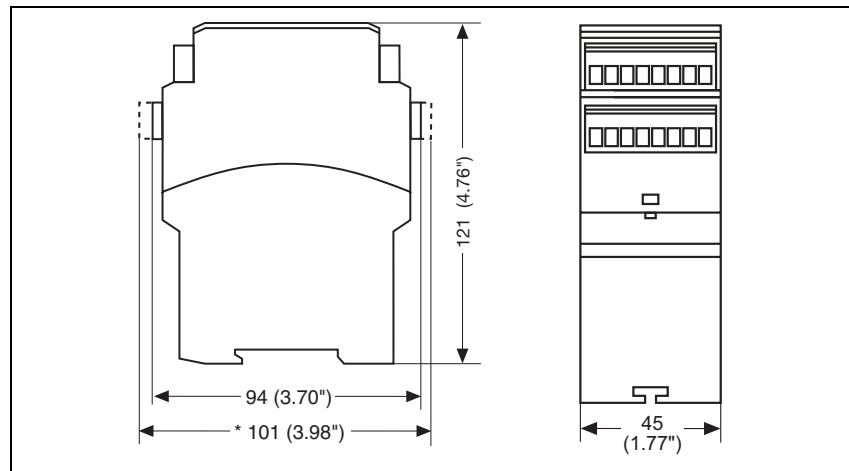


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

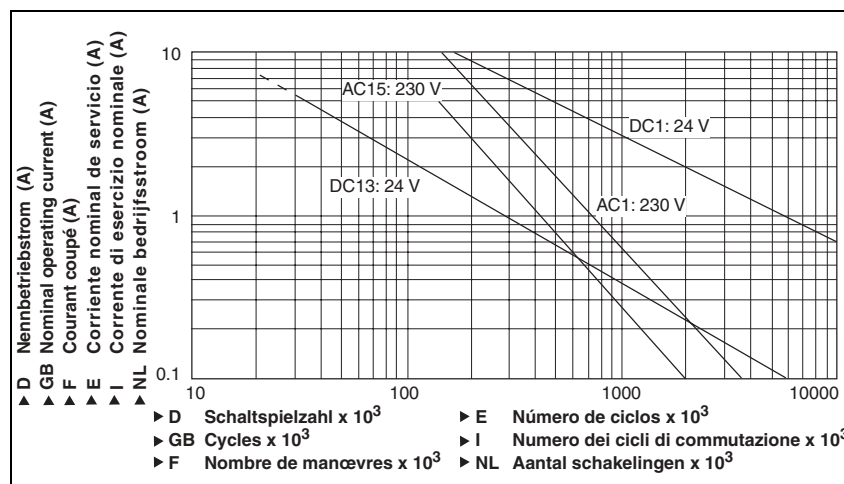


Up to Category 4, EN 954-1 PNOZ X3.10P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B AC	24 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B AC	5.0 VA
Power consumption at U_B DC	2.5 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit: 24.0 V DC	40 mA
reset circuit: 24.0 V DC	70 mA
feedback loop: 24.0 V DC	20 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 2000 VA
DC1: 24 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V	I_{max} : 5.0 A
DC13 (6 cycles/min): 24 V	I_{max} : 6.0 A
Contact material	AgSnO ₂ + 0.2 σm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A, 24 VAC/DC, characteristic B/C
Semiconductor outputs (short circuit proof)	24 V DC, 20 mA
External supply voltage	24 V DC
Voltage tolerance	-20 % / +20 %
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B DC	150 Ohm
Single-channel at U_B AC	180 Ohm
Dual-channel without detect. of shorts across contacts at U_B DC	300 Ohm
Dual-channel without detect. of shorts across contacts at U_B AC	360 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm
Dual-channel with detect. of shorts across contacts at U_B AC	30 Ohm

Up to Category 4, EN 954-1 PNOZ X3.10P

Times	
Switch-on delay	
with automatic reset typ.	250 ms
with automatic reset max.	500 ms
with automatic reset after power on typ.	280 ms
with automatic reset after power on max.	550 ms
with monitored reset typ.	35 ms
with monitored reset max.	50 ms
Delay-on de-energisation	
with E-STOP typ.	15 ms
with E-STOP max.	30 ms
with power failure typ.	180 ms
with power failure max.	260 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	350 ms
Waiting period with a monitored reset	300 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	150 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-20 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.50 Nm
Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.20 - 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	94.0 mm x 45.0 mm x 121.0 mm
With cage clamp terminals	101.0 mm x 45.0 mm x 121.0 mm
Weight	280 g Order no.: 777314 270 g Order no.: 787314

The standards current on **01/04** apply.

Up to Category 4, EN 954-1 PNOZ X3.10P

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC	$I_{\max}$ (A) at U_B AC
1	8.00 A	8.00 A
2	8.00 A	7.00 A
3	7.00 A	6.00 A

Order reference

Type	Features	Terminals	Order no.
PNOZ X3.10P C	24 VAC/DC	Cage clamp terminals	787 314
PNOZ X3.10P	24 VAC/DC	Screw terminals	777 314

Up to Category 2, EN 954-1
PNOZ X7P



Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
 - } Connection options for:
 - E-STOP pushbutton
 - Reset button
 - } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ X7P
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Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

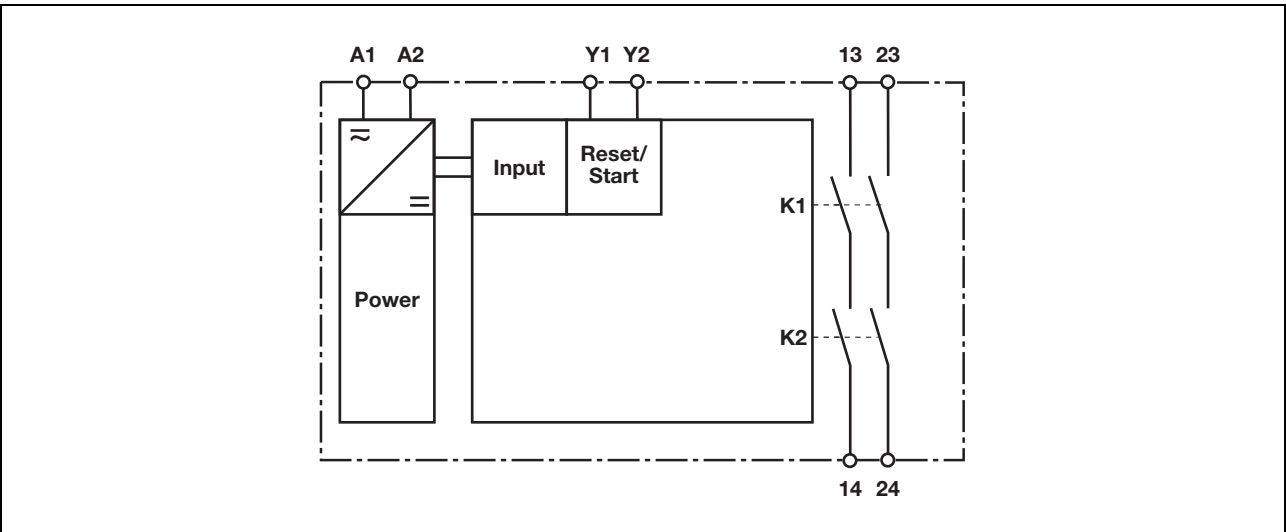
The safety relay is not suitable for non-contact barriers because

- } a dynamic start is not possible
- } the unit can be started during the delay-on de-energisation time.

Safety features

The relay conforms to the following safety criteria:

Block diagram

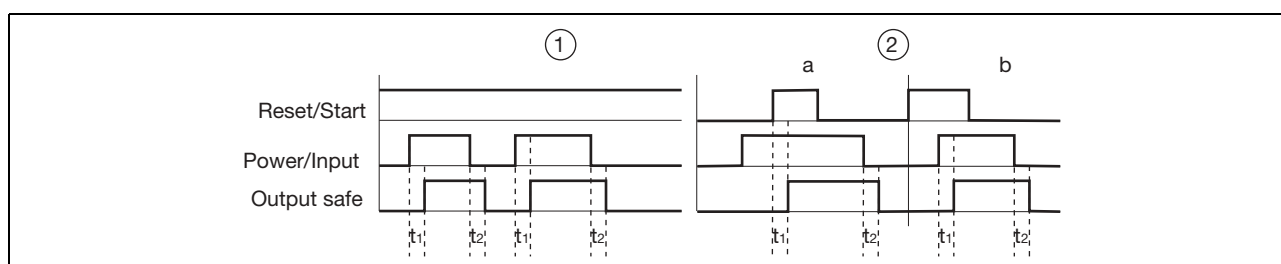


Up to Category 2, EN 954-1 PNOZ X7P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit Y1-Y2
- } Input: Input circuits A1
- } Output safe: Safety contacts 13-14, 23-24
- } i : Automatic reset
- } c : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.

- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

PNOZ X7 AC: The cable runs depend on the cable capacitance.

- } Loop circuit, 1 phase: max. I_r = 1 km
- } Stub circuit: Cable capacitance C_L and therefore the cable runs I_s are dependent on the supply voltage U_B

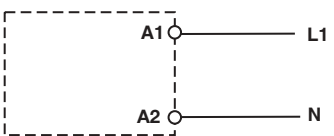
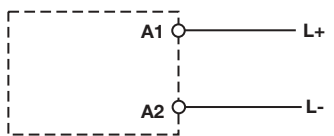
Cable capacitance C_L depends on the supply voltage U_B

U_B [V]	24	110	120	230	240
C_L [nF]	37.5	37.5	37.5	7.5	7.5
Cable runs					
Loop circuit			Stub circuit		

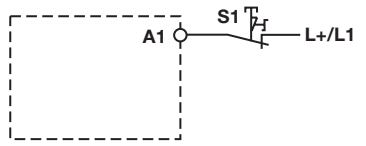
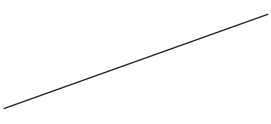
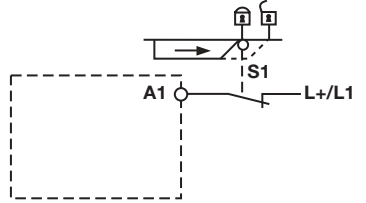
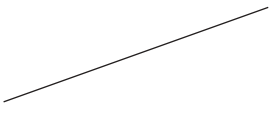
Up to Category 2, EN 954-1 PNOZ X7P

Preparing for operation

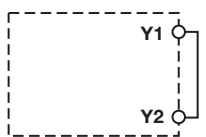
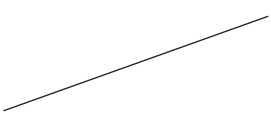
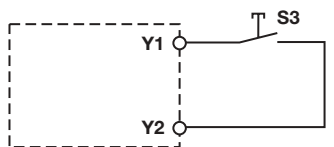
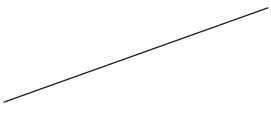
} Supply voltage

Supply voltage	AC	DC
		

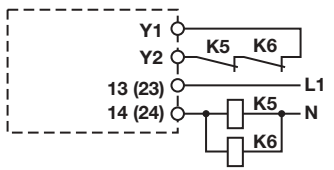
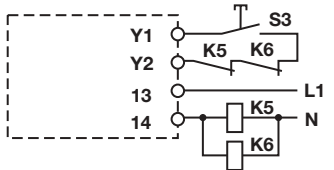
} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
Safety gate without detection of shorts across contacts		

} Reset circuit

Reset circuit	E-STOP wiring (single-channel)	E-STOP wiring (dual-channel)
Automatic reset		
Manual reset		

} Feedback loop

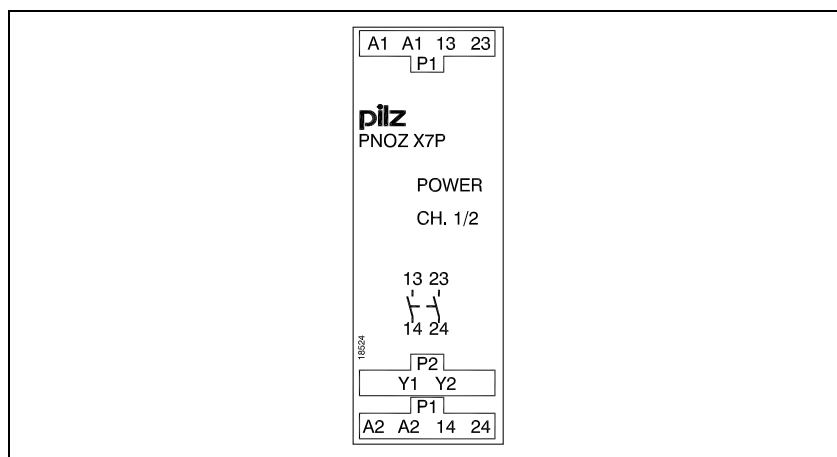
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

Up to Category 2, EN 954-1 PNOZ X7P

} Key

S1	E-STOP pushbutton
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Terminal configuration

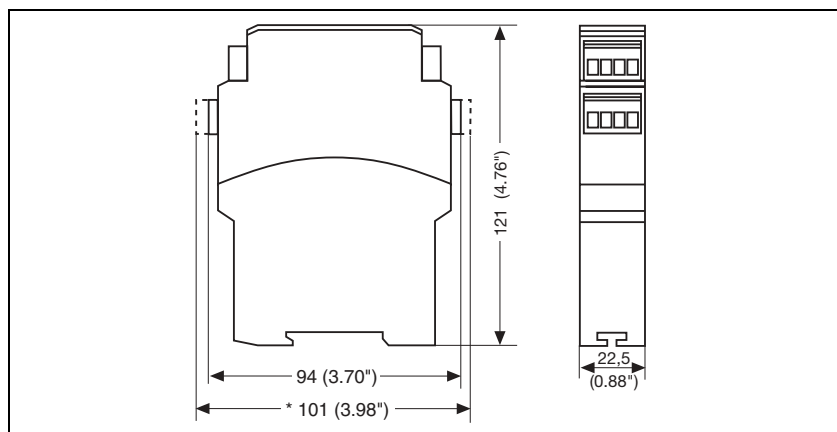


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

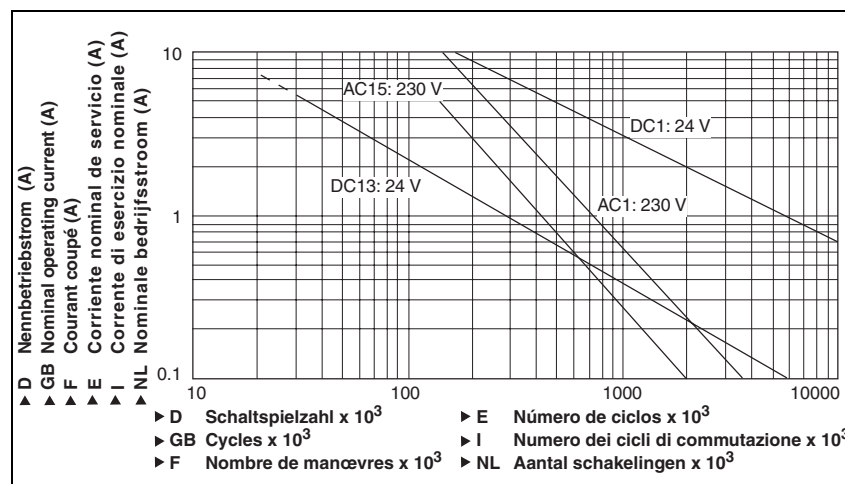


Up to Category 2, EN 954-1 PNOZ X7P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B AC	110 - 120 V, 230 - 240 V
Supply voltage U_B AC/DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B AC	2.0 VA Order no.: 777053, 777056, 787053, 787056 3.0 VA Order no.: 777059, 787059
Power consumption at U_B DC	1.5 W Order no.: 777059, 787059
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit:	
110.0 - 120.0 V Order no.: 777053, 787053	17 mA Order no.: 777053, 787053
230.0 - 240.0 V Order no.: 777056, 787056	8 mA Order no.: 777056, 787056
24.0 V Order no.: 777059, 787059	50 mA Order no.: 777059, 787059
reset circuit: 24 VDC	210.0 mA Order no.: 777059, 787059
	40.0 mA Order no.: 777053, 777056, 787053, 787056
feedback loop: 24 VDC	210.0 mA Order no.: 777059, 787059
	40.0 mA Order no.: 777053, 777056, 787053, 787056
Output contacts in accordance with EN 954-1, Category 2	Safety contacts (N/O): 2

Up to Category 2, EN 954-1 PNOZ X7P

2.2

Electrical data

Utilisation category in accordance with **EN 60947-4-1**

AC1: **240 V**

I_{min} : **0.01 A**,
 I_{max} : **4.00 A** Order no.: 777053, 777056, 787053, 787056
6.00 A Order no.: 777059, 787059
 P_{max} : **1,000 VA** Order no.: 777053, 777056, 787053, 787056
1,500 VA Order no.: 777059, 787059

DC1: **24 V**

I_{min} : **0.01 A**,
 I_{max} : **4.0 A** Order no.: 777053, 777056, 787053, 787056
6.0 A Order no.: 777059, 787059
 P_{max} : **100 W** Order no.: 777053, 777056, 787053, 787056
150 W Order no.: 777059, 787059

Utilisation category in accordance with **EN 60947-5-1**

AC15: **230 V**

I_{max} : **4.0 A** Order no.: 777053, 777056, 787053, 787056
5.0 A Order no.: 777059, 787059
 I_{max} : **4.0 A** Order no.: 777053, 777056, 787053, 787056
6.0 A Order no.: 777059, 787059

DC13 (6 cycles/min): **24 V**

Contact material

AgSnO₂ + 0.2 μ m Au

External contact fuse protection (**EN 60947-5-1**)

Blow-out fuse, quick

4 A Order no.: 777053, 777056, 787053, 787056

Blow-out fuse, slow

6 A Order no.: 777059, 787059

Circuit breaker

4 A

4 A, 24 VAC/DC, characteristic B/C

Max. overall cable resistance R_{lmax} input circuits,
reset circuits

Single-channel at U_B DC

15 Ohm Order no.: 777059, 787059

Single-channel at U_B AC

15 Ohm Order no.: 777059, 787059

Times

Switch-on delay

with automatic reset typ.

230 ms Order no.: 777053, 777056, 787053, 787056

50 ms Order no.: 777059, 787059

with automatic reset max.

700 ms Order no.: 777053, 777056, 787053, 787056

150 ms Order no.: 777059, 787059

with automatic reset after power on typ.

230 ms Order no.: 777053, 777056, 787053, 787056

50 ms Order no.: 777059, 787059

with automatic reset after power on max.

700 ms Order no.: 777053, 777056, 787053, 787056

150 ms Order no.: 777059, 787059

with manual reset typ.

140 ms Order no.: 777053, 777056, 787053, 787056

35 ms Order no.: 777059, 787059

with manual reset max.

700 ms Order no.: 777053, 777056, 787053, 787056

150 ms Order no.: 777059, 787059

Delay-on de-energisation

with E-STOP typ.

70 ms Order no.: 777053, 777056, 787053, 787056

45 ms Order no.: 777059, 787059

with E-STOP max.

100 ms Order no.: 777053, 777056, 787053, 787056

70 ms Order no.: 777059, 787059

with power failure typ.

70 ms Order no.: 777053, 777056, 787053, 787056

45 ms Order no.: 777059, 787059

with power failure max.

100 ms Order no.: 777053, 777056, 787053, 787056

70 ms Order no.: 777059, 787059

Recovery time at max. switching frequency 1/s
after E-STOP

120 ms Order no.: 777053, 777056, 787053, 787056

50 ms Order no.: 777059, 787059

after power failure

120 ms Order no.: 777053, 777056, 787053, 787056

150 ms Order no.: 777059, 787059

Supply interruption before de-energisation

20 ms

Up to Category 2, EN 954-1 PNOZ X7P

Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.50 Nm
Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.20 - 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
with screw terminals	94.0 mm x 22.5 mm x 121.0 mm
with cage clamp terminals	101.0 mm x 22.5 mm x 121.0 mm
Weight	190 g

The standards current on **09/04** apply.

Max. continuous current		
Number of contacts	I _{max} (A) at U _B AC/DC	I _{max} (A) at U _B AC
1	4 A Order no.: 777059, 787059	4 A Order no.: 777053, 777056, 787053, 787056
2	4 A Order no.: 777059, 787059	3 A Order no.: 777053, 777056, 787053, 787056

Order reference			
Type	Features	Terminals	Order no.
PNOZ X7P C	24 VAC/DC	Cage clamp terminals	787 059
PNOZ X7P	24 VAC/DC	Screw terminals	777 059
PNOZ X7P C	110 - 120 VAC	Cage clamp terminals	787 053
PNOZ X7P	110 - 120 VAC	Screw terminals	777 053
PNOZ X7P C	230 - 240 VAC	Cage clamp terminals	787 056
PNOZ X7P	230 - 240 VAC	Screw terminals	777 056

Up to Category 4, EN 954-1 PNOZ X8P



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ X8P
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 2 auxiliary contacts (N/C), instantaneous
- } 2 semiconductor outputs
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Semiconductor outputs signal:
 - Switch status channel 1/2
 - Supply voltage is present
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

} Safety gates

Safety features

The relay conforms to the following safety criteria:

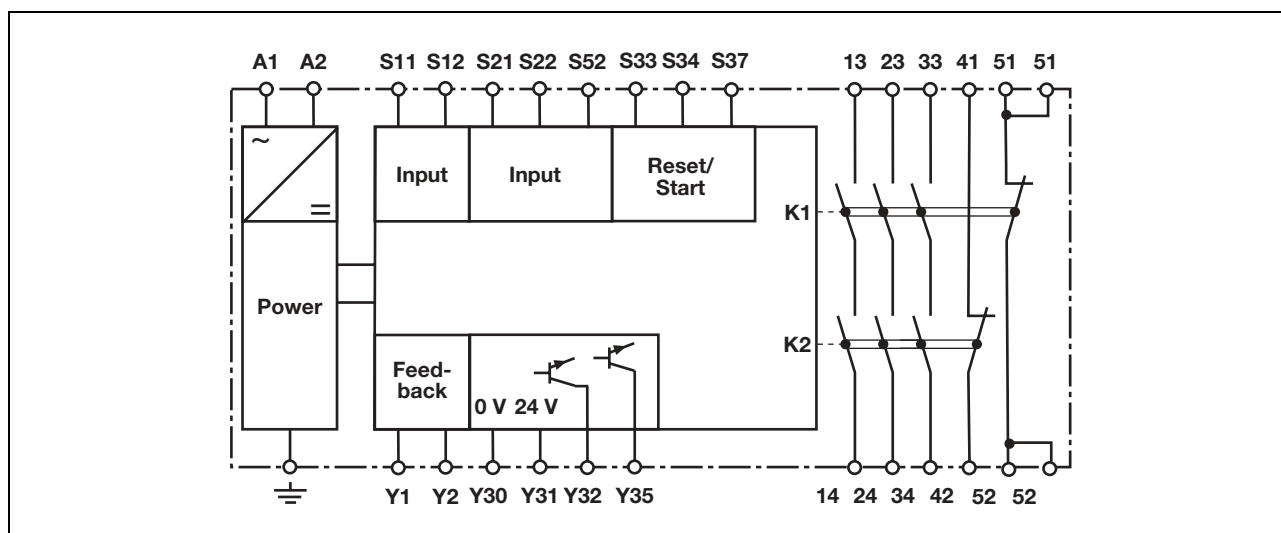
- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons

Block diagram

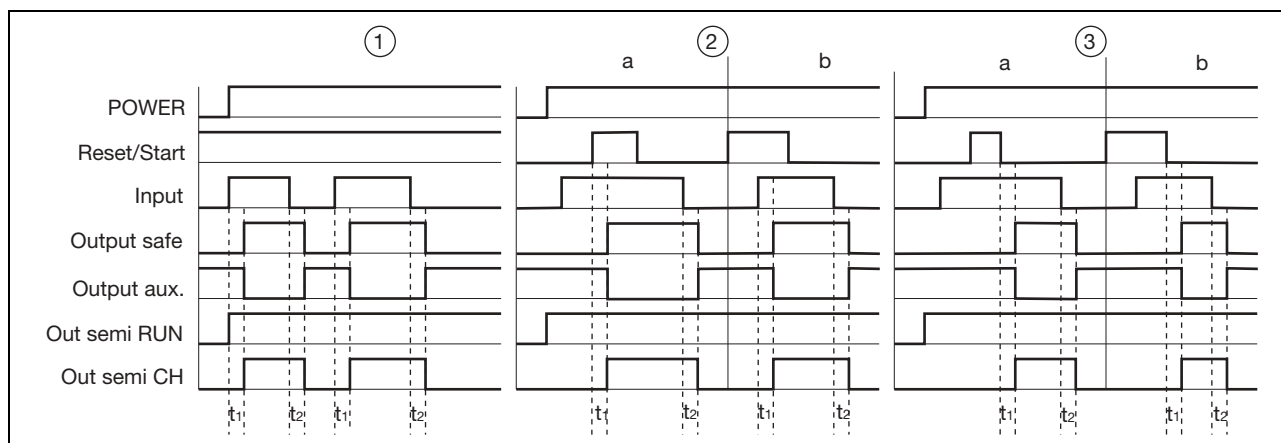


Up to Category 4, EN 954-1 PNOZ X8P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once
 - the input circuit is closed and then the reset circuit is closed and opened again.
 - the reset circuit is closed and then opened again once the input circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34, Y1-S37
- } Input: Input circuits S21-22, S11-S12, S52
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42, 51-52
- } Out semi RUN: Semiconductor output supply voltage Y35
- } Out semi CH: Semiconductor output switch status Y32
- } $\bar{i}$: Automatic reset
- } C : Manual reset
- } E : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, outputs 41-42, 51-52 are auxiliary contacts (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cabling runs $l_{\max}$ in the input circuit:

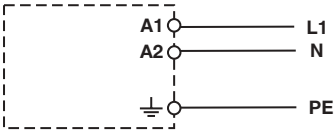
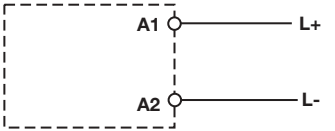
$$l_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

- $R_{l\max}$ = max. overall cable resistance (see technical details)
- R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

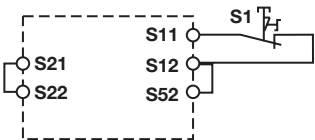
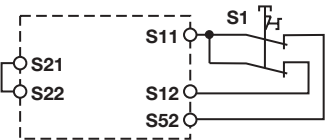
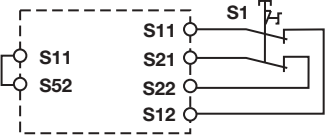
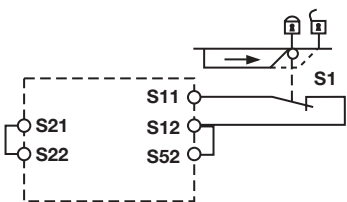
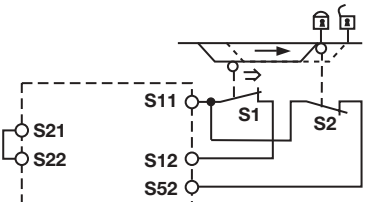
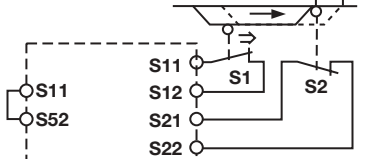
Up to Category 4, EN 954-1 PNOZ X8P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ X8P

} Reset circuit

Reset circuit	E-STOP/safety gate wiring (single and dual-channel, without shorts across contacts)	E-STOP/safety gate wiring (dual-channel with shorts across contacts)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

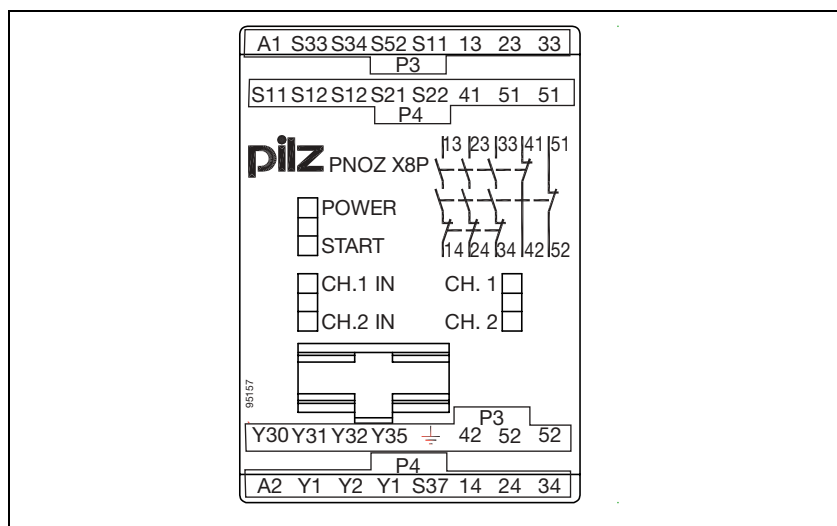
} Semiconductor output

} Key

S1	E-STOP pushbutton
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X8P

Terminal configuration

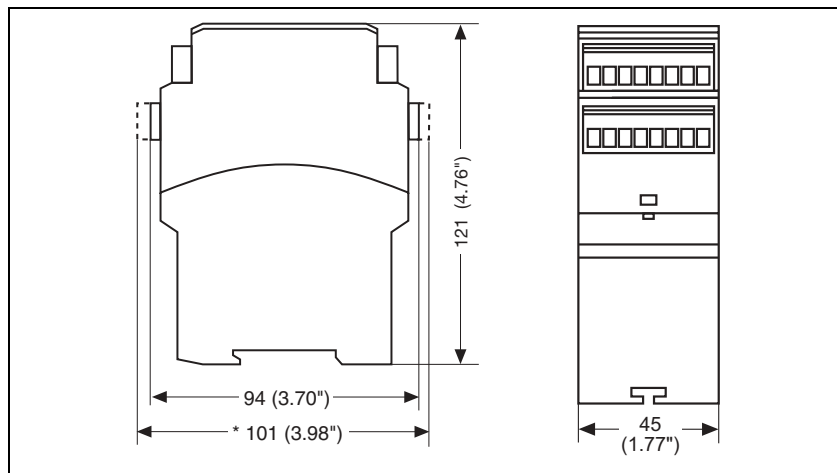


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

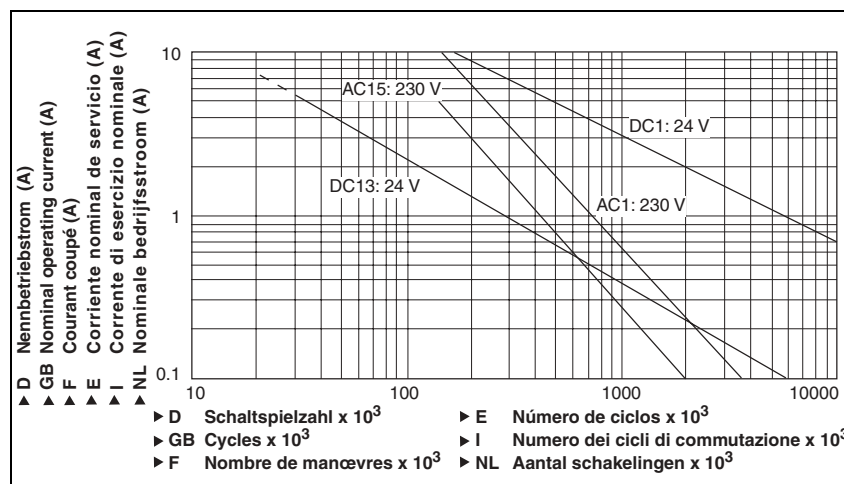


Up to Category 4, EN 954-1 PNOZ X8P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B AC	24 V
Supply voltage U_B DC	24 V, 110 V, 115 V, 120 V, 230 V
Voltage tolerance	-15% / 10%
Power consumption at U_B AC	6.5 VA Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764
Power consumption at U_B DC	2.5 W Order no.: 787760, 777760
Frequency range AC	50 - 60 Hz Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764
Residual ripple DC	160 % Order no.: 787760, 777760
Voltage and current at input circuit: 24 VDC	45 mA Order no.: 787760, 777760 40.0 mA Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764
reset circuit: 24 VDC	60.0 mA Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764 50.0 mA Order no.: 787760, 777760
feedback loop: 24 VDC	60.0 mA Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764 50.0 mA Order no.: 787760, 777760
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 3 ST Auxiliary contacts (N/C): 2 ST
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 2000 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V DC13 (6 cycles/min): 24 V	I_{max} : 5.0 A I_{max} : 7.0 A
Contact material	AgSnO₂ + 0.2 σm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A , 24 VAC/DC, characteristic B/C
Semiconductor outputs (short circuit proof)	24 V DC, 50 mA
External supply voltage	24 VDC
Voltage tolerance	-20 % / 20 %

Up to Category 4, EN 954-1 PNOZ X8P

Max. overall cable resistance R_{lmax} input circuits,

reset circuits

Single-channel at U_B DC

Single-channel at U_B AC

100 Ohm Order no.: 787760, 777760

100 Ohm Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764

Dual-channel without detect. of shorts across contacts at U_B DC

200 Ohm Order no.: 787760, 777760

Dual-channel without detect. of shorts across contacts at U_B AC

200 Ohm Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764

Dual-channel with detect. of shorts across contacts at U_B DC

16 Ohm Order no.: 787760, 777760

Dual-channel with detect. of shorts across contacts at U_B AC

28 Ohm Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764

Times

Switch-on delay

with automatic reset typ.

175 ms Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764

160 ms Order no.: 787760, 777760

with automatic reset max.

220 ms Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764

200 ms Order no.: 787760, 777760:

with automatic reset after power on typ.

200 ms Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764

185 ms Order no.: 787760, 777760

with automatic reset after power on max.

250 ms Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764

220 ms Order no.: 787760, 777760

with manual reset typ.

190 ms

with manual reset max.

250 ms

with monitored reset typ.

130 ms

with monitored reset max.

180 ms

Delay-on de-energisation

with E-STOP typ.

15 ms

with E-STOP max.

30 ms

with power failure typ.

160 ms Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764

100 ms Order no.: 787760, 777760

with power failure max.

220 ms Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764

150 ms Order no.: 787760, 777760

Recovery time at max. switching frequency 1/s

after E-STOP

50 ms

after power failure

250 ms Order no.: 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764:

180 ms Order no.: 787760, 777760

Min. start pulse duration with a monitored reset

30 ms

Simultaneity, channel 1 and 2

150 ms

Supply interruption before de-energisation

35 ms

Environmental data

EMC

EN 60947-5-1, EN 61000-6-2

Vibration in accordance with **EN 60068-2-6**

Frequency

10 - 55 Hz

Amplitude

0.35 mm

Climatic suitability

EN 60068-2-78

Airgap creepage

VDE 0110-1

Ambient temperature

-10 - 55 °C

Storage temperature

-40 - 85 °C

Protection type

Mounting (e.g. cabinet)

IP54

Housing

IP40

Terminals

IP20

Up to Category 4, EN 954-1 PNOZ X8P

Mechanical data

Housing material	PPO UL 94 V0
Housing	ABS UL 94 V0
Front	
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.5 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1 mm ²
without crimp connectors or with TWIN crimp connectors	0.5 - 1.5 mm ²
Torque setting with screw terminals	0.6 Nm
Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.2 - 1.5 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	94 mm x 45 mm x 121 mm
With cage clamp terminals	101 mm x 45 mm x 121 mm
Weight	420 g Order no. 777770, 777768, 777766, 777765, 777764 410 g Order no. 787770, 787768, 787766, 787765, 787764 320 g Order no. 777760 310 g Order no. 787760

The standards current on 11/03 apply.

Max. continuous current

Number of contacts	I _{max} (A) at U _B DC	I _{max} (A) at U _B AC
1	8.00 A Order no.: 787760, 777760	8.00 A Order no. 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764
2	8.00 A Order no.: 787760, 777760	7.30 A Order no. 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764
3	7.00 A Order no.: 787760, 777760	6.00 A Order no. 787770, 787768, 787766, 787765, 787764, 777770, 777768, 777766, 777765, 777764

Order reference

Type	Features	Terminals	Order no.
PNOZ X8P C	24 VDC	Cage clamp terminals	787 760
PNOZ X8P	24 VDC	Screw terminals	777 760
PNOZ X8P C	110 VAC	Cage clamp terminals	787 764
PNOZ X8P	110 VAC	Screw terminals	777 764
PNOZ X8P C	115 VAC	Cage clamp terminals	787 765
PNOZ X8P	115 VAC	Screw terminals	777 765
PNOZ X8P C	120 VAC	Cage clamp terminals	787 766
PNOZ X8P	120 VAC	Screw terminals	777 766
PNOZ X8P C	230 VAC	Cage clamp terminals	787 768
PNOZ X8P	230 VAC	Screw terminals	777 768
PNOZ X8P C	24 VAC	Cage clamp terminals	787 770
PNOZ X8P	24 VAC	Screw terminals	777 770

Up to Category 4, EN 954-1 PNOZ X9P



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Approvals

PNOZ X9P	
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 7 safety contacts (N/O), instantaneous
 - 2 auxiliary contacts (N/C), instantaneous
- } 2 semiconductor outputs
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Light barriers
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Input circuits
 - Supply voltage
 - Reset circuit
- } Semiconductor outputs signal:
 - Switch status channel 1/2
 - Supply voltage is present
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

- } E-STOP pushbuttons
- } Safety gates
- } Light barriers

Safety features

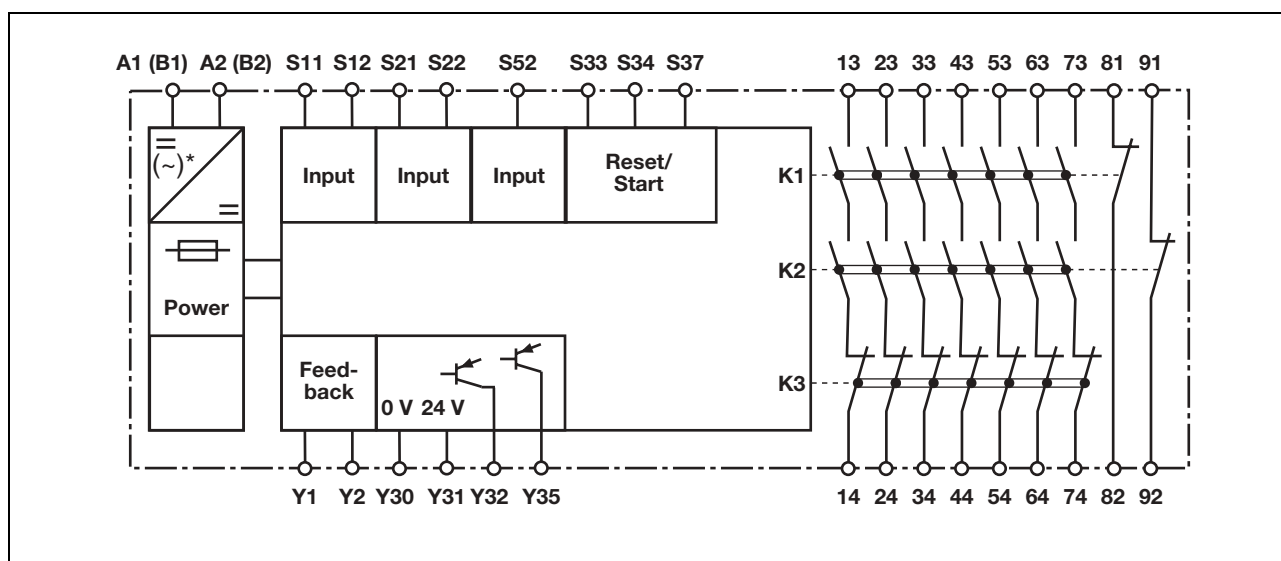
The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

Block diagram



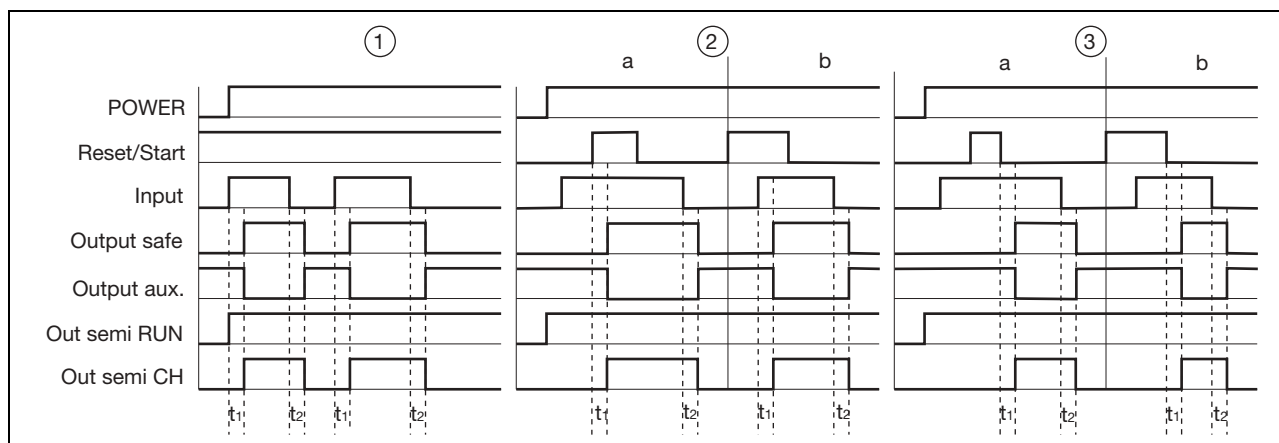
*Only applies when $U_B = 100 - 240 \text{ VAC}$

Up to Category 4, EN 954-1 PNOZ X9P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once
 - the input circuit is closed and then the reset circuit is closed and opened again.
 - the reset circuit is closed and then opened again once the input circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34
- } Input: Input circuits S11-S12, S21-S22, S52
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74
- } Output aux: Auxiliary contacts 81-82, 91-92
- } Out semi RUN: Semiconductor output supply voltage Y35
- } Out semi CH: Semiconductor output switch status Y32
- } $\bar{r}$: Automatic reset
- } M : Manual reset
- } r : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74 are safety contacts, outputs 81-82, 91-92 are auxiliary contacts (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cabling runs $l_{\max}$ in the input circuit:

$$l_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

- $R_{l\max}$ = max. overall cable resistance (see technical details)
- R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ X9P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
$U_B = 24 \text{ VDC}/100 - 240 \text{ VAC}$		
$U_B = 24 \text{ VDC}$		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1 PNOZ X9P

} Reset circuit

Reset circuit	E-STOP/safety gate wiring (single and dual-channel, without shorts across contacts)	E-STOP/safety gate wiring (dual-channel with shorts across contacts)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

Feedback loop	
Contacts from external contactors	

} Semiconductor output

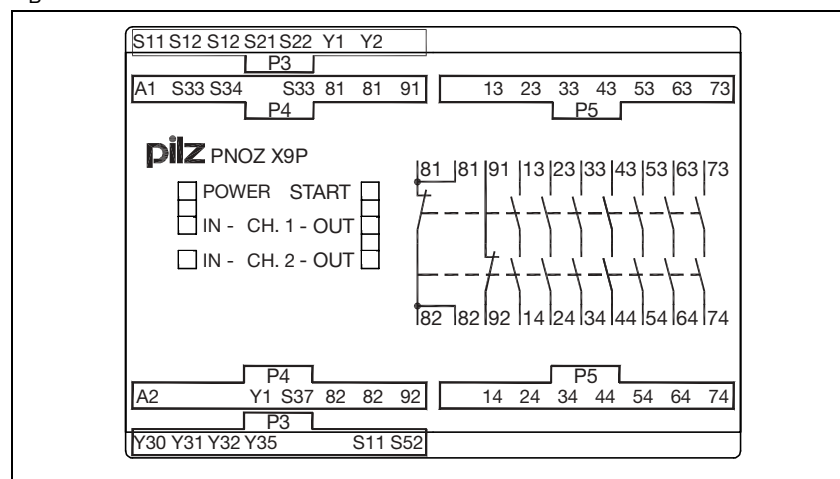
} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

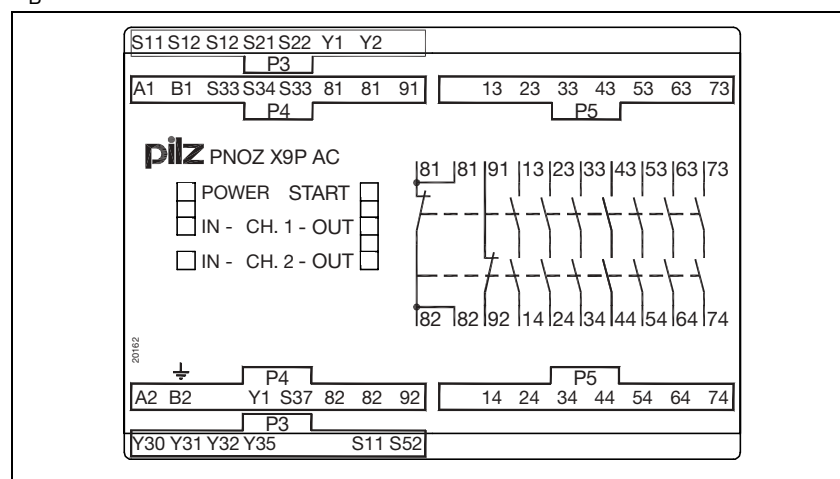
Up to Category 4, EN 954-1 PNOZ X9P

Terminal configuration

$U_B = 24 \text{ VDC}$



$U_B = 24 \text{ VDC}/100 - 240 \text{ VAC}$

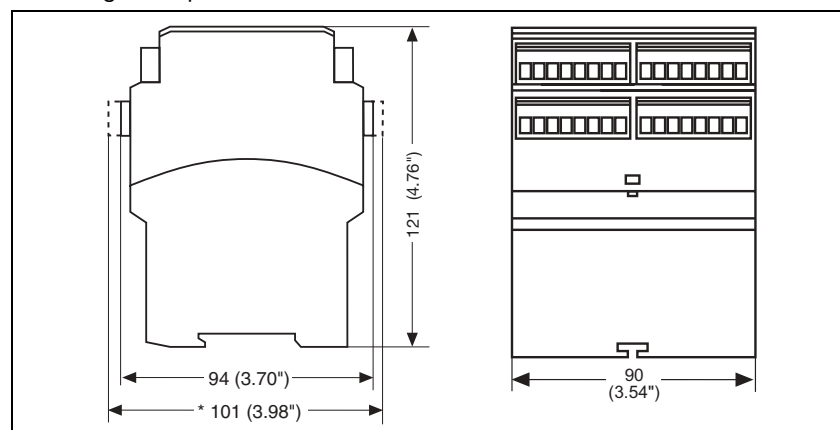


Installation

- The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- Use the notch on the rear of the unit to attach it to a DIN rail.
- Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

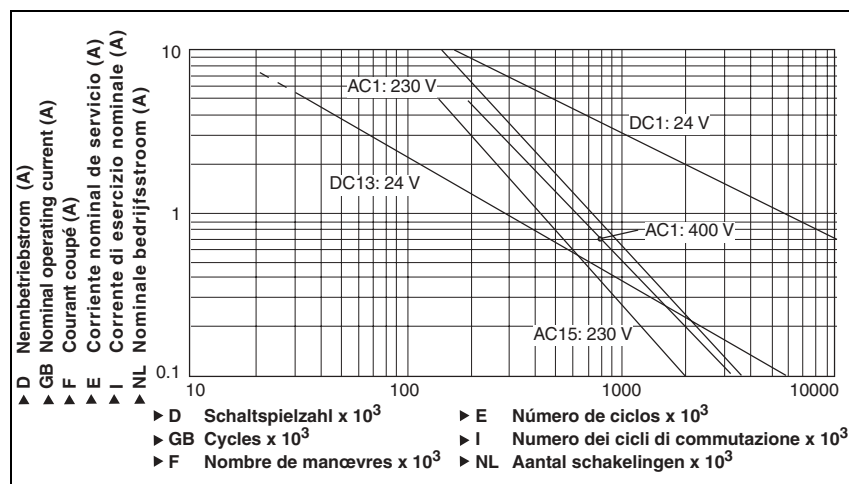


Up to Category 4, EN 954-1 PNOZ X9P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage	
Supply voltage U_B AC	100 - 240 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B AC	8.5 VA Order no.: 777606, 787606
Power consumption at U_B DC	5.5 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	50.0 mA
reset circuit DC: 24.0 V	100.0 mA
feedback loop DC: 24.0 V	100.0 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 7 Auxiliary contacts (N/C): 2
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 2000 VA
Safety contacts: DC1 at 24 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 200 W
Auxiliary contacts: AC1 at 240 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 2000 VA
Auxiliary contacts: DC1 at 24 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I_{max} : 5.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 7.0 A
Auxiliary contacts: AC15 at 230 V	I_{max} : 5.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 7.0 A
Contact material	AgSnO2 + 0.2 µm Au

Up to Category 4, EN 954-1 PNOZ X9P

2.2

Electrical data

External contact fuse protection to **EN 60947-5-1**

Blow-out fuse, quick

Safety contacts: **10 A**

Auxiliary contacts: **10 A**

Blow-out fuse, slow

Safety contacts: **6 A**

Auxiliary contacts: **6 A**

Circuit breaker 24 VAC/DC, characteristic B/C

Safety contacts: **6 A**

Auxiliary contacts: **6 A**

Semiconductor outputs (short circuit proof) **24.0 V DC, 20 mA**

External supply voltage **24.0 V DC**

Voltage tolerance **-20 %/+20 %**

Max. overall cable resistance R_{lmax}

input circuits, reset circuits

single-channel at U_B DC **45 Ohm**

single-channel at U_B AC **45 Ohm** Order no.: 777606, 787606

dual-channel without detect. of shorts across contacts at U_B DC **90 Ohm**

dual-channel without detect. of shorts across contacts at U_B AC **90 Ohm** Order no.: 777606, 787606

dual-channel with detect. of shorts across contacts at U_B DC **15 Ohm**

dual-channel with detect. of shorts across contacts at U_B AC **15 Ohm** Order no.: 777606, 787606

Times

Switch-on delay

with automatic reset typ. **200 ms**

with automatic reset max. **250 ms**

with automatic reset after power on typ. **220 ms**

with automatic reset after power on max. **300 ms**

with manual reset typ. **200 ms**

with manual reset max. **250 ms**

with monitored reset typ. **150 ms**

with monitored reset max. **220 ms**

Delay-on de-energisation

with E-STOP typ. **20 ms**

with E-STOP max. **30 ms**

with power failure typ. **170 ms**

with power failure max. **250 ms**

with power failure typ. $U_B = 100 \text{ V AC}$ Order no.: 777606, 787606 **165 ms** Order no.: 777606, 787606

with power failure max. $U_B = 100 \text{ V AC}$ Order no.: 777606, 787606 **200 ms** Order no.: 777606, 787606

with power failure typ. $U_B = 240 \text{ VAC}$ **320 ms** Order no.: 777606, 787606

with power failure max. $U_B = 240 \text{ VAC}$ **450 ms** Order no.: 777606, 787606

Recovery time at max. switching frequency 1/s

after E-STOP **50 ms**

after power failure **300 ms**

after power failure on universal power supply **500 ms** Order no.: 777606, 787606

Min. start pulse duration with a monitored reset **50 ms**

Simultaneity, channel 1 and 2 **150 ms**

Supply interruption before de-energisation **20 ms**

Environmental data

EMC **EN 60947-5-1, EN 61000-6-2**

Vibration in accordance with **EN 60068-2-6**

Frequency **10 - 55 Hz**

Amplitude **0.35 mm**

Climatic suitability **EN 60068-2-78**

Airgap creepage **VDE 0110-1**

Ambient temperature **-10 - 55 °C**

Storage temperature **-40 - 85 °C**

Up to Category 4, EN 954-1 PNOZ X9P

Environmental data	
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm² , 24 - 12 AWG Order no.: 777606, 777609
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm² , 24 - 16 AWG Order no.: 777606, 777609
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm² , 24 - 16 AWG Order no.: 777606, 777609
Torque setting with screw terminals	0.50 Nm Order no.: 777606, 777609
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm² , 24 - 16 AWG Order no.: 787606, 787609
Cage clamp terminals: terminal points per connection	2 Order no.: 787606, 787609
Stripping length	8 mm Order no.: 787606, 787609
Dimensions	
Height	101.0 mm Order no.: 787606, 787609 94.0 mm Order no.: 777606, 777609
Width	90.0 mm
Depth	121.0 mm
Weight	550 g Order no.: 787609 560 g Order no.: 777609 575 g Order no.: 787606 585 g Order no.: 777606

The standards current on **02/01** apply.

Max. continuous current		
Number of contacts	$I_{\max}$ (A) at U_B DC	$I_{\max}$ (A) at U_B AC
1	8.00 A Order no.: 777609, 787609	8.00 A Order no.: 777606, 787606
2	8.00 A Order no.: 777609, 787609	8.00 A Order no.: 777606, 787606
3	8.00 A Order no.: 777609, 787609	8.00 A Order no.: 777606, 787606
4	7.00 A Order no.: 777609, 787609	7.00 A Order no.: 777606, 787606
5	6.00 A Order no.: 777609, 787609	6.00 A Order no.: 777606, 787606
6	5.50 A Order no.: 777609, 787609	5.50 A Order no.: 777606, 787606
7	5.00 A Order no.: 777609, 787609	5.00 A Order no.: 777606, 787606

Order reference				
Type	Features		Terminals	Order no.
PNOZ X9P C	110 - 240 VAC	24 VDC	Cage clamp terminals	787 606
PNOZ X9P	110 - 240 VAC	24 VDC	Screw terminals	777 606
PNOZ X9P C		24 VDC	Cage clamp terminals	787 609
PNOZ X9P		24 VDC	Screw terminals	777 609

Up to Category 4, EN 954-1 PNOZ X10.11P



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Approvals

	PNOZ X10.11P
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 6 safety contacts (N/O), instantaneous
 - 4 auxiliary contacts (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
 - Input circuits
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)

Safety features

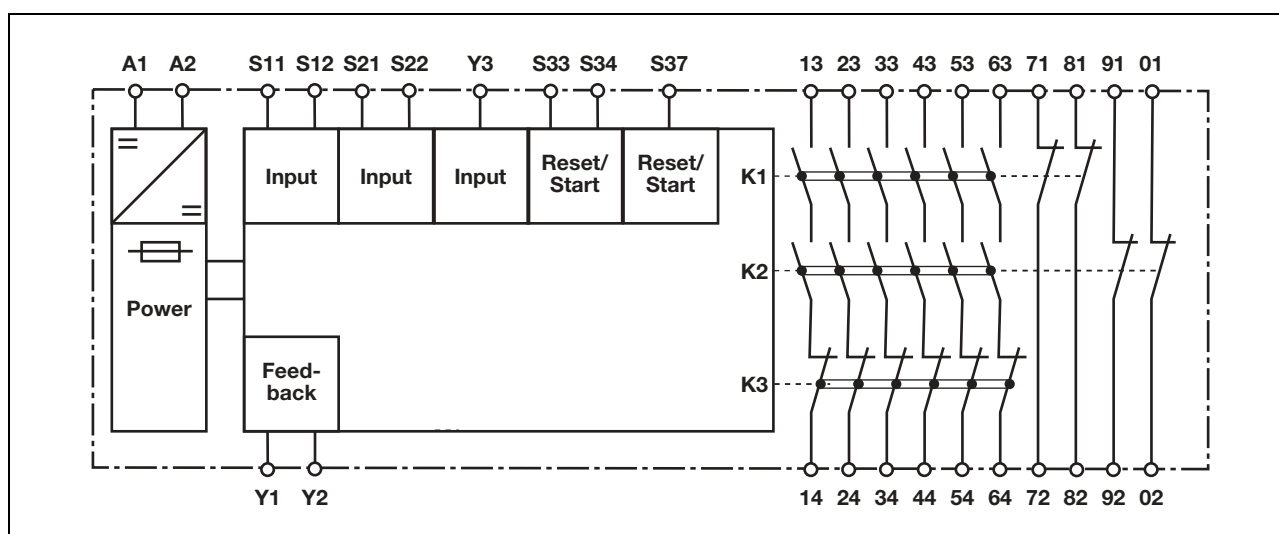
- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
 - } The unit has an electronic fuse.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates
- } Light barriers

Block diagram

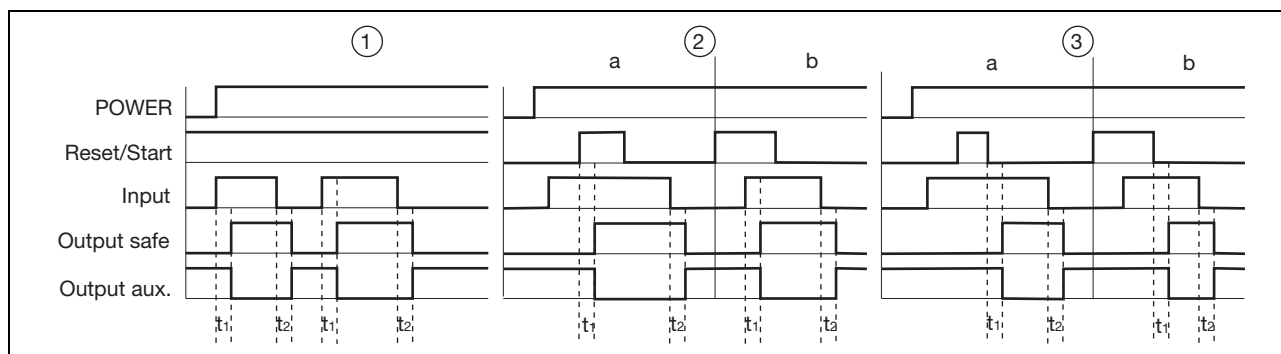


Up to Category 4, EN 954-1 PNOZ X10.11P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once
 - the input circuit is closed and then the reset circuit is closed and opened again.
 - the reset circuit is closed and then opened again once the input circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33(S12)-S34
- } Input: Input circuits S11-S12, S21-S22, Y3
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64
- } Output aux: Auxiliary contacts 71-72, 81-82, 91-92, 01-02
- } i : Automatic reset
- } c : Manual reset
- } E : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54, 63-64 are safety contacts, outputs 71-72, 81-82, 91-92, 01-02 are auxiliary contacts (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cabling runs I_{max} in the input circuit:

$$I_{\max} = \frac{R_{I\max}}{R_i / \text{km}}$$

R_{Imax} = max. overall cable resistance (see technical details)

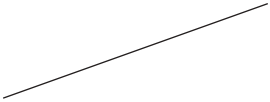
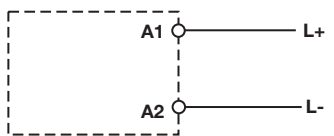
R_i /km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

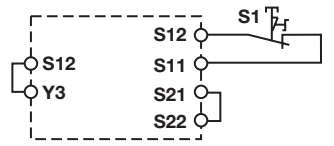
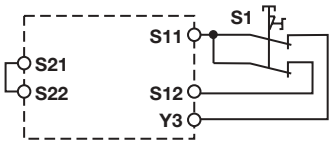
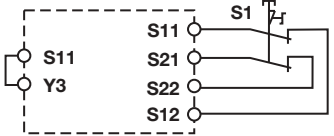
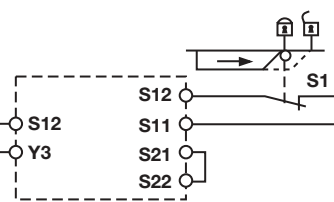
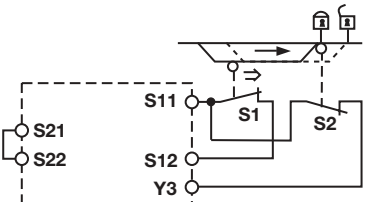
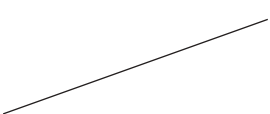
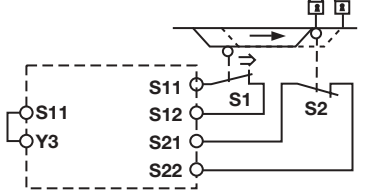
Up to Category 4, EN 954-1
PNOZ X10.11P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ X10.11P

} Reset circuit

Reset circuit	E-STOP/safety gate wiring (single or dual-channel, without detection of shorts across contacts)	E-STOP/safety gate wiring (dual-channel, with detection of shorts across contacts)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

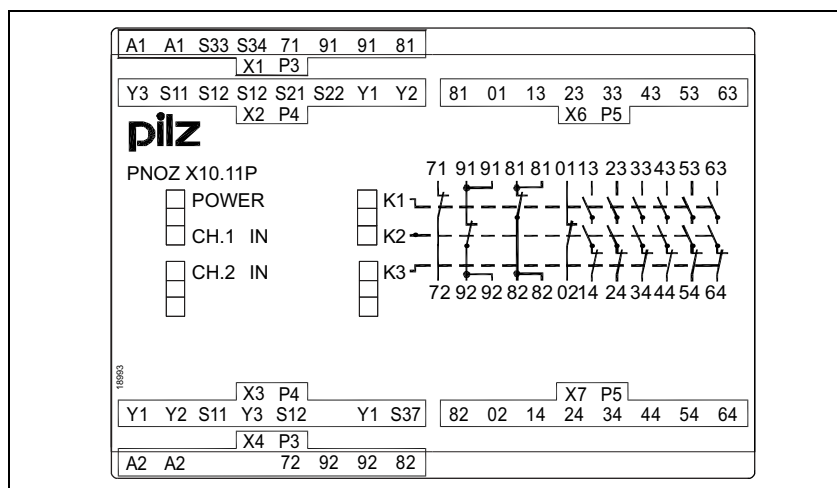
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X10.11P

Terminal configuration

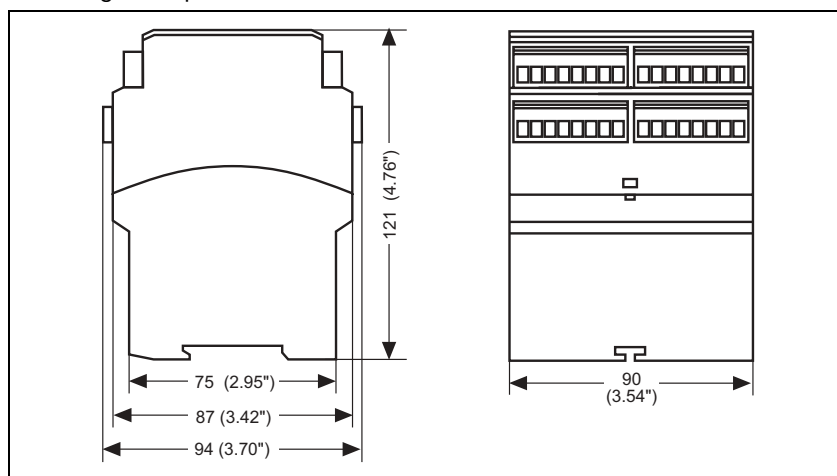


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

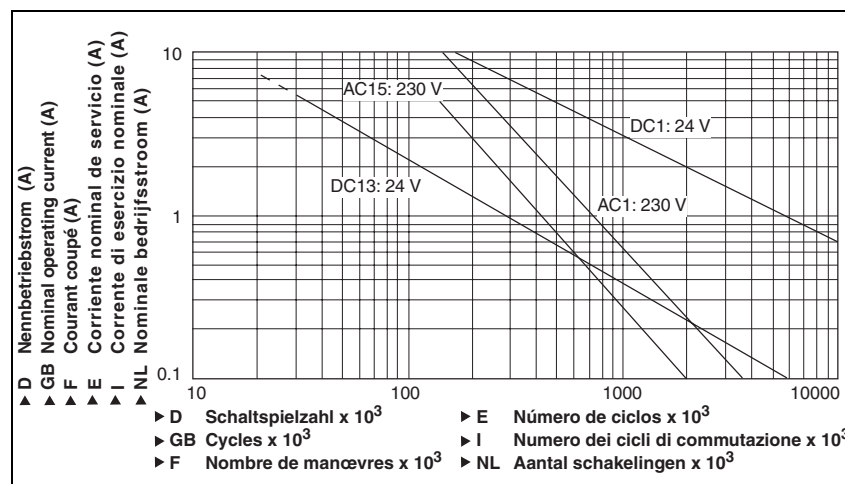


Up to Category 4, EN 954-1 PNOZ X10.11P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B DC	5.5 W
Frequency range AC	10 - 55 Hz
Residual ripple DC	160 %
Voltage and current at input circuit: 24.0 V DC	50 mA
reset circuit: 24.0 V DC	100 mA
feedback loop: 24.0 V DC	100 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 6 Auxiliary contacts (N/C): 4
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	I_{min} : 0.01 A , I_{max} : 8.00 A P_{max} : 2,000 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V	I_{max} : 5.0 A
DC13 (6 cycles/min): 24 V	I_{max} : 7.0 A
Contact material	AgSnO₂ + 0.2 μm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A , 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B DC	45 Ohm
Dual-channel without detect. of shorts across contacts at U_B DC	90 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	5 Ohm

Up to Category 4, EN 954-1 PNOZ X10.11P

2.2

Times	
Switch-on delay	
with automatic reset typ.	200 ms
with automatic reset max.	250 ms
with automatic reset after power on typ.	220 ms
with automatic reset after power on max.	300 ms
with manual reset typ.	200 ms
with manual reset max.	250 ms
with monitored reset typ.	220 ms
with monitored reset max.	260 ms
Delay-on de-energisation	
with E-STOP typ.	20 ms
with E-STOP max.	30 ms
with power failure typ.	360 ms
with power failure max.	480 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	500 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	150 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.50 Nm
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	94 mm x 90 mm x 121 mm
With cage clamp terminals	101 mm x 90 mm x 121 mm
Weight	570 g Order no.: 777750 560 g Order no.: 787750

The standards current on 11/03 apply.

Up to Category 4, EN 954-1 PNOZ X10.11P

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC	$I_{\max}$ (A) at U_B AC
1	8	-
2	8	-
3	8	-
4	7	-
5	6	-
6	5.5	-

Order reference

Type	Features	Terminals	Order no.
PNOZ X10.11P C	24 VDC	Cage clamp terminals	787 750
PNOZ X10.11P	24 VDC	Screw terminals	777 750

Up to Category 4, EN 954-1 PNOZ X11P



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Approvals

	PNOZ X11P
	Pending
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 7 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } 2 semiconductor outputs
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
 - Input circuits
- } Semiconductor outputs signal:
 - Switch status channel 1/2
 - Supply voltage is present
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

- } E-STOP pushbuttons
- } Safety gates

Safety features

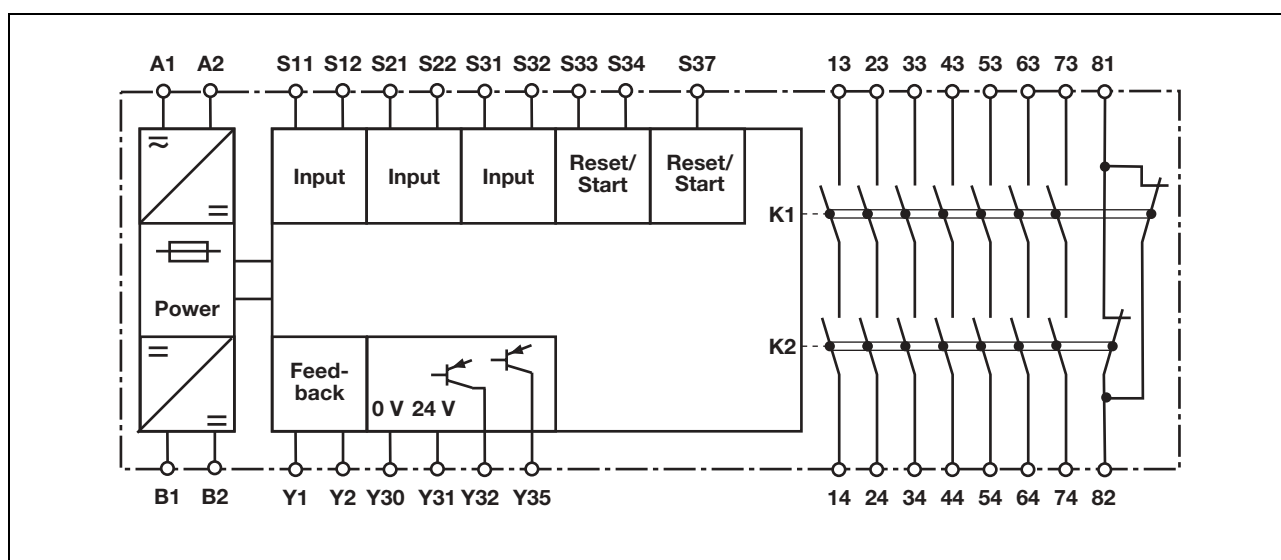
The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

Block diagram

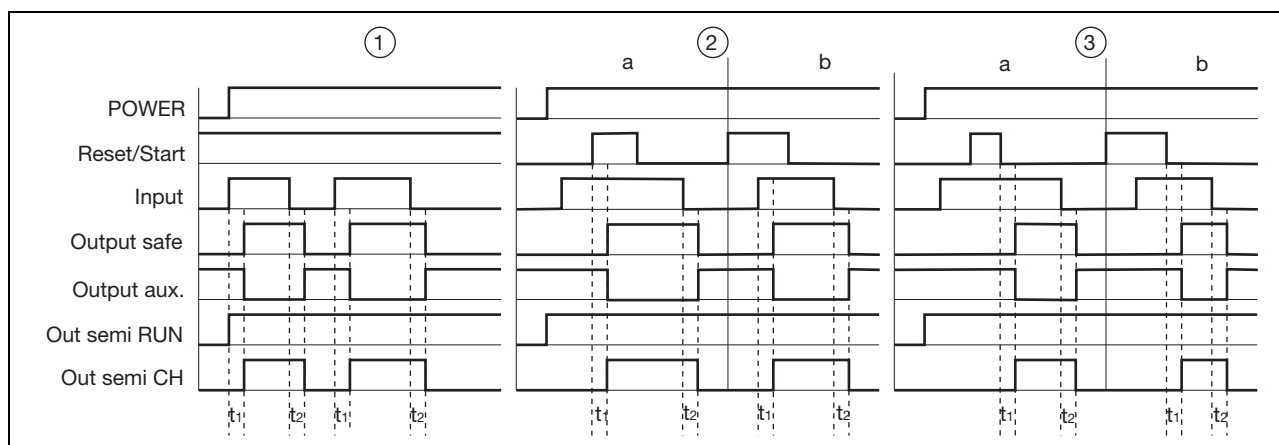


Up to Category 4, EN 954-1 PNOZ X11P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
- short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
- shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once
 - the input circuit is closed and then the reset circuit is closed and opened again.
 - the reset circuit is closed and then opened again once the input circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34, S37
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74
- } Output aux: Auxiliary contacts 81-82
- } Out semi RUN: Semiconductor output supply voltage Y35
- } Out semi CH: Semiconductor output switch status Y32
- } $\bar{r}$: Automatic reset
- } $\bar{r}$: Manual reset
- } $\bar{r}$: Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74 are safety contacts, output 81-82 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{I_{max}}}{R_i / km}$$

$R_{I_{max}}$ = max. overall cable resistance (see technical details)

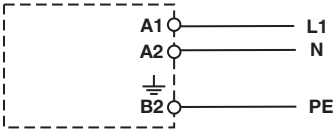
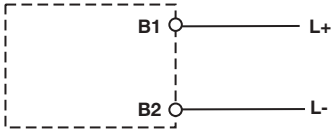
R_i / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

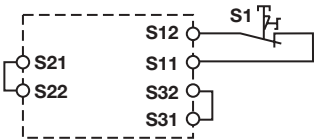
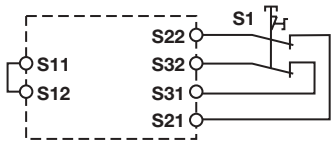
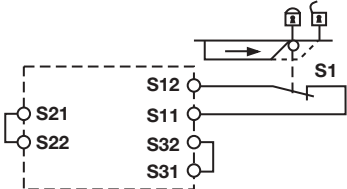
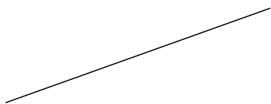
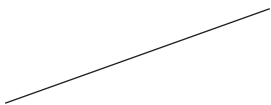
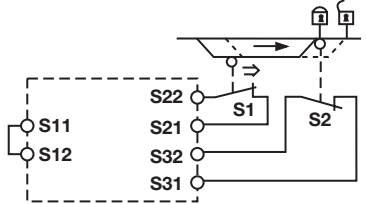
Up to Category 4, EN 954-1
PNOZ X11P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1 PNOZ X11P

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

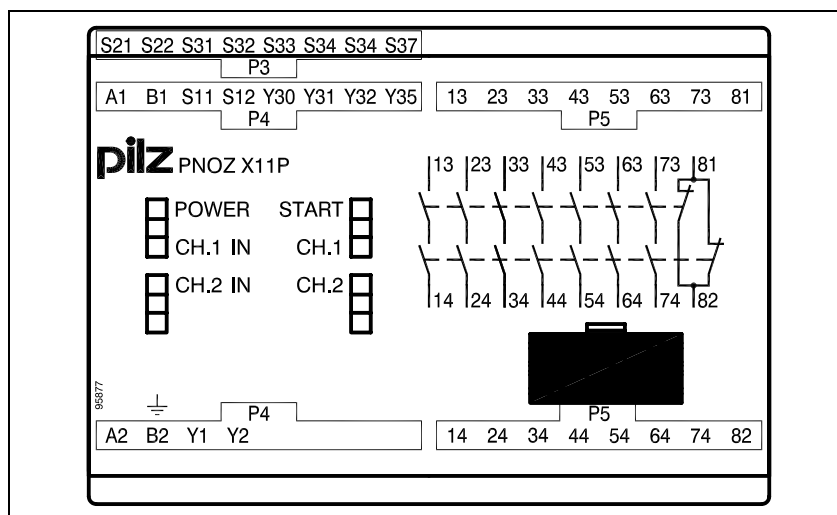
} Semiconductor output

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X11P

Terminal configuration

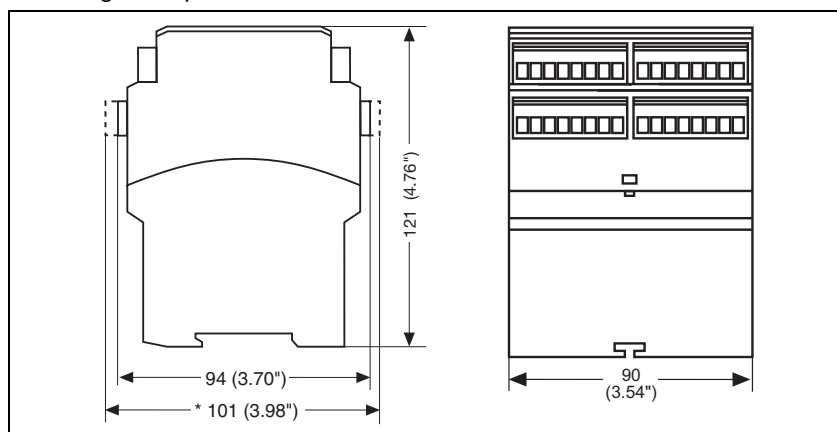


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

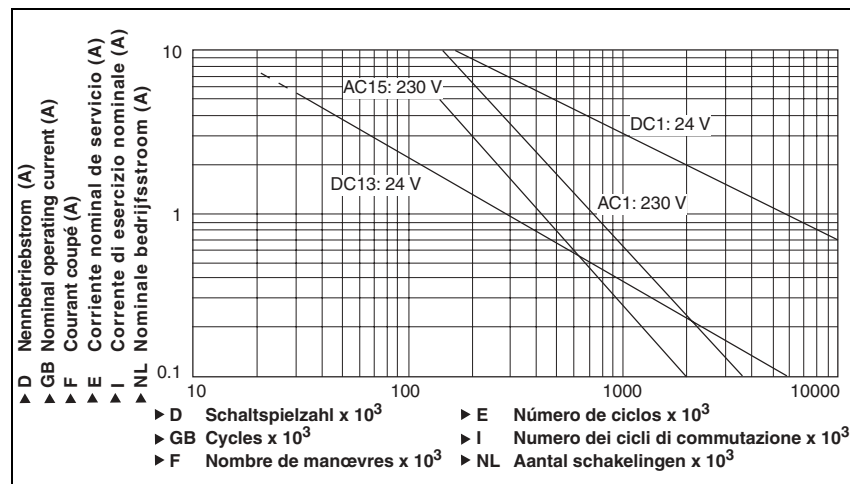


Up to Category 4, EN 954-1 PNOZ X11P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B AC **24 V, 110 – 120 V, 230 - 240 V**

Supply voltage U_B DC **24 V**

Voltage tolerance **-15% / +10%**

Power consumption at U_B AC **9.0 VA**

Power consumption at U_B DC **3.5 W**

Frequency range AC **50 - 60 Hz**

Residual ripple DC **160 %**

Voltage and current at
input circuit: **24 VDC**
reset circuit: **24 VDC**
feedback loop: **24 VDC**

Output contacts in accordance with **EN 954-1, Category 4**
Safety contacts (N/O): **7**
Auxiliary contacts (N/C): **1**

Utilisation category in accordance with **EN 60947-4-1**

AC1: 240 V
 I_{min} : **0.01 A**, I_{max} : **8.0 A**
 P_{max} : **2,000 VA**
DC1: 24 V
 I_{min} : **0.01 A**, I_{max} : **8.0 A**
 P_{max} : **200 W**

Utilisation category in accordance with **EN 60947-5-1**

AC15: 230 V
 I_{max} : **5.0 A**
DC13 (6 cycles/min): 24 V
 I_{max} : **7.0 A**

Contact material **AgSnO₂ + 0.2 σm Au**

External contact fuse protection (**EN 60947-5-1**)

Blow-out fuse, quick **10 A**

Blow-out fuse, slow **6 A**

Circuit breaker **6 A, 24 VAC/DC, characteristic B/C**

Semiconductor outputs (short circuit proof) **24 V DC, 20 mA**

External supply voltage **24 VDC**

Voltage tolerance **-20% / +20%**

Max. overall cable resistance R_{lmax} input circuits,
reset circuits

Single-channel at U_B DC **50 Ohm**

Single-channel at U_B AC **100 Ohm**

Dual-channel with detect. of shorts across contacts at U_B DC **15 Ohm**

Dual-channel with detect. of shorts across contacts at U_B AC **20 Ohm**

Up to Category 4, EN 954-1 PNOZ X11P

2.2

Times	
Switch-on delay	
with automatic reset typ.	450 ms
with automatic reset max.	680 ms
with automatic reset after power on typ.	450 ms
with automatic reset after power on max.	630 ms
with manual reset typ.	450 ms
with manual reset max.	680 ms
with monitored reset typ.	390 ms
with monitored reset max.	550 ms
Delay-on de-energisation	
with E-STOP typ.	17 ms
with E-STOP max.	30 ms
with power failure typ.	40 ms
with power failure max.	60 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	100 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.50 Nm
Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.20 - 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	94 mm x 90 mm x 121 mm
With cage clamp terminals	101 mm x 90 mm x 121 mm
Weight	630 g Order no.: 777080, 777083, 777086 640 g Order no.: 787080, 787083, 787086

The standards current on 03/04 apply.

Up to Category 4, EN 954-1 PNOZ X11P

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC	$I_{\max}$ (A) at U_B AC
1	8 A	8 A
2	8 A	8 A
3	8 A	6.80 A
4	7.20 A	5.90 A
5	6.50 A	5.30 A
6	5.90 A	4.80 A
7	5.50 A	4.50 A

Order reference

Type	Features		Terminals	Order no.
PNOZ X11P C	24 VAC/DC		Cage clamp terminals	787 080
PNOZ X11P	24 VAC/DC		Screw terminals	777 080
PNOZ X11P C	110 - 120 VAC	24 VDC	Cage clamp terminals	787 083
PNOZ X11P	110 - 120 VAC	24 VDC	Screw terminals	777 083
PNOZ X11P C	230 - 240 VAC	24 VDC	Cage clamp terminals	787 086
PNOZ X11P	230 - 240 VAC	24 VDC	Screw terminals	777 086

Up to Category 4, EN 954-1 PNOZ XV1P



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ XV1P	
	É	
	É	
	É	

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
 - 1 safety contact (N/O), delay-on de-energisation
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

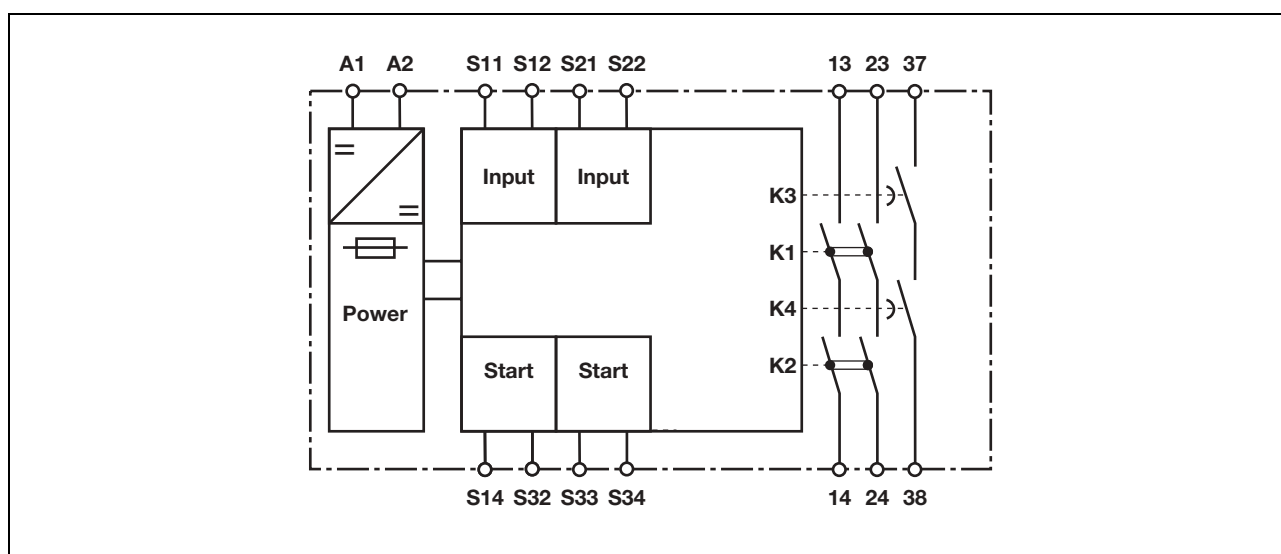
- } E-STOP pushbuttons
- } Safety gates

The max. category the safety contacts can achieve in accordance with EN 954-1 is stated in the technical details.

Safety features

- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
 - } The unit has an electronic fuse.

Block diagram

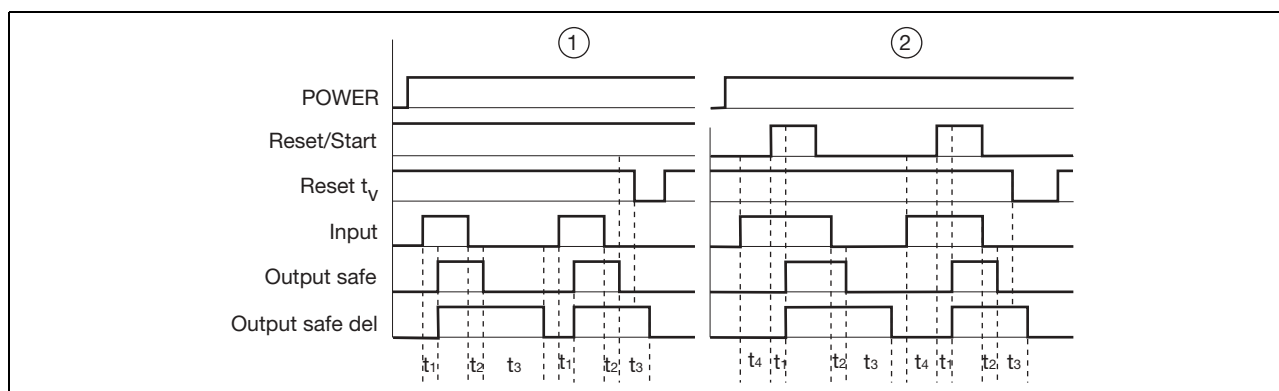


Up to Category 4, EN 954-1 PNOZ XV1P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit
- and, with a monitored reset, in the reset circuit too,
- shorts between contacts in the input circuit.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S14-S32, S33-S34
- } Reset t_v : Y39-Y40
- } Input: Input circuits S11-S12, S12-S32, S21-S22
- } Output safe: Safety contacts, instantaneous 13-14, 23-24
- } Output safe del: Safety contacts, delayed 37-38
- } i : Automatic reset
- } M : Monitored reset
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Delay time
- } t_4 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 37-38 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs $l_{\max}$ in the input circuit:

$$l_{\max} = \frac{R_{l_{\max}}}{R_l / \text{km}}$$

$R_{l_{\max}}$ = max. overall cable resistance (see technical details)

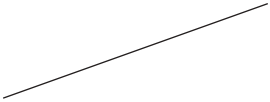
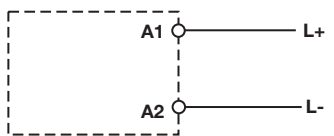
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

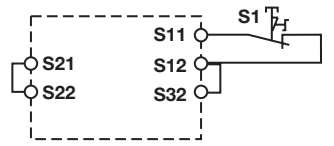
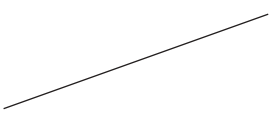
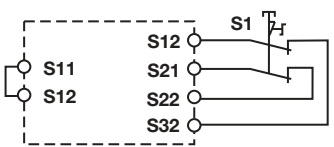
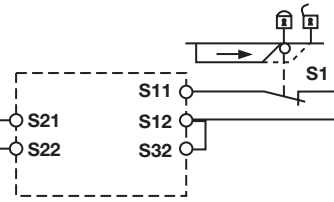
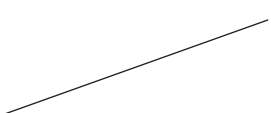
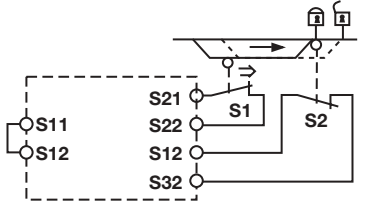
Up to Category 4, EN 954-1
PNOZ XV1P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ XV1P

} Reset circuit

Reset circuit	E-STOP wiring, safety gate	Safety gate (dual-channel)
Automatic reset		
Monitored reset		

} Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

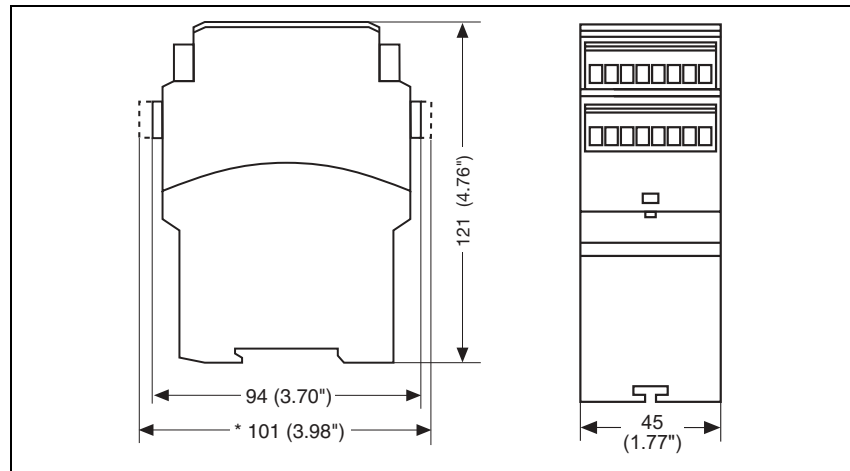
S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

2.2

Diagram of the PNOZ XV1P safety relay terminal block. The terminals are arranged in a 4x2 pin configuration. The top row contains terminals A1, 13, 23, and 37. The second row contains terminals P1, S11, S12, S14, and S32. The third row contains terminals P2, PNOZ XV1P, PWR, CH. 1/2, CH. 1/2[t], 1, 2, 3, 5, 10, 20, 30, and s. The bottom row contains terminals 95285, S21, S22, S33, S34, P2, P1, A2, 14, 24, and 38.

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

* with cage clamp terminals

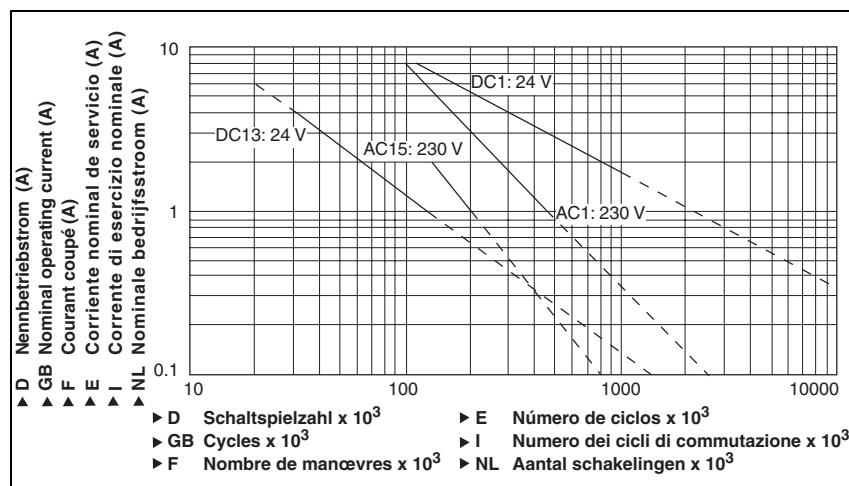


Up to Category 4, EN 954-1 PNOZ XV1P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15% / +10%
Power consumption	3.5 W
Residual ripple DC	20 %
Voltage and current at input circuit: 24.0 V DC	35.0 mA
reset circuit: 24.0 V DC	35.0 mA
feedback loop: 24.0 V DC	1.0 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 2 ST
Output contacts in accordance with EN 954-1	Safety contacts (N/O), delayed: 1 ST
Category 1 Order no. 777602, 787602	When delay time >30 s
Category 3	When delay time <30 s
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A , I_{max} : 5.0 A P_{max} : 1,250 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 5.0 A P_{max} : 125 W
Utilisation category in accordance with EN 60947-5-1:	
Inst. contacts	
AC15: 230 V	I_{max} : 1.5 A
DC13 (6 cycles/min): 24 V	I_{max} : 2.0 A
Utilisation category in accordance with EN 60947-5-1:	
Delayed contacts	
AC15: 230 V	I_{max} : 2.0 A
DC13 (6 cycles/min): 24 V	I_{max} : 4.0 A
Contact material	AgSnO₂ + 0.2 μm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A , 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel	100 Ohm
Dual-channel without detection of shorts across contacts	150 Ohm
Dual-channel with detection of shorts across contacts	15 Ohm

Up to Category 4, EN 954-1 PNOZ XV1P

2.2

Times	
Switch-on delay	
with automatic reset typ.	350 ms
with automatic reset max.	650 ms
with automatic reset after power on typ.	350 ms
with automatic reset after power on max.	650 ms
with monitored reset typ.	30 ms
with monitored reset max.	60 ms
Delay-on de-energisation	
with E-STOP typ.	15 ms
with E-STOP max.	30 ms
with power failure typ.	80 ms
with power failure max.	250 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms + t _v
after power failure	300 ms
Delay time t _v	
selectable	0.10 s – 3.00 s Order no.: 777601, 787601
	1.00 s – 30.00 s Order no.: 777602, 787602
Repetition accuracy	2 %
Time accuracy	-20% / +20%
Waiting period with a monitored reset	300 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2, EN 61000-6-3
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 – 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 – 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 1.50 mm ²
Torque setting with screw terminals	0.50 Nm
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 – 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	94.0 mm x 22.5 mm x 121.0 mm
With cage clamp terminals	101.0 mm x 22.5 mm x 121.0 mm
Weight	220 g

The standards current on 09/03 apply.

Up to Category 4, EN 954-1 PNOZ XV1P

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC
1	5.00 A
2	3.70 A
3	3.00 A

Order reference

Type	Features	Terminals	Order no.
PNOZ XV1P	24 VDC	3 s selectable	Screw terminals
PNOZ XV1P C	24 VDC	3 s selectable	Cage clamp terminals
PNOZ XV1P	24 VDC	30 s selectable	Screw terminals
PNOZ XV1P C	24 VDC	30 s selectable	Cage clamp terminals

Up to Category 4, EN 954-1 PNOZ XV2P



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ XV2P
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Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
 - 2 safety contacts (N/O), delay-on de-energisation
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } Delay-on de-energisation, fixed or selectable
- } Delay time can be cancelled via reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

} E-STOP pushbuttons

} Safety gates

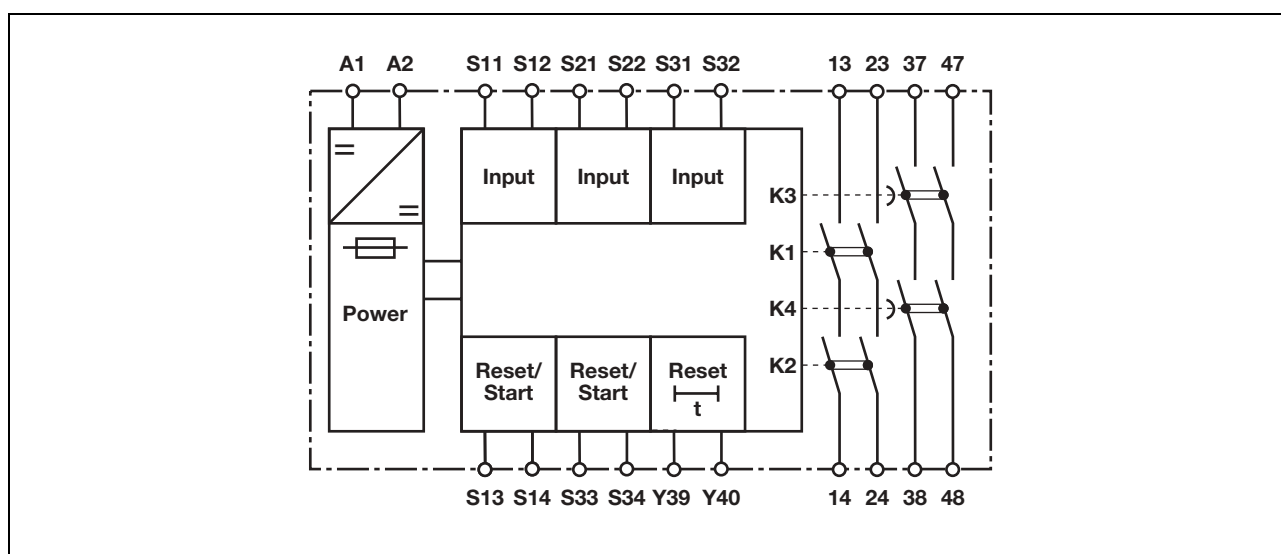
The max. category the safety contacts can achieve in accordance with EN 954-1 is stated in the technical details.

Safety features

The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Block diagram

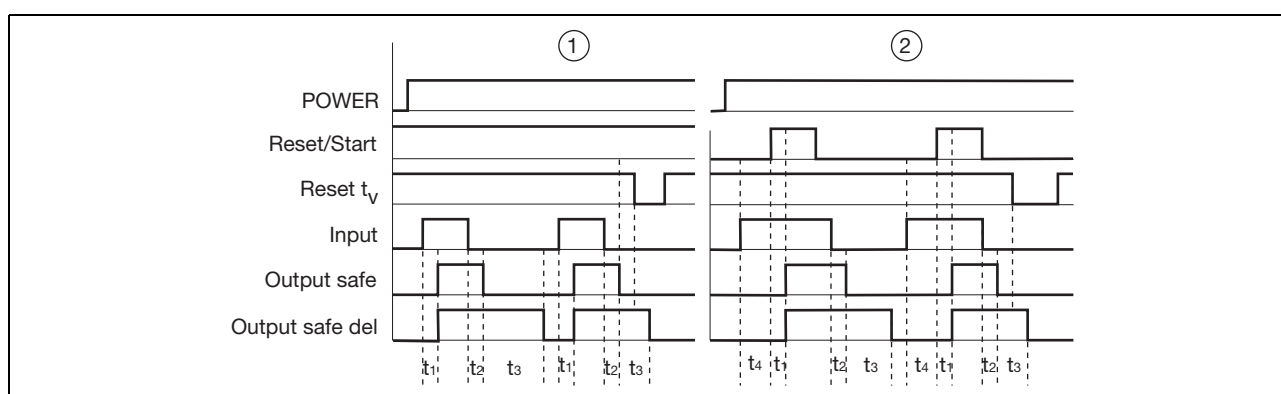


Up to Category 4, EN 954-1 PNOZ XV2P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S13-S14, S33-S34
- } Reset t_v : Y39-Y40
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts, instantaneous 13-14, 23-24
- } Output safe del: Safety contacts, delayed 37-38, 47-48
- } $\bar{i}$: Automatic reset
- } M : Monitored reset
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Delay time
- } t_4 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24 are instantaneous safety contacts, outputs 37-38, 47-48 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs $l_{\max}$ in the input circuit:

$$l_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

$R_{l\max}$ = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1
PNOZ XV2P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ XV2P

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Monitored reset		

} Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Reset delay time

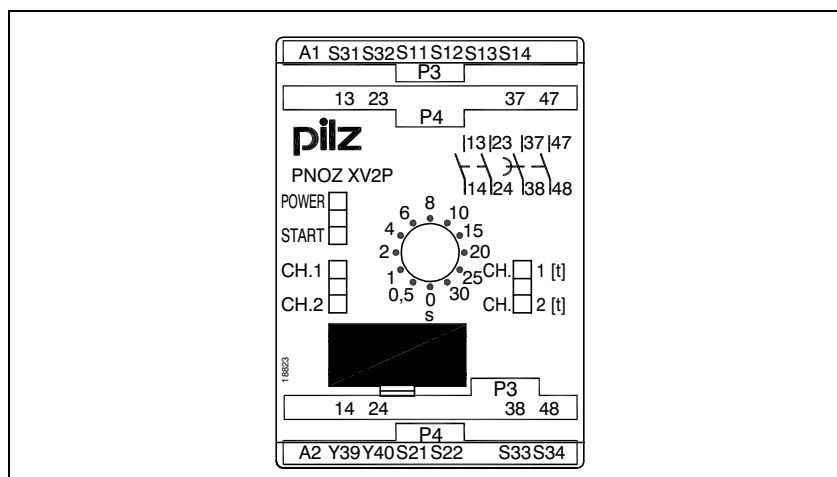
Reset	Without reset	With reset
Link or N/C contact		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ XV2P

Terminal configuration

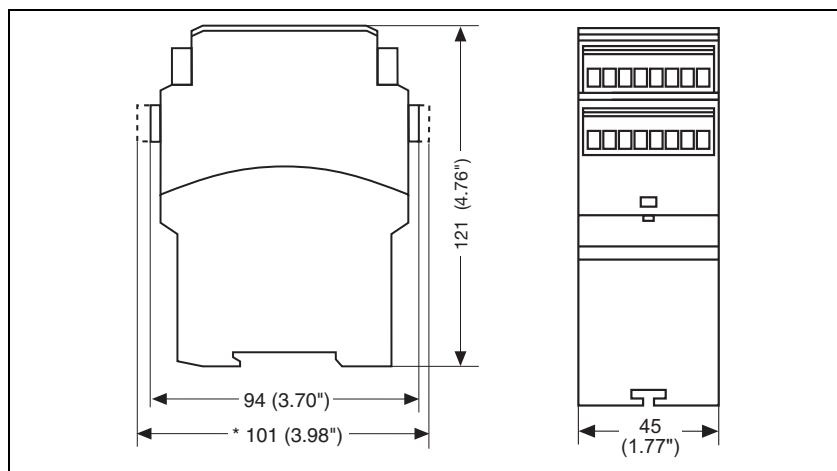


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

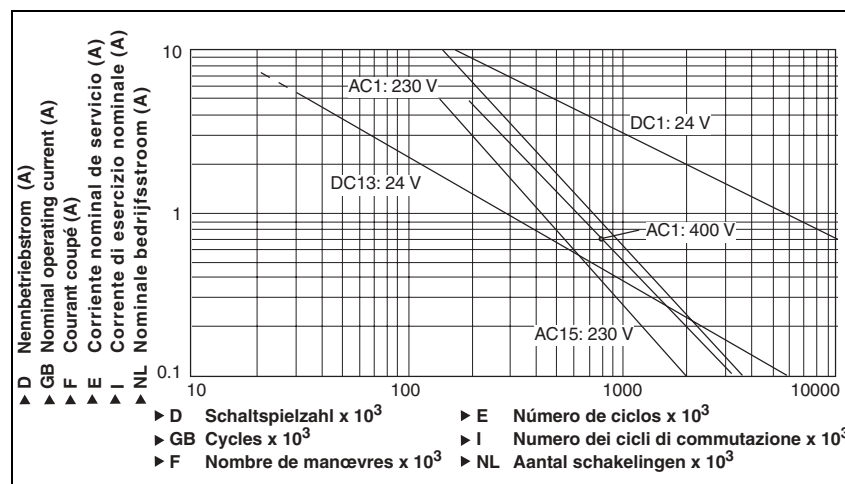


Up to Category 4, EN 954-1 PNOZ XV2P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B DC	4.5 W
Residual ripple DC	160 %
Voltage and current at input circuit: 24 VDC	40.0 mA
reset circuit: 24 VDC	40.0 mA
feedback loop: 24 VDC	40.0 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 2 ST
Output contacts in accordance with EN 954-1	Safety contacts (N/O), delayed: 2 ST
Category 1 Order no. 777500, 787500	If delay time >30 s
Category 3	If delay time <30 s
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 2000 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : 5.0 A
DC13 (6 cycles/min): 24 V	I_{max} : 7.0 A
Contact material	AgSnO₂ + 0.2 σm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A , 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B DC	100 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	10 Ohm

Up to Category 4, EN 954-1 PNOZ XV2P

2.2

Times	
Switch-on delay	
with automatic reset typ.	350 ms
with automatic reset max.	650 ms
with automatic reset after power on typ.	385 ms
with automatic reset after power on max.	700 ms
with monitored reset typ.	35 ms
with monitored reset max.	70 ms
Delay-on de-energisation	
with E-STOP typ.	15 ms
with E-STOP max.	30 ms
with power failure typ.	85 ms
with power failure max.	200 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	250 ms
Delay time t_v	
selectable	0.10 s, 0.20 s, 0.30 s, 0.40 s, 0.50 s, 0.60 s, 0.70 s, 0.80 s, 1.00 s, 1.50 s, 2.00 s, 3.00 s Order no.: 777502, 787502
	0.00 s, 0.50 s, 1.00 s, 2.00 s, 4.00 s, 6.00 s, 8.00 s, 10.00 s, 15.00 s, 20.00 s, 25.00 s, 30.00 s Order no.: 774500, 787500
Fixed	0.5 s Order no.: 777504, 787504 1.0 s Order no.: 777503, 787503
Repetition accuracy	2 %
Time accuracy	-15 % / +15 % +50 ms
Waiting period with a monitored reset	300 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.50 Nm
Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.2 - 1.5 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	94 mm x 45 mm x 121 mm
With cage clamp terminals	101 mm x 45 mm x 121 mm
Weight	360 g Order no. 777502, 777500
	350 g Order no. 787502, 787500, 777504, 777503
	340 g Order no. 787504, 787503

Up to Category 4, EN 954-1 PNOZ XV2P

The standards current on **11/03** apply.

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC
1	8.00 A
2	7.00 A
3	5.70 A
4	5.00 A

Order reference

Type	Features	Terminals	Order no.
PNOZ XV2P	24 VDC	30 s selectable	Screw terminals
PNOZ XV2P C	24 VDC	30 s selectable	Cage clamp terminals
PNOZ XV2P	24 VDC	3 s selectable	Screw terminals
PNOZ XV2P C	24 VDC	3 s selectable	Cage clamp terminals
PNOZ XV2P	24 VDC	1 s fixed	Screw terminals
PNOZ XV2P C	24 VDC	1 s fixed	Cage clamp terminals
PNOZ XV2P	24 VDC	0.5 s fixed	Screw terminals
PNOZ XV2P C	24 VDC	0.5 s fixed	Cage clamp terminals

Up to Category 4, EN 954-1 PNOZ XV2.1P



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ XV2.1P
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	É
	É

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
 - 2 safety contacts (N/O), delay-on de-energisation
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } Delay time can be cancelled via reset button
- } Delay-on de-energisation, fixed or selectable
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
- } See order reference for unit types

The max. category the safety contacts can achieve in accordance with EN 954-1 is stated in the technical details.

Safety features

The relay conforms to the following safety criteria:

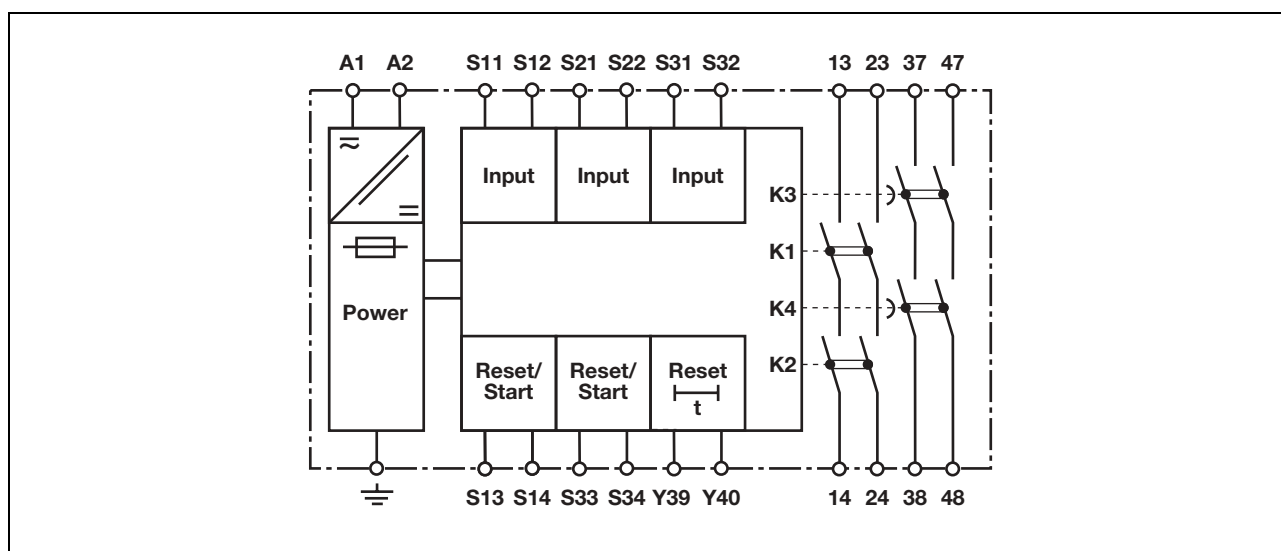
- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

Block diagram

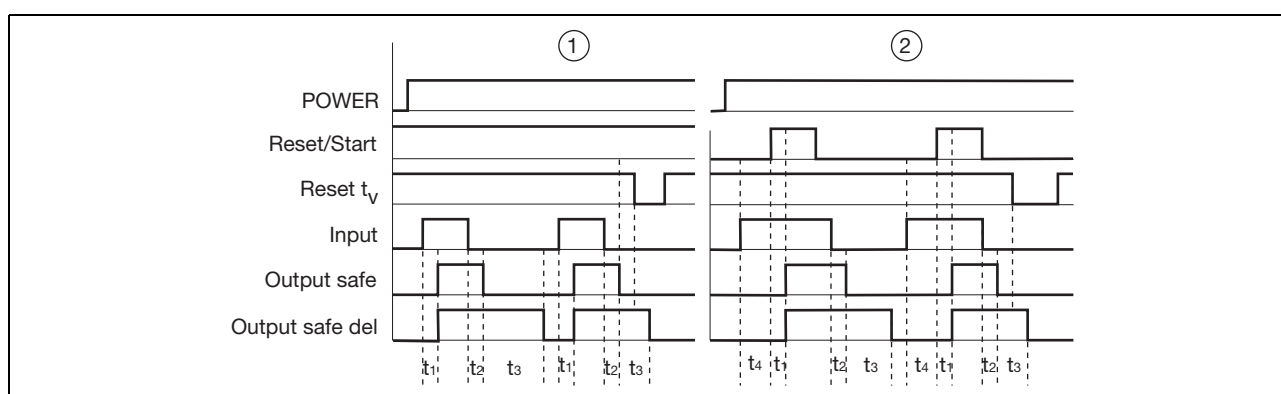


Up to Category 4, EN 954-1 PNOZ XV2.1P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S13-S14, S33-S34
- } Reset t_v : Y39-Y40
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts, instantaneous 13-14, 23-24
- } Output safe del: Safety contacts, delayed 37-38, 47-48
- } i : Automatic reset
- } C : Monitored reset
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Delay time
- } t_4 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24 are instantaneous safety contacts, outputs 37-38, 47-48 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs l_{max} in the input circuit:

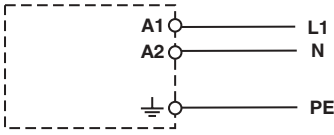
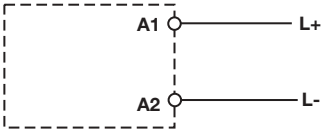
$$l_{\text{max}} = \frac{R_{l\text{max}}}{R_l / \text{km}}$$

$R_{l\text{max}}$ = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

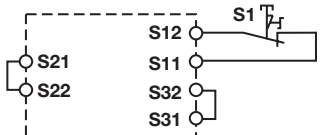
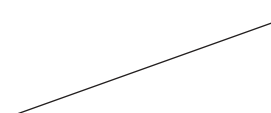
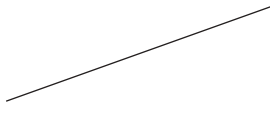
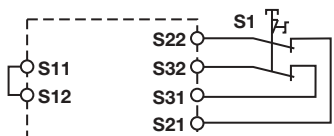
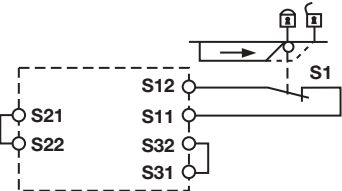
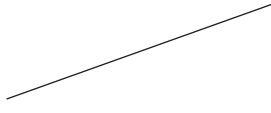
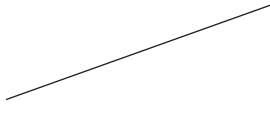
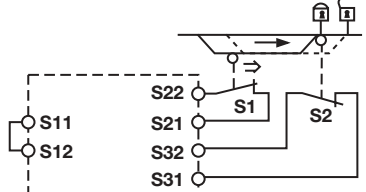
Up to Category 4, EN 954-1
PNOZ XV2.1P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ XV2.1P

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Monitored reset		

} Reset

Feedback loop	Automatic reset	Monitored reset
Link or N/C contact		

} Feedback loop

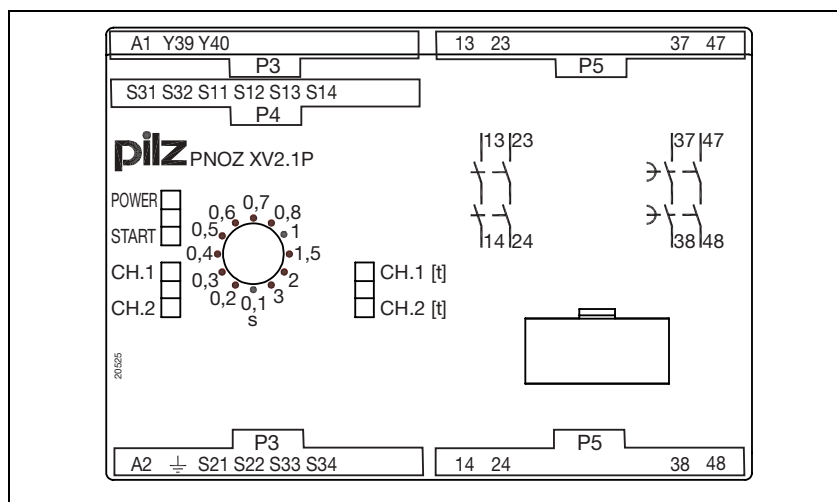
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ XV2.1P

Terminal configuration

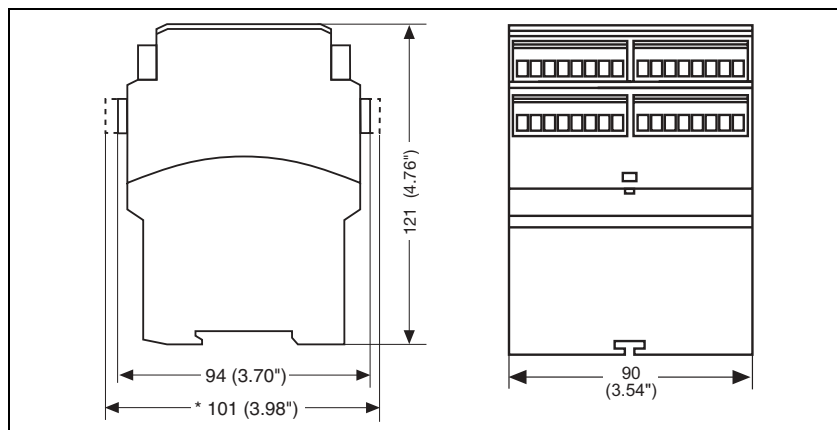


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

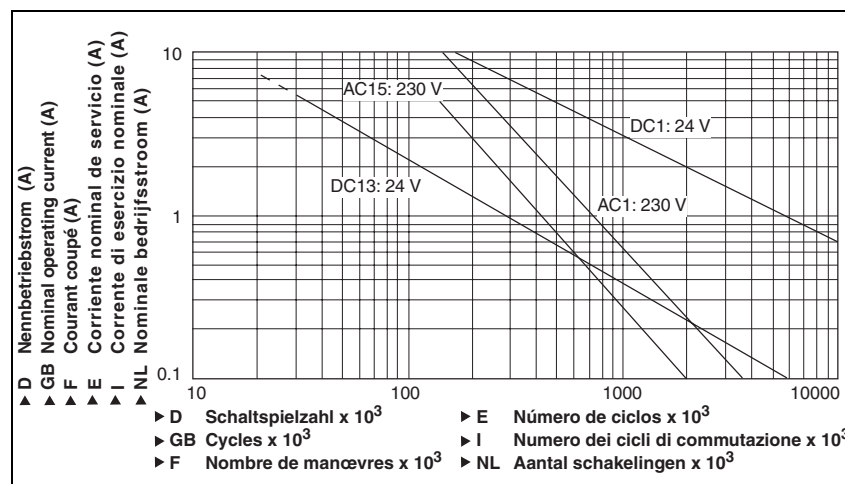


Up to Category 4, EN 954-1 PNOZ XV2.1P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage	
Supply voltage U_B AC/DC	24 - 240 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B AC	8.5 VA
Power consumption at U_B DC	5.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at	
input circuit DC: 24.0 V	35.0 mA
reset circuit DC: 24.0 V	30.0 mA
feedback loop DC: 24.0 V	3.1 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 2
Output contacts in accordance with EN 954-1 Category 3	Safety contacts (N/O), delayed: 2
Category 1 Order no.: 777540, 777548, 787540, 787548	Delay time <30 s
Utilisation category in accordance with EN 60947-4-1	Delay time >30 s
Safety contacts: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 8.00 A P_{max} : 2000 VA
Safety contacts: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 200 W
Safety contacts, delayed: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 2000 VA
Safety contacts, delayed: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I_{max} : 5.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 7.0 A
Safety contacts, delayed: AC15 at 230 V	I_{max} : 5.0 A
Safety contacts, delayed: DC13 at 24 V (6 cycles/min)	I_{max} : 7.0 A
Contact material	AgSnO2 + 0.2 µm Au

Up to Category 4, EN 954-1 PNOZ XV2.1P

2.2

Electrical data

External contact fuse protection to **EN 60947-5-1**

Blow-out fuse, quick

Safety contacts: **10 A**

Safety contacts, delayed: **10 A**

Blow-out fuse, slow

Safety contacts: **6 A**

Safety contacts, delayed: **6 A**

Circuit breaker 24 VAC/DC, characteristic B/C

Safety contacts: **6 A**

Safety contacts, delayed: **6 A**

Max. overall cable resistance R_{lmax}

input circuits, reset circuits

single-channel at U_B DC **200 Ohm**

single-channel at U_B AC **200 Ohm**

dual-channel with detect. of shorts across contacts at U_B DC **20 Ohm**

dual-channel with detect. of shorts across contacts at U_B AC **20 Ohm**

Times

Switch-on delay

with automatic reset typ. **400 ms**

with automatic reset max. **550 ms**

with automatic reset after power on typ. **625 ms**

with automatic reset after power on max. **870 ms**

with monitored reset typ. **35 ms**

with monitored reset max. **60 ms**

Delay-on de-energisation

with E-STOP typ. **15 ms**

with E-STOP max. **30 ms**

with power failure typ. $U_B = 24 \text{ V DC}$ **120 ms**

with power failure max. $U_B = 24 \text{ V DC}$ **500 ms**

with power failure typ. $U_B = 240 \text{ VAC}$ **900 ms**

with power failure max. $U_B = 240 \text{ VAC}$ **2200 ms**

Recovery time at max. switching frequency 1/s

after E-STOP **50 ms +tv**

after power failure on universal power supply **2250 ms**

Delay time t_V : selectable

0.00 s; 0.50 s; 1.00 s; 2.00 s; 4.00 s; 6.00 s; 8.00 s; 10.00 s; 15.00 s; 20.00 s; 25.00 s; 30.00 s Order no.: 777540

0.10 s; 0.20 s; 0.30 s; 0.40 s; 0.50 s; 0.60 s; 0.70 s; 0.80 s; 1.00 s; 1.50 s; 2.00 s; 3.00 s Order no.: 777542

0.00 s; 5.00 s; 10.00 s; 20.00 s; 40.00 s; 60.00 s; 80.00 s; 100.00 s; 150.00 s; 200.00 s; 250.00 s; 300.00 s Order no.: 777548

0.00 s; 0.50 s; 1.00 s; 2.00 s; 4.00 s; 6.00 s; 8.00 s; 10.00 s; 15.00 s; 20.00 s; 25.00 s; 30.00 s Order no.: 787540

0.10 s; 0.20 s; 0.30 s; 0.40 s; 0.50 s; 0.60 s; 0.70 s; 0.80 s; 1.00 s; 1.50 s; 2.00 s; 3.00 s Order no.: 787542

0.00 s; 5.00 s; 10.00 s; 20.00 s; 40.00 s; 60.00 s; 80.00 s; 100.00 s; 150.00 s; 200.00 s; 250.00 s; 300.00 s Order no.: 787548

Delay time t_V : fixed

0.50 s Order no.: 777544

10.00 s Order no.: 777547

3.00 s Order no.: 777545

Repetition accuracy

2 %

Time accuracy

-15 %/+15 % +50 ms

Waiting period with a monitored reset

300 ms

Min. start pulse duration with a monitored reset

30 ms

Simultaneity, channel 1 and 2

←

Supply interruption before de-energisation

20 ms

Up to Category 4, EN 954-1 PNOZ XV2.1P

Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2, EN 61000-6-4
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG Order no.: 777540, 777542, 777544, 777545, 777547, 777548
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG Order no.: 777540, 777542, 777544, 777545, 777547, 777548
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 777540, 777542, 777544, 777545, 777547, 777548
Torque setting with screw terminals	0.50 Nm Order no.: 777540, 777542, 777544, 777545, 777547, 777548
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 787540, 787542, 787548
Cage clamp terminals: terminal points per connection	2 Order no.: 787540, 787542, 787548
Stripping length	8 mm Order no.: 787540, 787542, 787548
Dimensions	
Height	101.0 mm Order no.: 787540, 787542, 787548 94.0 mm Order no.: 777540, 777542, 777544, 777545, 777547, 777548
Width	90.0 mm
Depth	121.0 mm
Weight	550 g Order no.: 777544, 777545, 777547, 787540, 787542, 787548 560 g Order no.: 777540, 777542, 777548

The standards current on 04/03 apply.

Max. continuous current		
Number of contacts	I _{max} (A) at U _B DC	I _{max} (A) at U _B AC
1	8.00 A	8.00 A
2	7.00 A	7.00 A
3	5.70 A	5.70 A
4	5.00 A	5.00 A

Up to Category 4, EN 954-1 PNOZ XV2.1P

Order reference

Type	Features		Terminals	Order no.
PNOZ XV2.1P C	24 - 240 VAC/DC	3 s selectable	Cage clamp terminals	787 542
PNOZ XV2.1P	24 - 240 VAC/DC	3 s selectable	Screw terminals	777 542
PNOZ XV2.1P C	24 - 240 VAC/DC	30 s selectable	Cage clamp terminals	787 540
PNOZ XV2.1P	24 - 240 VAC/DC	30 s selectable	Screw terminals	777 540
PNOZ XV2.1P C	24 - 240 VAC/DC	300 s selectable	Cage clamp terminals	787 548
PNOZ XV2.1P	24 - 240 VAC/DC	300 s selectable	Screw terminals	777 548
PNOZ XV2.1P	24 - 240 VAC/DC	0.5 s fixed	Screw terminals	777 544
PNOZ XV2.1P	24 - 240 VAC/DC	3 s fixed	Screw terminals	777 545
PNOZ XV2.1P	24 - 240 VAC/DC	10 s fixed	Screw terminals	777 547

Up to Category 4, EN 954-1 PNOZ XV3P



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Approvals

	PNOZ XV3P
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	É
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Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 2 safety contacts (N/O), delay-on de-energisation
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- } Delay-on de-energisation, fixed or selectable
- } Delay time can be cancelled via reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

} Safety gates

} Light barriers

The max. category the safety contacts can achieve in accordance with EN 954-1 is stated in the technical details.

Safety features

The relay conforms to the following safety criteria:

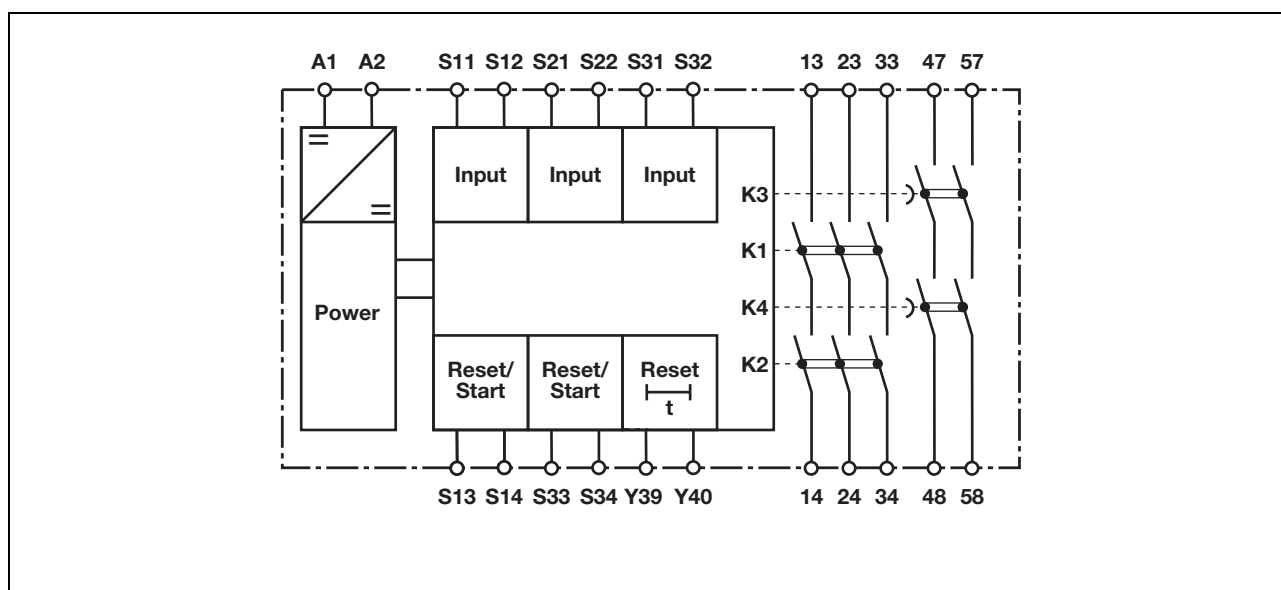
- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons

Block diagram

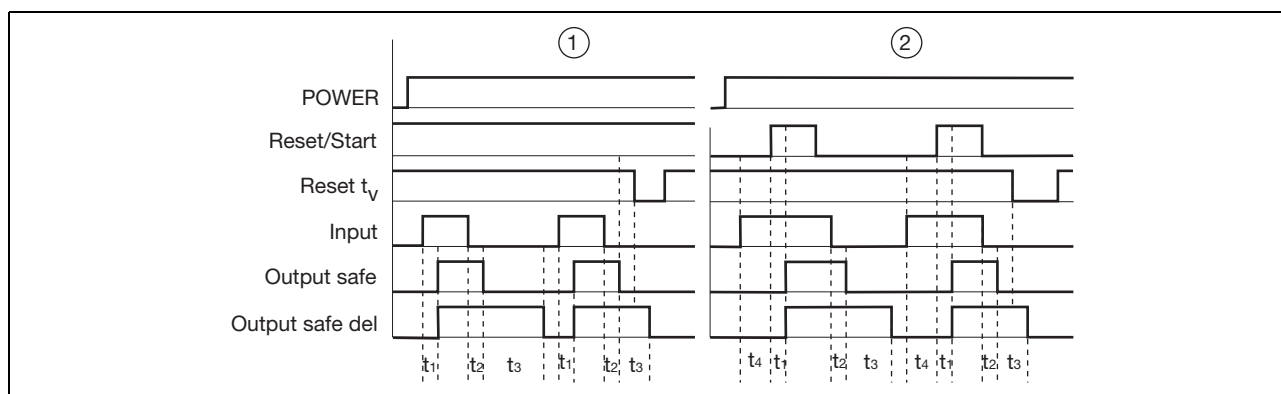


Up to Category 4, EN 954-1 PNOZ XV3P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit
- and, with a monitored reset, in the reset circuit too.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S13-S14, S33-S34
- } Reset t_v : Y39-Y40
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts, instantaneous 13-14, 23-24, 33-34
- } Output safe del: Safety contacts, delayed 47-48, 57-58
- } i : Automatic reset
- } C : Monitored reset
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Delay time
- } t_4 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34 are instantaneous safety contacts, outputs 47-48, 57-58 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs $I_{\max}$ in the input circuit:

$$I_{\max} = \frac{R_{I_{\max}}}{R_l / \text{km}}$$

$R_{I_{\max}}$ = max. overall cable resistance (see technical details)

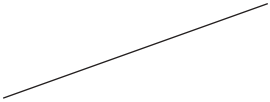
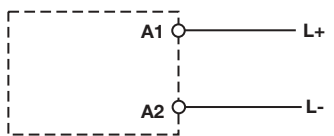
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

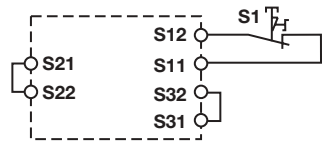
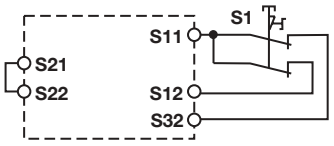
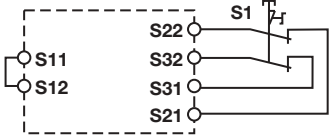
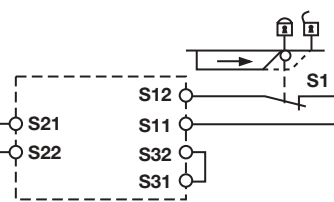
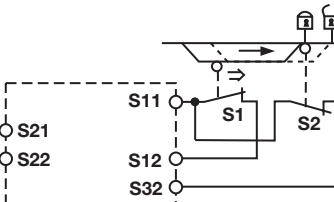
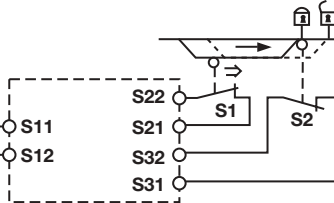
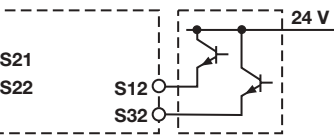
Up to Category 4, EN 954-1 PNOZ XV3P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP Without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Light barrier with detection of shorts across contacts via ESPE		

Up to Category 4, EN 954-1
PNOZ XV3P

} Reset circuit

Reset circuit	E-STOP wiring, safety gate	Safety gate (dual-channel)
Automatic reset		
Monitored reset		

} Reset

Reset	Link	N/C contact for resetting the delay time
Link or N/C contact		

} Feedback loop

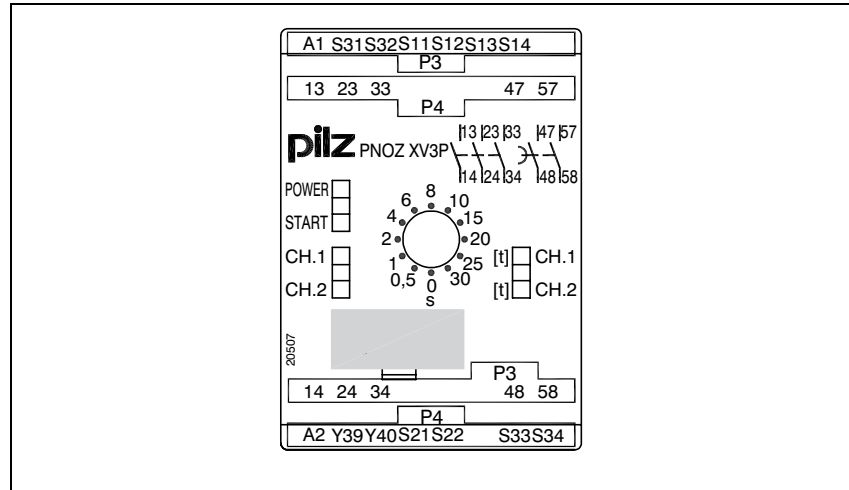
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ XV3P

Terminal configuration

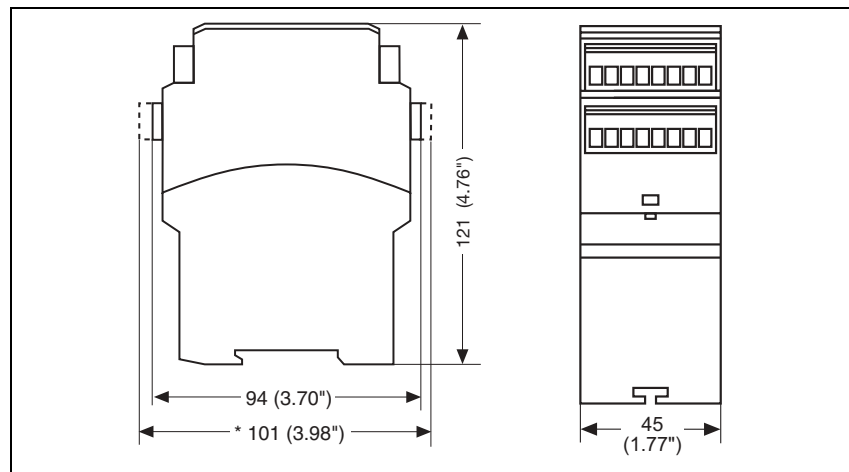


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

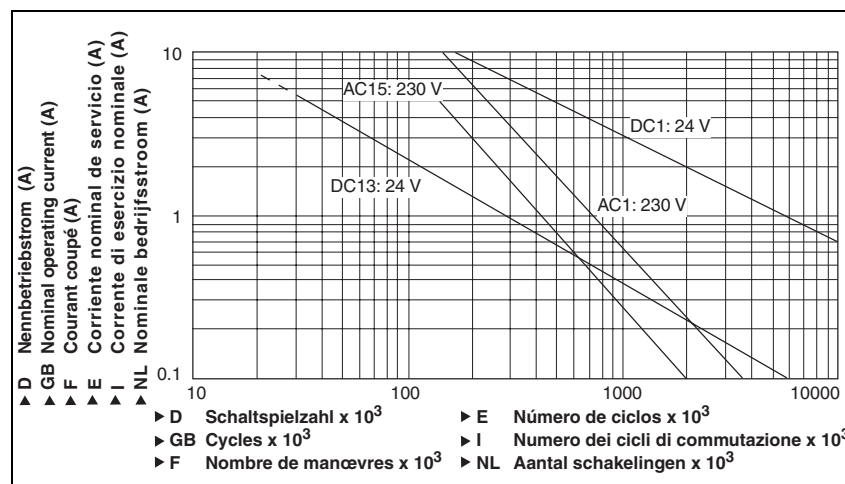


Up to Category 4, EN 954-1 PNOZ XV3P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / + 10 %
Power consumption at U_B DC	4.5 W
Residual ripple DC	160 %
Voltage and current at input circuit: 24 VDC reset circuit: 24 VDC feedback loop: 24 VDC	45 mA 50.0 mA 1.0 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 3 ST
Output contacts in accordance with EN 954-1 Category 1 Order no. 777 510, 777 518, 787 510, 787 518 Category 3	Safety contacts (N/O), delayed: 2 ST If delay time >30 s If delay time <30 s
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	I_{min} : 0.01 A , I_{max} : 8 A P_{max} : 2,000 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 8 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V DC13 (6 cycles/min): 24 V	I_{max} : 5 A I_{max} : 7 A
Contact material	AgSnO₂ + 0.2 σm Au
External contact fuse protection (EN 60947-5-1) Blow-out fuse, quick Blow-out fuse, slow Circuit breaker	10 A 6 A 6 A , 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits Single-channel at U_B DC Dual-channel without detect. of shorts across contacts at U_B DC Dual-channel with detect. of shorts across contacts at U_B DC	100 Ohm 100 Ohm 10 Ohm

Up to Category 4, EN 954-1 PNOZ XV3P

Times	
Switch-on delay	
with automatic reset typ.	350 ms
with automatic reset max.	650 ms
with automatic reset after power on typ.	385 ms
with automatic reset after power on max.	700 ms
with monitored reset typ.	35 ms
with monitored reset max.	70 ms
Delay-on de-energisation	
with E-STOP typ.	15 ms
with E-STOP max.	30 ms
with power failure typ.	85 ms
with power failure max.	200 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms + t _v
after power failure	250 ms
Delay time t _v	
selectable	0.10 s, 0.20 s, 0.30 s, 0.40 s, 0.50 s, 0.60 s, 0.70 s, 0.80 s, 1.00 s, 1.50 s, 2.00 s, 3.00 s Order no.: 777512, 787512
	0.00 s, 0.50 s, 1.00 s, 2.00 s, 4.00 s, 6.00 s, 8.00 s, 10.00 s, 15.00 s, 20.00 s, 25.00 s, 30.00 s Order no.: 777510, 787510
	0.00 s, 5.00 s, 10.00 s, 20.00 s, 40.00 s, 60.00 s, 80.00 s, 100.00 s, 150.00 s, 200.00 s, 250.00 s, 300.00 s Order no.: 777518, 787518
Fixed	0.5 s Order no.: 777514, 3.0 s Order no.: 777515, 10.0 s Order no.: 777517
Repetition accuracy	2 %
Time accuracy	-15% / +15% +50 ms
Waiting period with a monitored reset	300 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 – 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 – 55 °C
Storage temperature	-40 – 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL94 VO
Front	ABS UL94 VO
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.50 Nm

Up to Category 4, EN 954-1 PNOZ XV3P

Mechanical data

Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.2 - 1.5 mm²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
With screw terminals	94 mm x 45 mm x 121 mm
With cage clamp terminals	101 mm x 45 mm x 121 mm
Weight	360 g Order no.: 777514, 777515, 777517, 787510, 787512, 787518 370 g Order no.: 777510, 777512, 777518

The standards current on **08/02** apply.

Max. continuous current

Number of contacts	I _{max} (A) at U _B DC
1	8.0 A
2	6.8 A
3	5.5 A
4	4.8 A
5	4.3 A

Order reference

Type	Features		Terminals	Order no.
PNOZ XV3P	24 VDC	0.5 s fixed	Screw terminals	777 514
PNOZ XV3P	24 VDC	3 s fixed	Screw terminals	777 515
PNOZ XV3P	24 VDC	10 s fixed	Screw terminals	777 517
PNOZ XV3P C	24 VDC	3 s selectable	Cage clamp terminals	787 512
PNOZ XV3P	24 VDC	3 s selectable	Screw terminals	777 512
PNOZ XV3P C	24 VDC	30 s selectable	Cage clamp terminals	787 510
PNOZ XV3P	24 VDC	30 s selectable	Screw terminals	777 510
PNOZ XV3P C	24 VDC	300 s selectable	Cage clamp terminals	787 518
PNOZ XV3P	24 VDC	300 s selectable	Screw terminals	777 518

Up to Category 4, EN 954-1
PNOZ XV3.1P



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ XV3.1P
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	É
	É

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 2 safety contacts (N/O), delay-on de-energisation
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Light barriers
 - Reset button
- } Delay-on de-energisation, fixed or selectable
- } Delay time can be cancelled via reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates
- } Light barriers

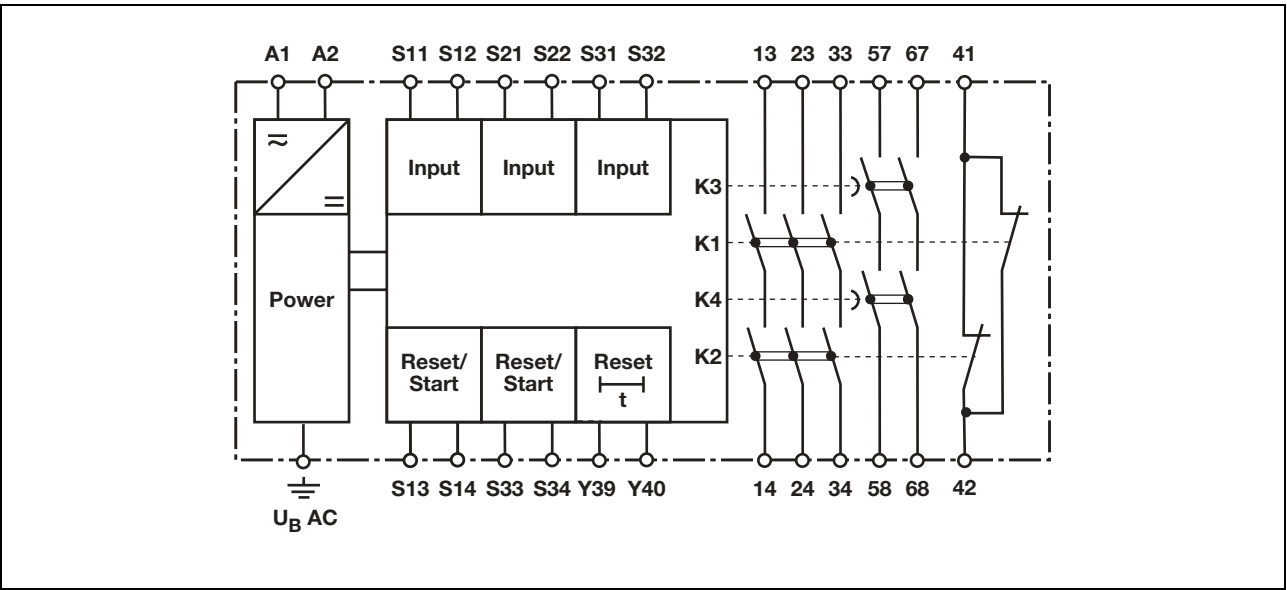
The max. category the safety contacts can achieve in accordance with EN 954-1 is stated in the technical details.

Safety features

The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

Block diagram

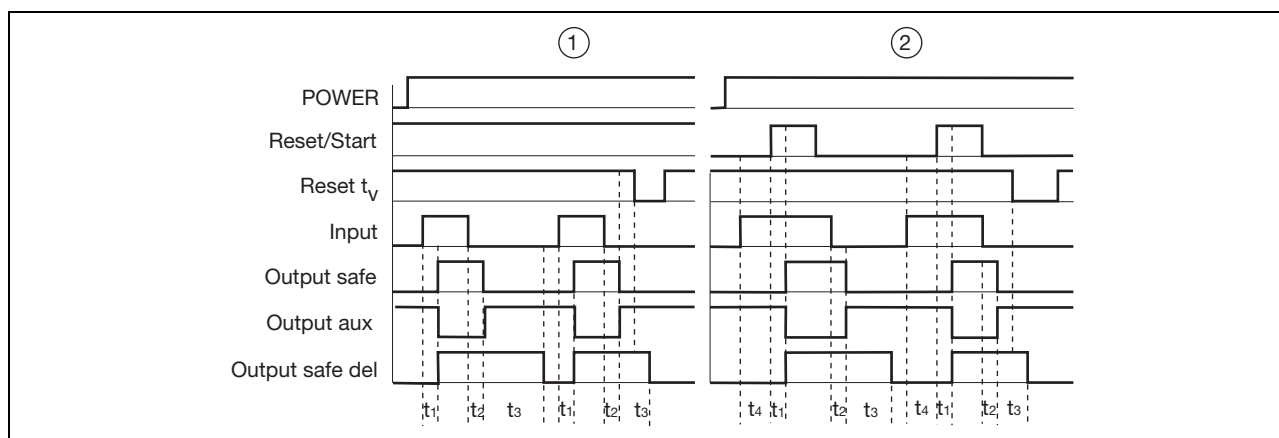


Up to Category 4, EN 954-1 PNOZ XV3.1P

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit
- and, with a monitored reset, in the reset circuit too,
- shorts between contacts in the input circuit.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S13-S14, S33-S34
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts, instantaneous 13-14, 23-24, 33-34
- } Output safe del: Safety contacts, delayed 57-58, 67-68
- } Output aux: Auxiliary contacts 41-42
- } i : Automatic reset
- } ϕ : Monitored reset
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Delay time
- } t_4 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34 are instantaneous safety contacts, outputs 57-58, 67-68 are delay-on de-energisation safety contacts, output 41-42 is an instantaneous auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs $l_{\max}$ in the input circuit:

$$l_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

$R_{l\max}$ = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ XV3.1P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Light barrier with detection of shorts across contacts via ESPE		

Up to Category 4, EN 954-1
PNOZ XV3.1P

} Reset circuit

Reset circuit	E-STOP wiring, safety gate	Safety gate (dual-channel)
Automatic reset		
Monitored reset		

} Reset

Reset	Link	N/C contact for resetting the delay time
Link or N/C contact		

} Feedback loop

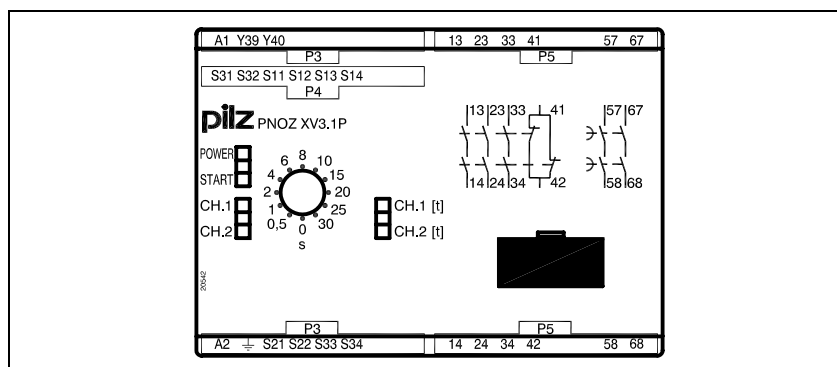
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ XV3.1P

Terminal configuration

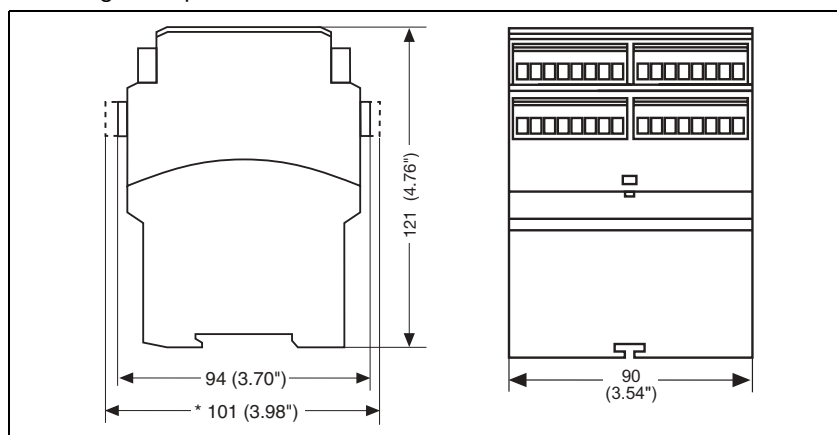


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

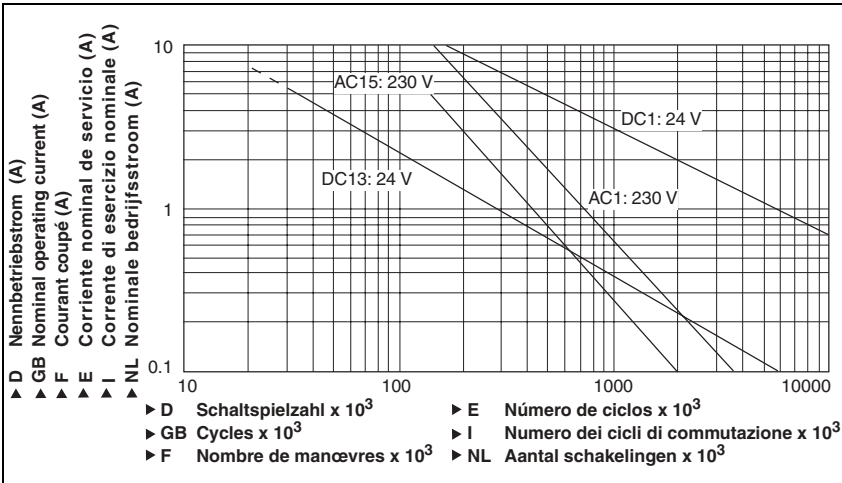


Up to Category 4, EN 954-1
PNOZ XV3.1P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U_B DC	24 V
Supply voltage U_B AC/DC	24 - 240 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B AC	8.5 VA Order no.: 777530, 777532, 777538, 787530, 787532, 787538
Power consumption at U_B DC	4.5 W Order no.: 777520, 777522, 777525, 787520, 787522 5.0 W Order no.: 777530, 777532, 777538, 787530, 787532, 787538
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	40.0 mA Order no.: 777530, 777532, 777538, 787530, 787532, 787538 50.0 mA Order no.: 777520, 777522, 777525, 787520, 787522
reset circuit DC: 24.0 V	40.0 mA
feedback loop DC: 24.0 V	3.1 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 3
Output contacts in accordance with EN 954-1 Category 3	Safety contacts (N/O), delayed: 2
Category 1 Order no.: 777520, 777530, 777538, 787520, 787530, 787538	Delay time <30 s Delay time >30 s
	Auxiliary contacts (N/C): 1

Up to Category 4, EN 954-1 PNOZ XV3.1P

Electrical data

Utilisation category in accordance with **EN 60947-4-1**

Safety contacts: AC1 at **240 V**

I_{min} : 0.01 A, I_{max} : 8.00 A

P_{max} : 2000 VA

Safety contacts: DC1 at **24 V**

I_{min} : 0.01 A, I_{max} : 8.0 A

P_{max} : 200 W

Safety contacts, delayed: AC1 at **240 V**

I_{min} : 0.01 A, I_{max} : 8.0 A

P_{max} : 2000 VA

Safety contacts, delayed: DC1 at **24 V**

I_{min} : 0.01 A, I_{max} : 8.0 A

P_{max} : 200 W

Auxiliary contacts: AC1 at **240 V**

I_{min} : 0.01 A, I_{max} : 8.0 A

P_{max} : 2000 VA

Auxiliary contacts: DC1 at **24 V**

I_{min} : 0.01 A, I_{max} : 8.0 A

P_{max} : 200 W

Utilisation category in accordance with **EN 60947-5-1**

Safety contacts: AC15 at **230 V**

I_{max} : 5.0 A

Safety contacts: DC13 at **24 V** (6 cycles/min)

I_{max} : 7.0 A

Safety contacts, delayed: AC15 at **230 V**

I_{max} : 5.0 A

Safety contacts, delayed: DC13 at **24 V** (6 cycles/min)

I_{max} : 7.0 A

Auxiliary contacts: AC15 at **230 V**

I_{max} : 5.0 A

Auxiliary contacts: DC13 at **24 V** (6 cycles/min)

I_{max} : 7.0 A

Contact material

AgSnO₂ + 0.2 µm Au

External contact fuse protection to **EN 60947-5-1**

Blow-out fuse, quick

Safety contacts:

10 A

Safety contacts, delayed:

10 A

Auxiliary contacts:

10 A

Blow-out fuse, slow

Safety contacts:

6 A

Safety contacts, delayed:

6 A

Auxiliary contacts:

6 A

Circuit breaker 24 VAC/DC, characteristic B/C

Safety contacts:

6 A

Safety contacts, delayed:

6 A

Auxiliary contacts:

6 A

Max. overall cable resistance R_{lmax}

input circuits, reset circuits

single-channel at U_B DC

100 Ohm Order no.: 777520, 777522, 777525, 787520, 787522

150 Ohm Order no.: 777530, 777532, 777538, 787530, 787532, 787538

single-channel at U_B AC

150 Ohm Order no.: 777530, 777532, 777538, 787530, 787532, 787538

dual-channel without detect. of shorts across contacts at U_B DC

120 Ohm Order no.: 777520, 777522, 777525, 787520, 787522

200 Ohm Order no.: 777530, 777532, 777538, 787530, 787532, 787538

dual-channel without detect. of shorts across contacts at U_B AC

200 Ohm Order no.: 777530, 777532, 777538, 787530, 787532, 787538

dual-channel with detect. of shorts across contacts at U_B DC

10 Ohm Order no.: 777520, 777522, 777525, 787520, 787522

20 Ohm Order no.: 777530, 777532, 777538, 787530, 787532, 787538

dual-channel with detect. of shorts across contacts at U_B AC

20 Ohm Order no.: 777530, 777532, 777538, 787530, 787532, 787538

Up to Category 4, EN 954-1 PNOZ XV3.1P

2.2

Times	
Switch-on delay	
with automatic reset typ.	400 ms
with automatic reset max.	550 ms Order no.: 777530, 777532, 777538, 787530, 787532, 787538
	850 ms Order no.: 777520, 777522, 777525, 787520, 787522
with automatic reset after power on typ.	400 ms Order no.: 777520, 777522, 777525, 787520, 787522
	625 ms Order no.: 777530, 777532, 777538, 787530, 787532, 787538
with automatic reset after power on max.	870 ms
with monitored reset typ.	35 ms Order no.: 777530, 777532, 777538, 787530, 787532, 787538
	40 ms Order no.: 777520, 777522, 777525, 787520, 787522
with monitored reset max.	60 ms Order no.: 777530, 777532, 777538, 787530, 787532, 787538
	70 ms Order no.: 777520, 777522, 777525, 787520, 787522
Delay-on de-energisation	
with E-STOP typ.	15 ms
with E-STOP max.	30 ms
with power failure typ.	110 ms Order no.: 777520, 777522, 777525, 787520, 787522
with power failure max.	150 ms Order no.: 777520, 777522, 777525, 787520, 787522
with power failure typ. $U_B = 24 \text{ V DC}$ Order no.: 777530, 777532, 777538, 787530, 787532, 787538	90 ms Order no.: 777530, 777532, 777538, 787530, 787532, 787538
with power failure max. $U_B = 24 \text{ V DC}$ Order no.: 777530, 777532, 777538, 787530, 787532, 787538	250 ms Order no.: 777530, 777532, 777538, 787530, 787532, 787538
with power failure typ. $U_B = 240 \text{ VAC}$	815 ms Order no.: 777530, 777532, 777538, 787530, 787532, 787538
with power failure max. $U_B = 240 \text{ VAC}$	1900 ms Order no.: 777530, 777532, 777538, 787530, 787532, 787538
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms +tv
after power failure	200 ms Order no.: 777520, 777522, 777525, 787520, 787522
after power failure on universal power supply	2000 ms Order no.: 777530, 777532, 777538, 787530, 787532, 787538
Delay time t_V : selectable	0.00 s; 0.50 s; 1.00 s; 2.00 s; 4.00 s; 6.00 s; 8.00 s; 10.00 s; 15.00 s; 20.00 s; 25.00 s; 30.00 s Order no.: 777520
	0.10 s; 0.20 s; 0.30 s; 0.40 s; 0.50 s; 0.60 s; 0.70 s; 0.80 s; 1.00 s; 1.50 s; 2.00 s; 3.00 s Order no.: 777522
	0.00 s; 0.50 s; 1.00 s; 2.00 s; 4.00 s; 6.00 s; 8.00 s; 10.00 s; 15.00 s; 20.00 s; 25.00 s; 30.00 s Order no.: 777530
	0.10 s; 0.20 s; 0.30 s; 0.40 s; 0.50 s; 0.60 s; 0.70 s; 0.80 s; 1.00 s; 1.50 s; 2.00 s; 3.00 s Order no.: 777532
	0.00 s; 5.00 s; 10.00 s; 20.00 s; 40.00 s; 60.00 s; 80.00 s; 100.00 s; 150.00 s; 200.00 s; 250.00 s; 300.00 s Order no.: 777538
	0.00 s; 0.50 s; 1.00 s; 2.00 s; 4.00 s; 6.00 s; 8.00 s; 10.00 s; 15.00 s; 20.00 s; 25.00 s; 30.00 s Order no.: 787520
	0.10 s; 0.20 s; 0.30 s; 0.40 s; 0.50 s; 0.60 s; 0.70 s; 0.80 s; 1.00 s; 1.50 s; 2.00 s; 3.00 s Order no.: 787522
	0.00 s; 0.50 s; 1.00 s; 2.00 s; 4.00 s; 6.00 s; 8.00 s; 10.00 s; 15.00 s; 20.00 s; 25.00 s; 30.00 s Order no.: 787530
	0.10 s; 0.20 s; 0.30 s; 0.40 s; 0.50 s; 0.60 s; 0.70 s; 0.80 s; 1.00 s; 1.50 s; 2.00 s; 3.00 s Order no.: 787532
	0.00 s; 5.00 s; 10.00 s; 20.00 s; 40.00 s; 60.00 s; 80.00 s; 100.00 s; 150.00 s; 200.00 s; 250.00 s; 300.00 s Order no.: 787538
Delay time t_V : fixed	3.00 s Order no.: 777525
Repetition accuracy	2 %
Time accuracy	-15 %/+15 % +50 ms

Up to Category 4, EN 954-1 PNOZ XV3.1P

Times	
Waiting period with a monitored reset	300 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms Order no.: 777522, 777525, 777530, 777532, 777538, 787520, 787522, 787530, 787532, 787538 25 ms Order no.: 777520
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2, EN 61000-6-4
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG Order no.: 777520, 777522, 777525, 777530, 777532, 777538
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG Order no.: 777520, 777522, 777525, 777530, 777532, 777538
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 777520, 777522, 777525, 777530, 777532, 777538
Torque setting with screw terminals	0.50 Nm Order no.: 777520, 777522, 777525, 777530, 777532, 777538
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 787520, 787522, 787530, 787532, 787538
Cage clamp terminals: terminal points per connection	2 Order no.: 787520, 787522, 787530, 787532, 787538
Stripping length	8 mm Order no.: 787520, 787522, 787530, 787532, 787538
Dimensions	
Height	101.0 mm Order no.: 787520, 787522, 787530, 787532, 787538 94.0 mm Order no.: 777520, 777522, 777525, 777530, 777532, 777538
Width	90.0 mm
Depth	121.0 mm
Weight	500 g Order no.: 787520, 787522 510 g Order no.: 777520, 777522, 777525 570 g Order no.: 787530, 787532, 787538 580 g Order no.: 777530, 777532, 777538

The standards current on **04/03** apply.

Up to Category 4, EN 954-1 PNOZ XV3.1P

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC	$I_{\max}$ (A) at U_B AC
1	8.00 A	8.00 A Order no.: 777530, 777532, 777538, 787530, 787532, 787538
2	7.80 A	7.80 A Order no.: 777530, 777532, 777538, 787530, 787532, 787538
3	6.50 A	6.50 A Order no.: 777530, 777532, 777538, 787530, 787532, 787538
4	5.50 A	5.50 A Order no.: 777530, 777532, 777538, 787530, 787532, 787538
5	5.00 A	5.00 A Order no.: 777530, 777532, 777538, 787530, 787532, 787538

Order reference

Type	Features		Terminals	Order no.	
PNOZ XV3.1P C		24 VDC	30 s selectable	Cage clamp terminals	787 520
PNOZ XV3.1P		24 VDC	30 s selectable	Screw terminals	777 520
PNOZ XV3.1P C		24 VDC	3 s selectable	Cage clamp terminals	787 522
PNOZ XV3.1P		24 VDC	3 s selectable	Screw terminals	777 522
PNOZ XV3.1P		24 VDC	3 s fixed	Screw terminals	777 525
PNOZ XV3.1P C	24 - 240 VAC/DC		30 s selectable	Cage clamp terminals	787 530
PNOZ XV3.1P	24 - 240 VAC/DC		30 s selectable	Screw terminals	777 530
PNOZ XV3.1P C	24 - 240 VAC/DC		3 s selectable	Cage clamp terminals	787 532
PNOZ XV3.1P	24 - 240 VAC/DC		3 s selectable	Screw terminals	777 532
PNOZ XV3.1P C	24 - 240 VAC/DC		300 s selectable	Cage clamp terminals	787 538
PNOZ XV3.1P	24 - 240 VAC/DC		300 s selectable	Screw terminals	777 538

Up to Category 4, EN 954-1 PMUT X1P



Unit for the temporary suspension of safety functions (muting)

Approvals

	PMUT X1P
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Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } 4 inputs for muting sensors
- } 1 ESPE input (2channel)
- } 1 input for additional safety light barrier (dual-channel) or safety contacts
- } 2 muting lamps
- } Connection options for
 - Reset button
 - Key switch
 - Feedback loop
- } Monitors muting lamps
- } Muting mode: sequential or parallel
- } LED indicators for
 - Switch status channel 1/2
 - Muting sensors
 - Light barrier
 - Simultaneity requirement
 - Muting lamp error
- } Semiconductor outputs signal:
 - Switch status channel 1/2
 - Muting active
 - One of the muting lamps defective
 - Both muting lamps defective

- Light barrier (ESPE) active
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

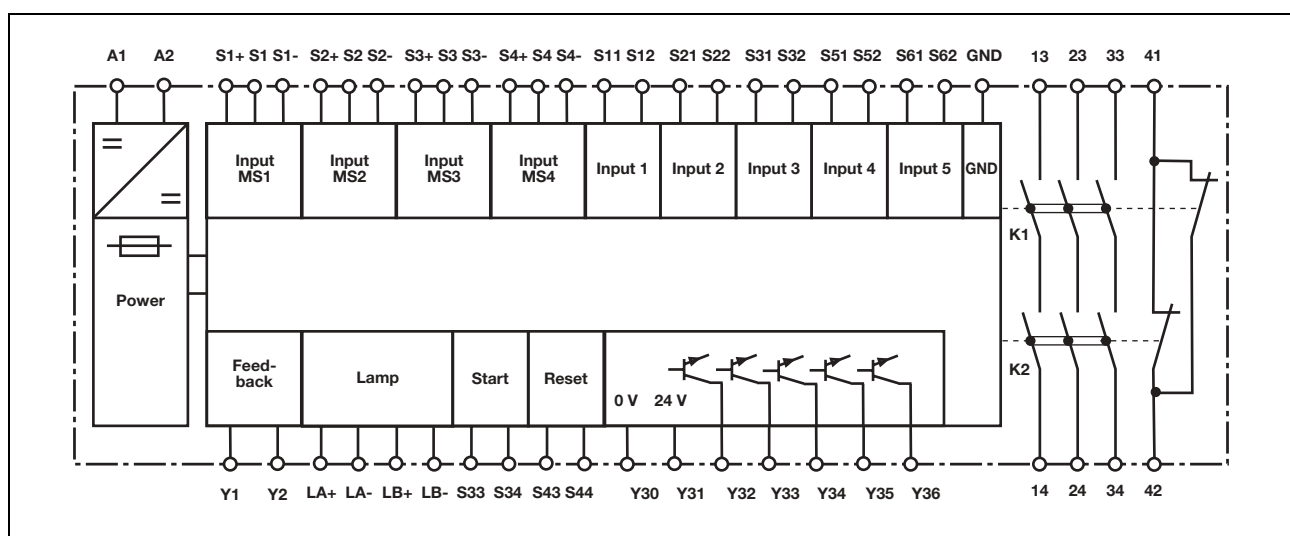
Unit description

The muting controller meets the requirements of EN 60204-1. It may be used in safety circuits which temporarily suspend safety functions (muting), in accordance with EN 61496-1.

Safety features

- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Block diagram

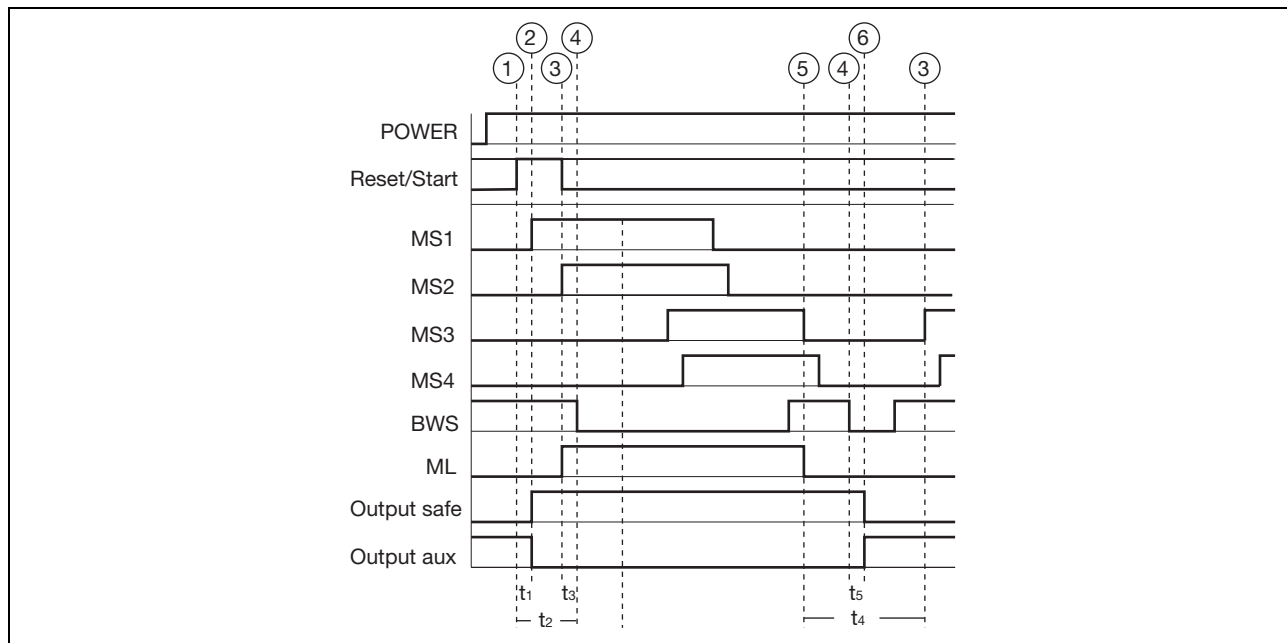


Up to Category 4, EN 954-1 PMUT X1P

Function description

- } Dual-channel operation (contact or semiconductor outputs from ESPE) without detection of shorts between contacts
- } Dual-channel operation (contact or semiconductor outputs from ESPE) with detection of shorts between contacts: Redundant input circuit, earth faults in the input circuit or shorts between the input circuits are detected.
- } Monitored manual reset. Supply voltage must be present before the reset contact is closed. The unit is not active until the reset button has been operated.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset button
- } ESPE: Light barrier
- } MS1 ... MS2: Muting sensors
- } ML: Muting lamps
- } Output Safe: Safety contacts 13-14, 23-24, 33-34
- } Output aux: Auxiliary contact 41-42
- } i : Operate reset button
- } c : Close safety contacts
- } E : Muting on
- } □ : Light barrier interrupted
- } Y : Muting off
- } i : Open safety contacts
- } t₁: Switch-on delay of safety contacts
- } t₂: Minimum start pulse duration
- } t₃: Minimum period before light barrier may be interrupted
- } t₄: Recovery time after muting off
- } t₅: Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-24 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

- R_{lmax} = max. overall cable resistance (see technical details)
- R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.
- } Mechanical and optoelectronic sensors (safety light barriers, safety light guards) are suitable for use.

- } The safety contacts can be used to shutdown the hazardous movement.
- } Only safe contact outputs (e.g. from safety light barriers) may be used on S51-S52 and S61-S62. Do **not** connect safety light barriers to semiconductor outputs.

Up to Category 4, EN 954-1 PMUT X1P

Preparing for operation

} Supply voltage

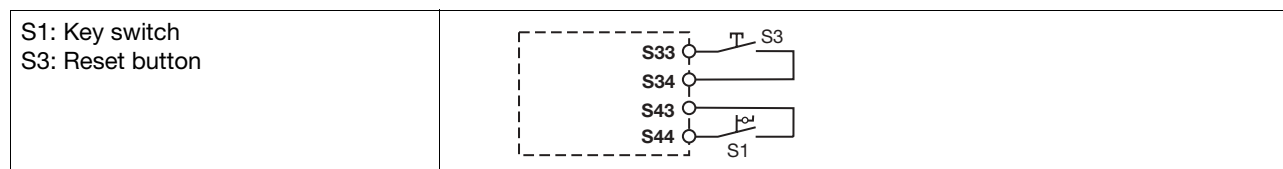
Supply voltage	AC	DC

} Input circuit

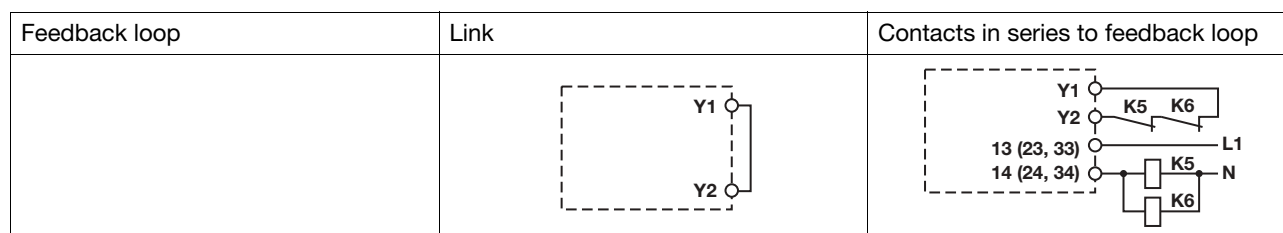
Input circuit	Semiconductor	Contacts
Muting sensors		
Light barrier (ESPE) Semiconductor output 2 x PNP Light barrier detects shorts across contacts		
Light barrier (ESPE) Semiconductor output PNP/NPN Detection of shorts across contacts; - Semiconductor: via light barrier - Contacts: via PMUT X1P		
Additional light barrier, dual-channel, E-STOP pushbutton		

Up to Category 4, EN 954-1 PMUT X1P

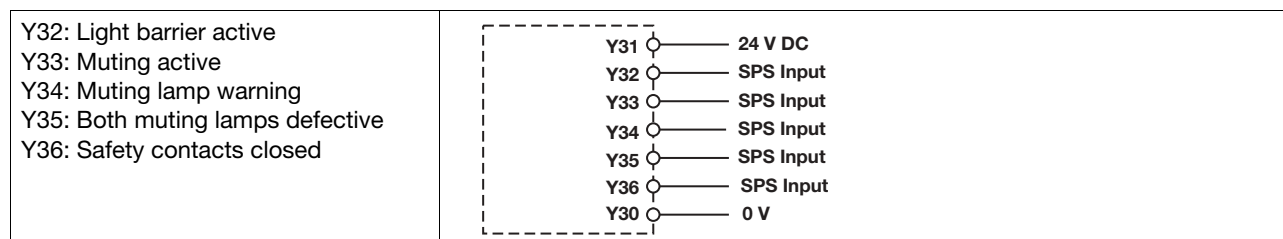
} Reset circuit



} Feedback loop

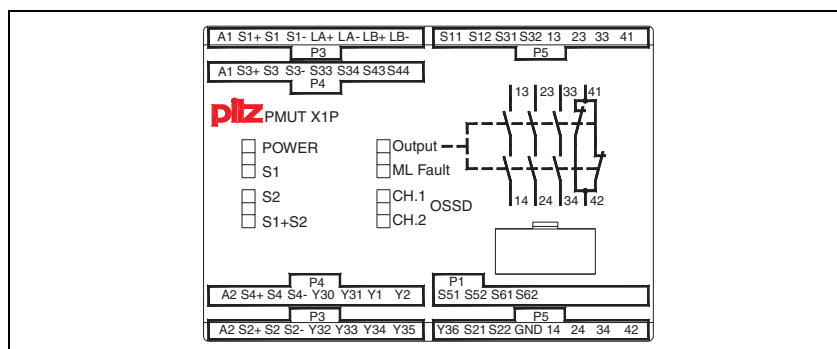


} Semiconductor output



Up to Category 4, EN 954-1 PMUT X1P

Terminal configuration

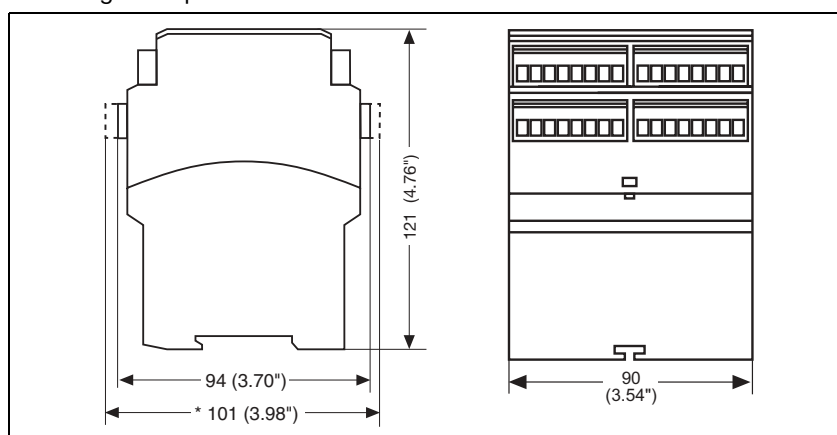


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

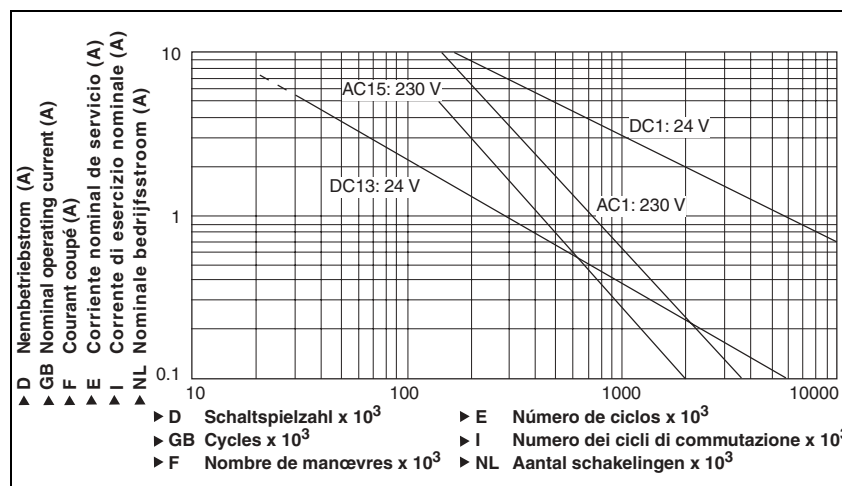


Up to Category 4, EN 954-1 PMUT X1P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U_B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B DC	6.0 W
Residual ripple DC	48 %
Voltage and current at input circuit DC: 24.0 V	25.0 mA
reset circuit DC: 24.0 V	40.0 mA
feedback loop DC: 24.0 V	40.0 mA
Muting lamp DC: 24.0 V	500 mA
Muting sensor DC: 24.0 V	40 mA
Max. power consumption	
Muting sensors	5 W
Light barrier	10 W
Muting lamp	12 W
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 8.00 A P_{max} : 2000 VA
Safety contacts: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 200 W
Auxiliary contacts: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 2000 VA
Auxiliary contacts: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 240 V	I_{max} : 5.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 5.0 A
Auxiliary contacts: AC15 at 230 V	I_{max} : 5.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 5.0 A

Up to Category 4, EN 954-1 PMUT X1P

Electrical data	
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	10 A
Auxiliary contacts:	10 A
Blow-out fuse, slow	
Safety contacts:	6 A
Auxiliary contacts:	6 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	6 A
Auxiliary contacts:	6 A
Semiconductor outputs (short circuit proof)	24.0 V DC, 20 mA
External supply voltage	24.0 V DC
Voltage tolerance	
	-20% / +20%
Max. overall cable resistance R_{lmax}	
input circuits, reset circuits	
dual-channel without detect. of shorts across contacts at U_B DC	70 Ohm
dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm
Times	
Switch-on delay	
with monitored reset max.	80 ms
Muting typ.	35 ms
Muting max.	80 ms
Delay-on de-energisation	
with E-STOP typ.	15 ms
with E-STOP max.	30 ms
with power failure typ.	490 ms
with power failure max.	700 ms
with power failure during muting typ.	125 ms
with power failure during muting max.	180 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	150 ms
after muting sensors off	300 ms
Waiting period with a monitored reset	300 ms
Min. start pulse duration with a monitored reset	40 ms
Simultaneity, channel 1 and 2	3 s
Supply interruption before de-energisation	20 ms
Supply interruption before de-energisation in the input circuit	4.0 ms
Environmental data	
EMC	EN 61000-6-2, EN 61496-1
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0

Up to Category 4, EN 954-1 PMUT X1P

Mechanical data

Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 2.50 mm ² , 24 - 12 AWG Order no.: 778010
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 1.00 mm ² , 24 - 16 AWG Order no.: 778010
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 778010
Torque setting with screw terminals	0.50 Nm Order no.: 778010
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 778010
Cage clamp terminals: terminal points per connection	2 Order no.: 778010
Stripping length	8 mm Order no.: 778010
Dimensions	
Height	101.0 mm Order no.: 778010 94.0 mm Order no.: 778010
Width	90.0 mm
Depth	121.0 mm
Weight	550 g Order no.: 778010 560 g Order no.: 778010

The standards current on **06/02** apply.

Max. continuous current

Number of contacts	I _{max} (A) at U _B DC
1	8 A
2	6 A
3	5 A

Order reference

Type	Features	Terminals	Order no.
PMUT X1P C	24 VDC	Cage clamp terminals	788 010
PMUT X1P	24 VDC	Screw terminals	778 010

Requirement class IIIC, EN 574 P2HZ X1P



Two-hand control unit for press controllers and safety circuits

Approvals

	P2HZ X1P
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Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } 2 semiconductor outputs
- } Connection options for:
 - 2 operator elements (buttons)
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Semiconductor outputs signal:
 - Switch status channel 1/2
 - Supply voltage is present
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit Description

The two-hand control relay meets the requirements of EN 574 Type IIIC. It forces the operator to keep his hands outside the danger zone area during the hazardous movement. The unit is suitable for use on controllers for metalworking presses as a component for simultaneous switching.

It can be used in applications with

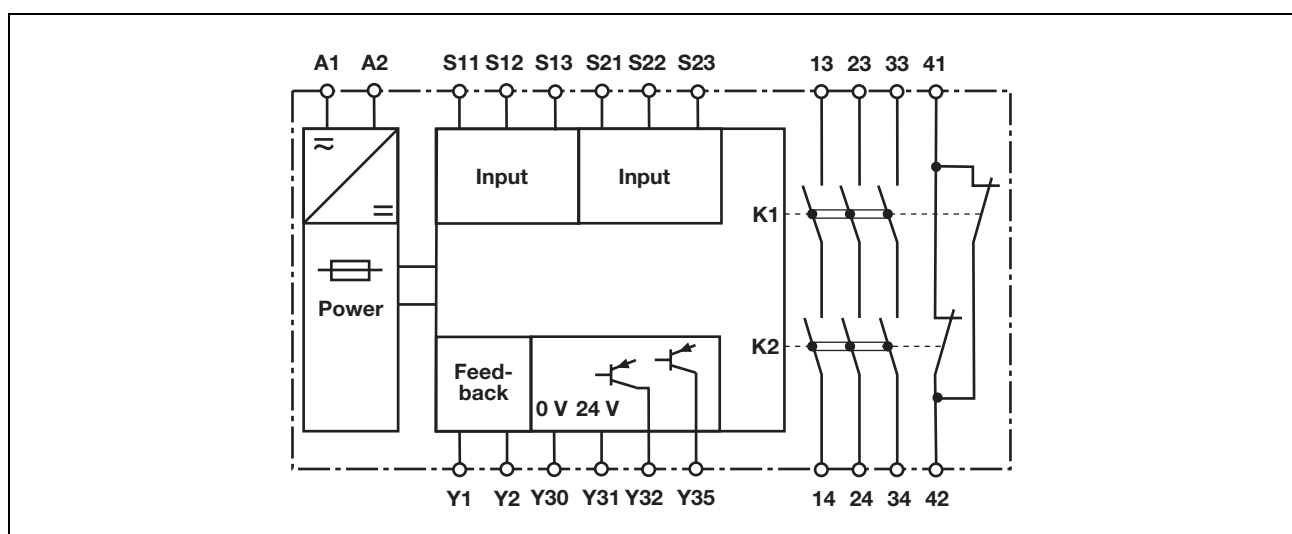
- } Mechanical presses (EN 692)
- } Hydraulic presses (EN 693)
- } Safety circuits in accordance with EN 60204-1

Safety features

The two-hand control relay meets the following safety requirements:

- } The circuit is redundant with built-in self-monitoring
- } The safety function remains effective in the case of a component failure
- } The circuit prevents a further press stroke in the case of:
 - Relay failure
 - Contact welding
 - Coil defect on a relay
 - Open circuit
 - Short circuit

Block diagram

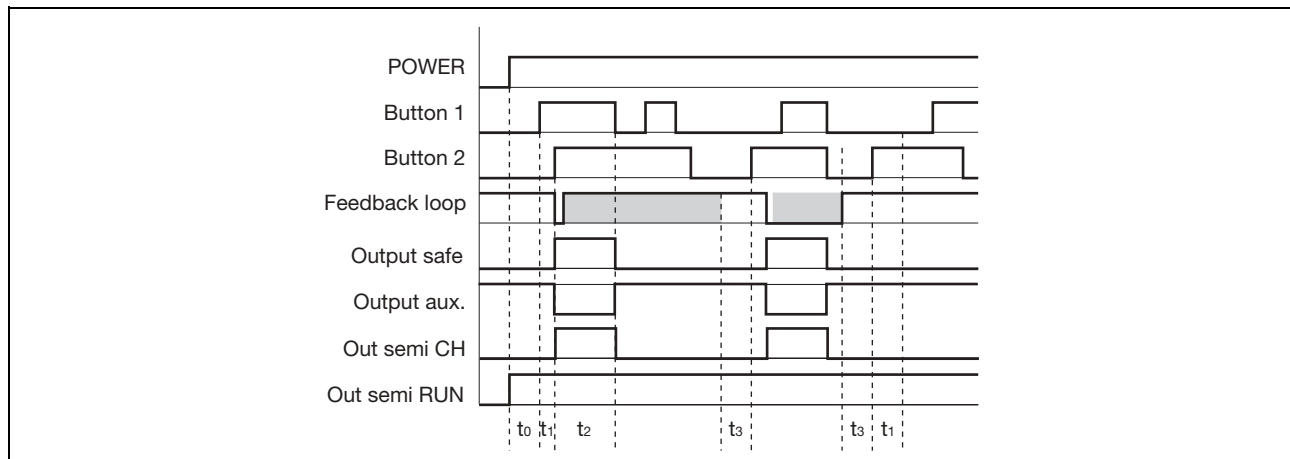


Requirement class IIIC, EN 574 P2HZ X1P

Function description

- } The two-hand control relay must be activated by simultaneously pressing two buttons. If one or both of the buttons are released, the unit interrupts the control command for the hazardous movement.
- } Reactivation: The output relays will not re-energise until both operator elements have been released and then re-operated simultaneously.

Timing diagram



Key

- } POWER: Supply voltage
- } Button 1/Button 2: Input circuits S11-S12-S13, S21-S22-S23
- } Feedback loop: Feedback loop Y1-Y2
- } Output safe: Safety outputs 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } Out semi RUN: Semiconductor output for operational readiness Y35
- } Out semi CH: Semiconductor output switch status Y32
- } t_0 : Recovery time after power on
- } t_1 : Simultaneity, channel 1 and 2
- } t_2 : Operating cycle ended through button 1 or 2
- } t_3 : Y1-Y2 must be closed before the button is operated (recovery time)
- } Shaded area: Status irrelevant

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

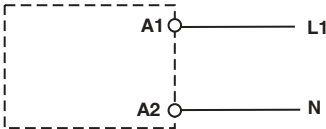
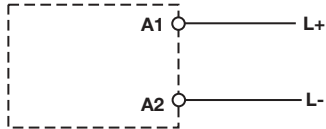
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

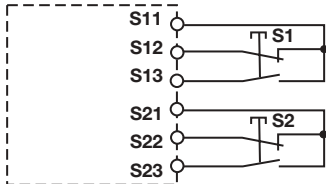
Requirement class IIIC, EN 574 P2HZ X1P

Preparing for operation

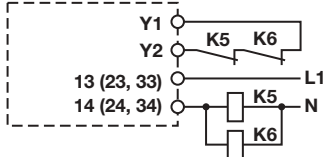
} Supply voltage

Supply voltage	AC	DC
		

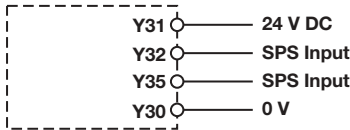
} Input circuit

Input circuit	Single-channel	Dual-channel
Two-hand button with detection of shorts across con- tacts		

} Feedback loop

Feedback loop	
Contacts from external contactors	

} Semiconductor output

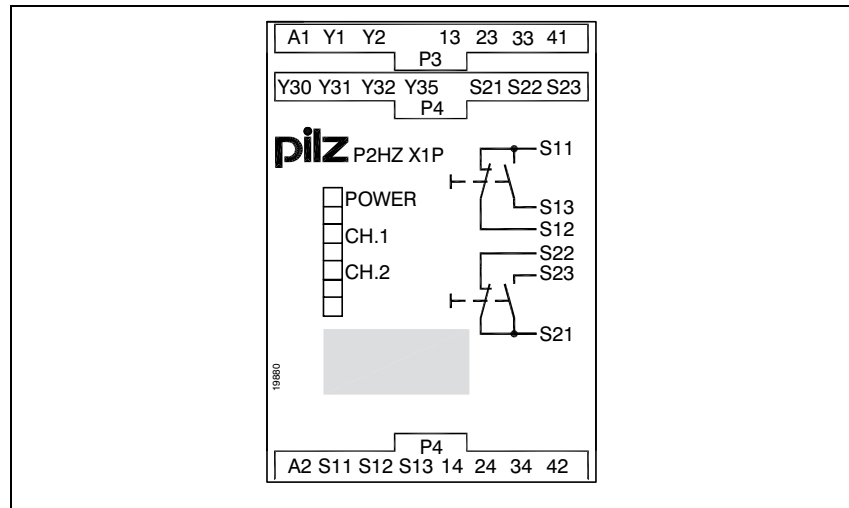


} Key

S1/S2 Two-hand button

Requirement class IIIC, EN 574 P2HZ X1P

Terminal configuration



Installation

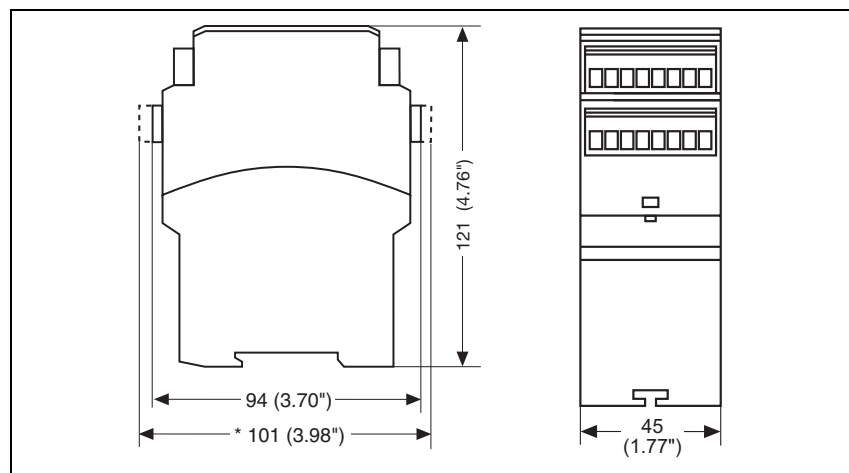
- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Notice

The distance of the button connected to the two-hand relay from the nearest danger zone must be large enough that if one of the buttons is released, the dangerous moment is interrupted before the operator can reach into the danger zone (see EN 999 "The positioning of protective equipment in respect of approach speeds of parts of the human body").

Dimensions

* with cage clamp terminals

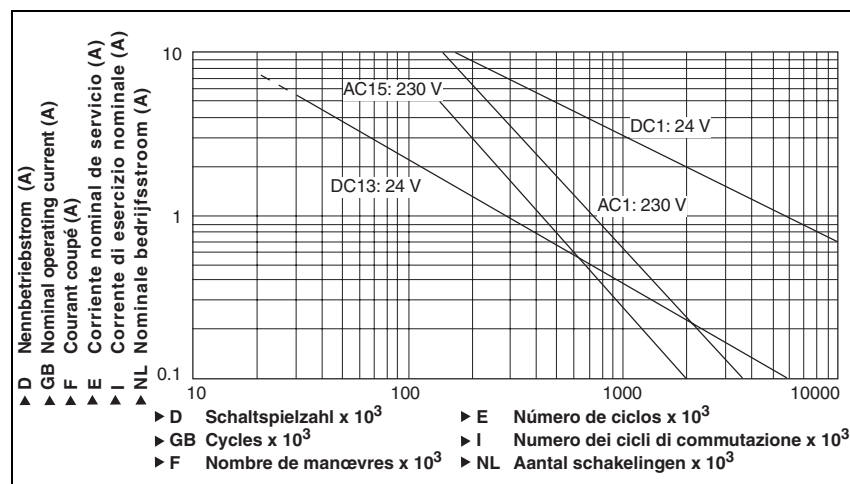


Requirement class IIIC, EN 574 P2HZ X1P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B AC	24 V, 42 V, 48 V, 110 V, 115 V, 120 V, 230 V, 240 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B AC	6.0 VA
Power consumption at U_B DC	2.5 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	10 %

Voltage and current at input circuit: **24 V DC**

N/O contact	30 mA
N/C contact	20 mA
feedback loop: 24 V DC	45 mA

Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1

Utilisation category of safety contacts in accordance with

EN 60947-4-1

AC1: **240 V**

I_{min} : 0.01 A, I_{max} : 5.0 A

P_{max} : 1250 VA

DC1: **24 V**

I_{min} : 0.01 A, I_{max} : 5.0 A

P_{max} : 125 W

Utilisation category of safety contacts in accordance with

EN 60947-5-1

AC15: **230 V**

I_{max} : 2.5 A

DC13 (6 cycles/min): **24 V**

I_{max} : 1.5 A

Requirement class IIIC, EN 574

P2HZ X1P

Electrical data

Utilisation category of auxiliary contact in accordance with

EN 60947-4-1

 AC1: **240 V**
 $I_{min}: 0.01 \text{ A}, I_{max}: 2.0 \text{ A}$
 $P_{max}: 500 \text{ VA}$

 DC1: **24 V**
 $I_{min}: 0.01 \text{ A}, I_{max}: 2.0 \text{ A}$
 $P_{max}: 50 \text{ W}$

Utilisation category of auxiliary contact in accordance with

EN 60947-5-1

 AC15: **230 V**
 $I_{max}: 2.0 \text{ A}$

 DC13 (6 cycles/min): **24 V**
 $I_{max}: 1.5 \text{ A}$

Contact material

AgSnO₂ + 0.2 μm Au

 External contact fuse protection for safety contacts (**EN 60947-5-1**)

Blow-out fuse, quick

6 A

Blow-out fuse, slow

4 A

Circuit breaker

4 A, 24 VAC/DC, characteristic B/C

 External contact fuse protection for auxiliary contact (**EN 60947-5-1**)

Blow-out fuse, quick

4 A

Blow-out fuse, slow

2 A

Circuit breaker

2 A, 24 VAC/DC, characteristic B/C

Semiconductor outputs (short circuit proof)

24 V DC, 20 mA

External supply voltage

24 V DC

Voltage tolerance

-15 % / +10 %

 Max. overall cable resistance R_{lmax} per input circuit

14 Ohm

Times

Delay-on de-energisation (reaction time in accordance with EN 574)

N/O contact

15 ms

N/C contact

30 ms

Recovery time

250 ms

Simultaneity, channel 1 and 2

 Max. **500 ms**

Environmental data

EMC

EN 60947-5-1, EN 61000-6-2

 Vibration in accordance with **EN 60068-2-6**

Frequency

10 - 55 Hz

Amplitude

0.35 mm

Climatic suitability

EN 60068-2-78

Airgap creepage

VDE 0110-1

Ambient temperature

-25 - 55 °C

Storage temperature

-25 - 85 °C

Protection type

Mounting (e.g. cabinet)

IP54

Housing

IP40

Terminals

IP20

Mechanical data

Housing material

Housing

PPO UL 94 V0

Front

ABS UL 94 V0

Max. Cross section of external conductors with screw terminals

1 core flexible

0.25 - 2.50 mm²

2 core, same cross section, flexible:

with crimp connectors, without insulating sleeve

0.25 - 1.00 mm²

without crimp connectors or with TWIN crimp connectors

0.20 - 1.50 mm²

Torque setting with screw terminals

0.50 Nm

Requirement class IIIC, EN 574 P2HZ X1P

Mechanical data

Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.20 - 1.50 mm ²
Cage clamp terminals	2
Terminal points per connection	8 mm
Stripping length	
Dimensions (H x W x D)	
with screw terminals	94.0 mm x 45.0 mm x 121.0 mm
with cage clamp terminals	101.0 mm x 45.0 mm x 121.0 mm
Weight	360 g Order no.: 777439, 777438, 777436, 777435, 777434, 777332, 777331, 777330 350 g Order no.: 787439, 787438, 787436, 787435, 787434, 787332, 787331, 787330 250 g Order no.: 777340 240 g Order no.: 787340

The standards current on **08/03** apply.

Order reference

Type	Features	Terminals	Order no.
P2HZ X1P C	24 VAC	Cage clamp terminals	787 330
P2HZ X1P	24 VAC	Screw terminals	777 330
P2HZ X1P C	42 VAC	Cage clamp terminals	787 331
P2HZ X1P	42 VAC	Screw terminals	777 331
P2HZ X1P C	48 VAC	Cage clamp terminals	787 332
P2HZ X1P	48 VAC	Screw terminals	777 332
P2HZ X1P C	110 VAC	Cage clamp terminals	787 434
P2HZ X1P	110 VAC	Screw terminals	777 434
P2HZ X1P C	115 VAC	Cage clamp terminals	787 435
P2HZ X1P	115 VAC	Screw terminals	777 435
P2HZ X1P C	120 VAC	Cage clamp terminals	787 436
P2HZ X1P	120 VAC	Screw terminals	777 436
P2HZ X1P C	230 VAC	Cage clamp terminals	787 438
P2HZ X1P	230 VAC	Screw terminals	777 438
P2HZ X1P C	240 VAC	Cage clamp terminals	787 439
P2HZ X1P	240 VAC	Screw terminals	777 439
P2HZ X1P C	24 VDC	Cage clamp terminals	787 340
P2HZ X1P	24 VDC	Screw terminals	777 340

Requirement class IIIC, EN 574

P2HZ X1.10P



Two-hand control unit for press controllers and safety circuits

Approvals

	P2HZ X1.10P
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	É
	É

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } 2 semiconductor outputs
- } Connection options for:
 - 2 operator elements (buttons)
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Semiconductor outputs signal:
 - Switch status channel 1/2
 - Supply voltage is present
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)

Unit description

The two-hand control relay meets the requirements of EN 574 Type IIIC. It forces the operator to keep his hands outside the danger zone area during the hazardous movement. The unit is suitable for use on controllers for met-

alworking presses as a component for simultaneous switching.

It can be used in applications with

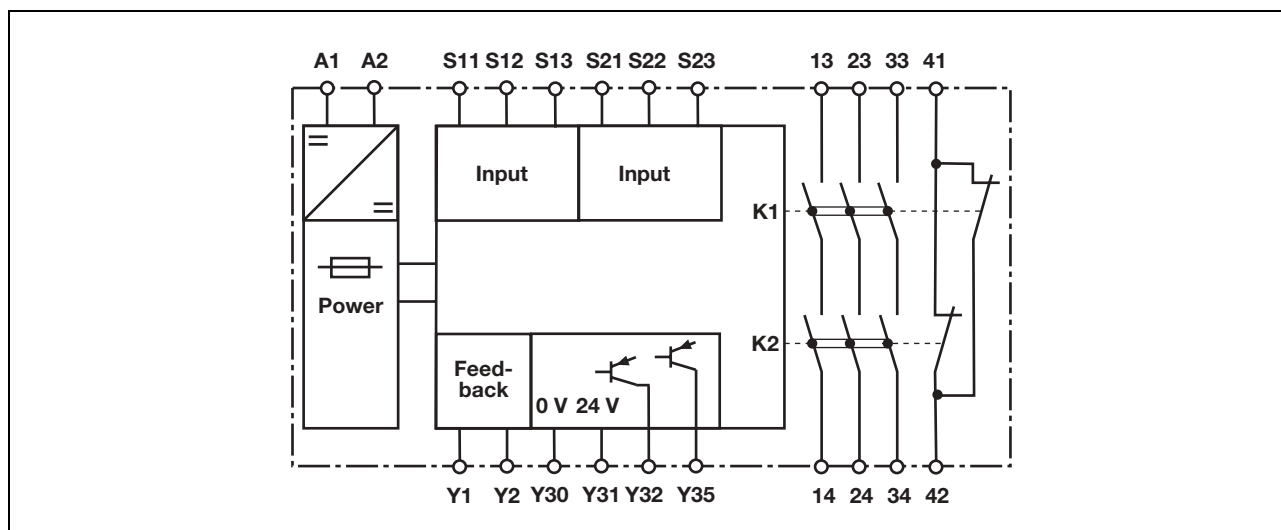
- } Mechanical presses (EN 692)
- } Hydraulic presses (EN 693)
- } Safety circuits in accordance with EN 60204-1

Safety features

The two-hand control relay meets the following safety requirements:

- } The circuit is redundant with built-in self-monitoring
- } The safety function remains effective in the case of a component failure
- } The circuit prevents a further press stroke in the case of:
 - Relay failure
 - Contact welding
 - Coil defect on a relay
 - Open circuit
 - Short circuit

Block diagram

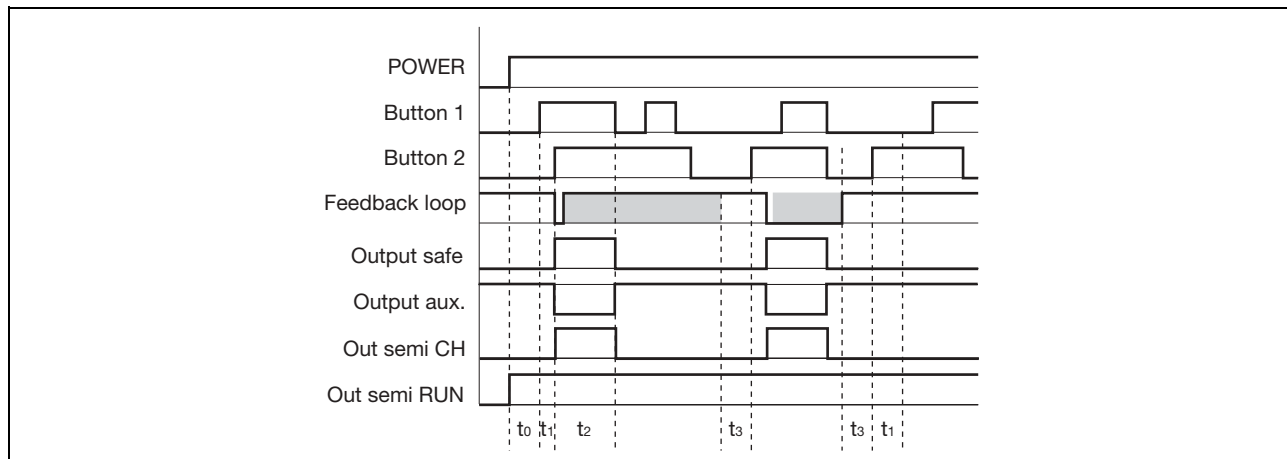


Requirement class IIIC, EN 574 P2HZ X1.10P

Function description

- } The two-hand control relay must be activated by simultaneously pressing two buttons. If one or both of the buttons are released, the unit interrupts the control command for the hazardous movement.
- } Reactivation: The output relays will not re-energise until both operator elements have been released and then re-operated simultaneously.

Timing diagram



Key

- } POWER: Supply voltage
- } Button 1/Button 2: Input circuits S11-S12-S13, S21-S22-S23
- } Feedback loop: Feedback loop Y1-Y2
- } Output safe: Safety outputs 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } Out semi RUN: Semiconductor output for operational readiness Y35
- } Out semi CH: Semiconductor output switch status Y32
- } t₀: Recovery time after power on
- } t₁: Simultaneity, channel 1 and 2
- } t₂: Operating cycle ended through button 1 or 2
- } t₃: Y1-Y2 must be closed before before the button is operated (recovery time)
- } Shaded area: Status irrelevant

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Requirement class IIIC, EN 574 P2HZ X1.10P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
Two-hand button with detection of shorts across con- tacts		

} Feedback loop

Feedback loop	
Contacts from external contactors	

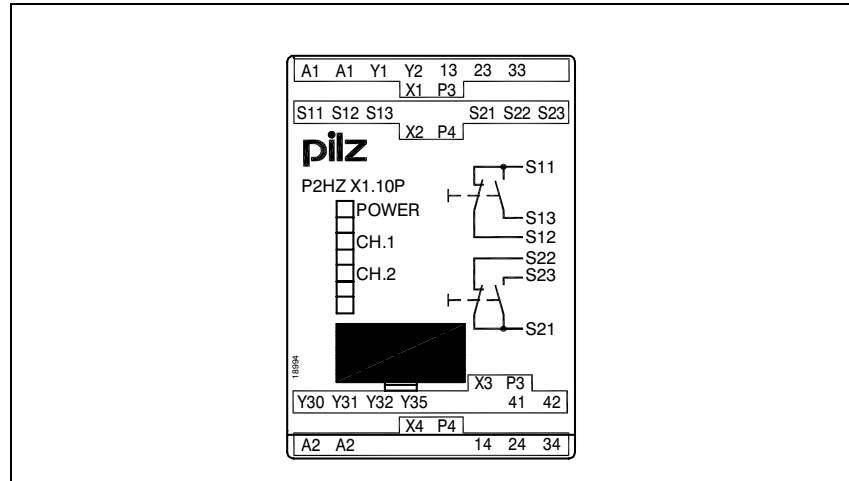
} Semiconductor output

} Key

S1/S2	Two-hand button

Requirement class IIIC, EN 574 P2HZ X1.10P

Terminal configuration



Installation

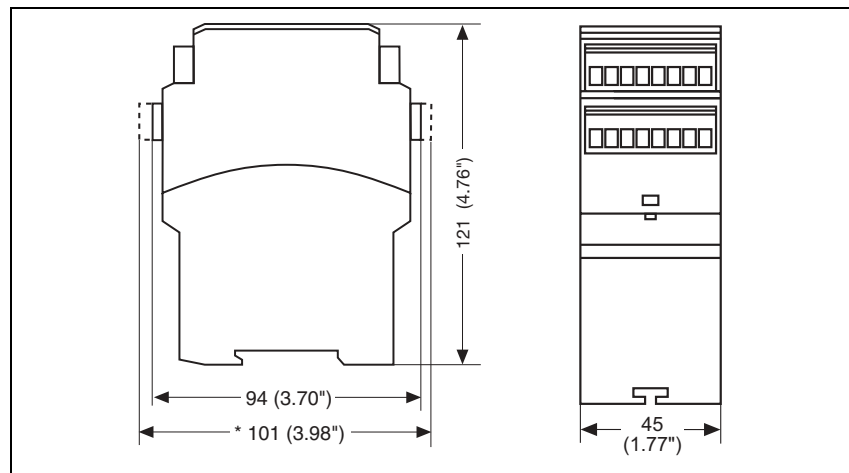
- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Notice

The distance of the button connected to the two-hand relay from the nearest danger zone must be large enough that if one of the buttons is released, the dangerous moment is interrupted before the operator can reach into the danger zone (see EN 999 "The positioning of protective equipment in respect of approach speeds of parts of the human body").

Dimensions

* with cage clamp terminals

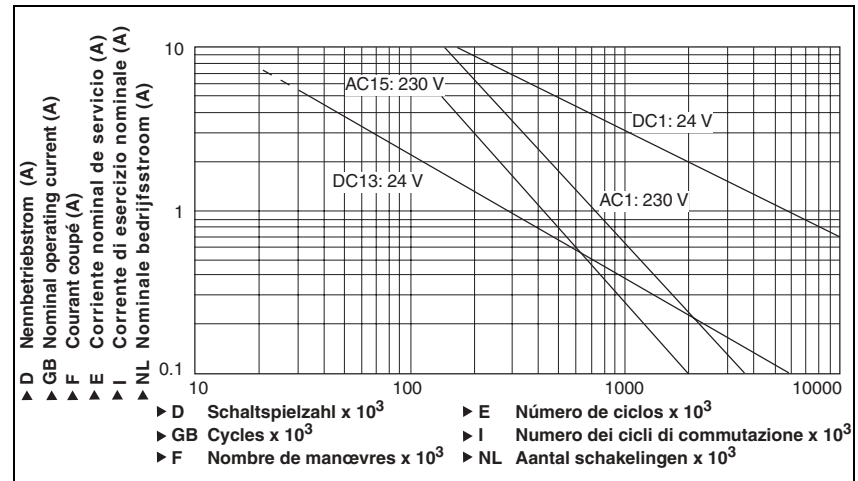


Requirement class IIIC, EN 574 P2HZ X1.10P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B DC	2.5 W
Residual ripple DC	10 %
Voltage and current at input circuit: 24 V DC	
N/O contact	30 mA
N/C contact	20 mA
feedback loop: 24 V DC	45 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A , I_{max} : 5.0 A P_{max} : 1250 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 5.0 A P_{max} : 125 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : 2.5 A
DC13 (6 cycles/min): 24 V	I_{max} : 1.5 A

Requirement class IIIC, EN 574 P2HZ X1.10P

Electrical data

Utilisation category of auxiliary contact in accordance with

EN 60947-4-1

AC1: **240 V**

I_{min} : **0.01 A**, I_{max} : **2.0 A**

P_{max} : **500 VA**

DC1: **24 V**

I_{min} : **0.01 A**, I_{max} : **2.0 A**

P_{max} : **50 W**

Utilisation category of auxiliary contact in accordance with

EN 60947-5-1

AC15: **230 V**

I_{max} : **2.0 A**

DC13 (6 cycles/min): **24 V**

I_{max} : **1.5 A**

Contact material

AgSnO₂ + 0.2 μ m Au

External contact fuse protection for safety contacts (**EN 60947-5-1**)

Blow-out fuse, quick

6 A

Blow-out fuse, slow

4 A

Circuit breaker

4 A, 24 VAC/DC, characteristic B/C

External contact fuse protection for auxiliary contact (**EN 60947-5-1**)

Blow-out fuse, quick

4 A

Blow-out fuse, slow

2 A

Circuit breaker

2 A, 24 VAC/DC, characteristic B/C

Semiconductor outputs (short circuit proof)

24 V DC, **20 mA**

External supply voltage

24 V DC

Voltage tolerance

-15 % / +10 %

Max. overall cable resistance R_{lmax} per input circuit

14 Ohm

Times

Delay-on de-energisation (reaction time in accordance with EN 574)

N/O contact

15 ms

N/C contact

30 ms

Recovery time

250 ms

Simultaneity, channel 1 and 2

Max. **500 ms**

Supply interruption before de-energisation

150 ms

Environmental data

EMC

EN 60947-5-1, EN 61000-6-2

Vibration in accordance with **EN 60068-2-6**

Frequency

10 - 55 Hz

Amplitude

0.35 mm

Climatic suitability

EN 60068-2-78

Airgap creepage

VDE 0110-1

Ambient temperature

-25 - 55 °C

Storage temperature

-25 - 85 °C

Protection type

Mounting (e.g. cabinet)

IP54

Housing

IP40

Terminals

IP20

Mechanical data

Housing material

Housing

PPO UL 94 V0

Front

ABS UL 94 V0

Max. cross section of external conductors with screw terminals

1 core flexible

0.25 - 2.50 mm²

2 core, same cross section, flexible:

with crimp connectors, without insulating sleeve

0.25 - 1.00 mm²

without crimp connectors or with TWIN crimp connectors

0.20 - 1.50 mm²

Torque setting with screw terminals

0.50 Nm

Requirement class IIIC, EN 574 P2HZ X1.10P

Mechanical data

Max. cross section of external conductors with cage clamp terminals: Flexible without crimp connectors	0.20 - 1.50 mm²
Cage clamp terminals	2
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
with screw terminals	94.0 mm x 45.0 mm x 121.0 mm
with cage clamp terminals	101.0 mm x 45.0 mm x 121.0 mm
Weight	250 g Order no.: 777341 240 g Order no.: 787341

The standards current on **08/03** apply.

Order reference

Type	Features	Terminals	Order no.
P2HZ X1.10P C	24 VDC	Cage clamp terminals	787 341
P2HZ X1.10P	24 VDC	Screw terminals	777 341

Requirement class IIIC, EN 574 P2HZ X4P



Two-hand control unit for press controllers and safety circuits

Approvals

	P2HZ X4P
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Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - 2 operator elements (buttons)
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

- } Safety circuits in accordance with EN 60204-1

Safety features

The two-hand control relay meets the following safety requirements:

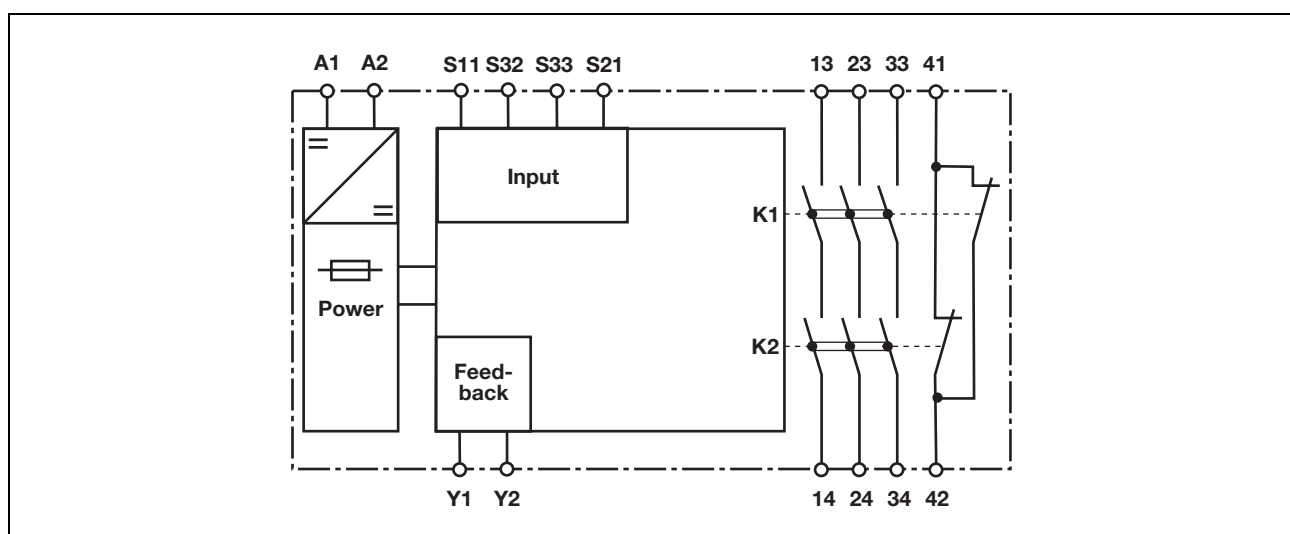
- } The circuit is redundant with built-in self-monitoring
- } The safety function remains effective in the case of a component failure
- } The circuit prevents a further press stroke in the case of:
 - Relay failure
 - Contact welding
 - Coil defect on a relay
 - Open circuit
 - Short circuit

Unit description

The two-hand control relay meets the requirements of EN 574 Type IIIC. It forces the operator to keep his hands outside the danger zone area during the hazardous movement. The unit is suitable for use on controllers for metalworking presses as a component for simultaneous switching. It can be used in applications with

- } Mechanical presses (EN 692)
- } Hydraulic presses (EN 693)

Block diagram

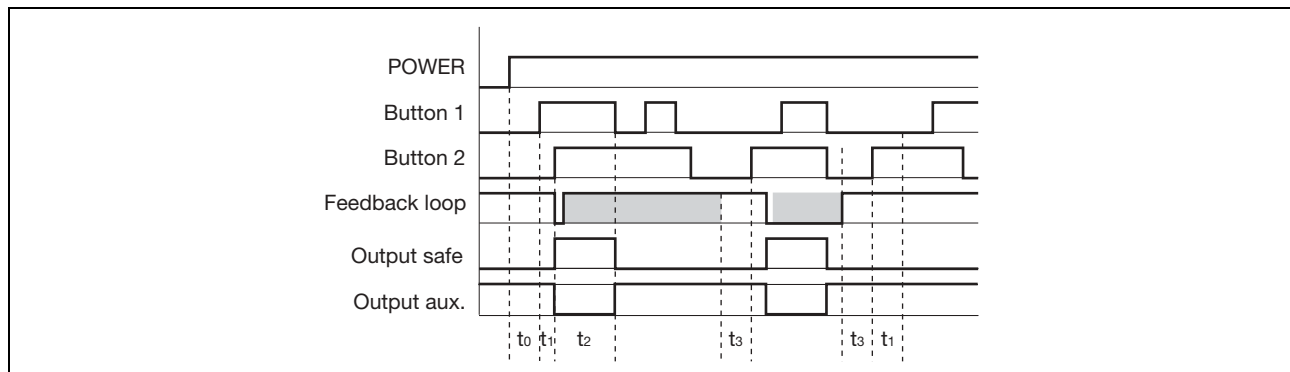


Requirement class IIIC, EN 574 P2HZ X4P

Function description

- } The two-hand control relay must be activated by simultaneously pressing two buttons. If one or both of the buttons are released, the unit interrupts the control command for the hazardous movement.
- } Reactivation: The output relays will not re-energise until both operator elements have been released and then re-operated simultaneously.

Timing diagram



Key

- } POWER: Supply voltage
- } Button 1/Button 2: Input circuits S11, S21, S32, S33
- } Feedback loop: Feedback loop Y1-Y2
- } Output safe: Safety outputs 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } t0: Recovery time after power on
- } t1: Simultaneity, channel 1 and 2
- } t2: Operating cycle ended through button 1 or 2
- } t3: Y1-Y2 must be closed before before the button is operated (recovery time)
- } Shaded area: Status irrelevant

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

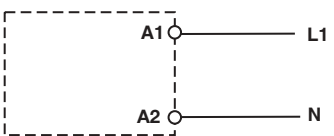
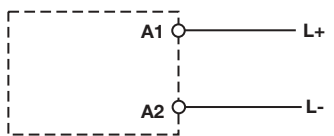
R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

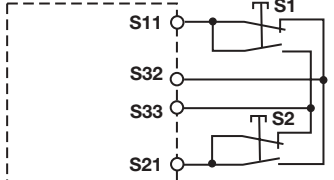
Requirement class IIIC, EN 574
P2HZ X4P

Preparing for operation

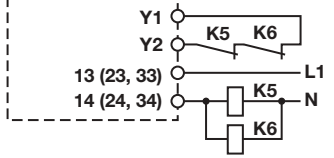
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
Two-hand button with detection of shorts across con- tacts		

} Feedback loop

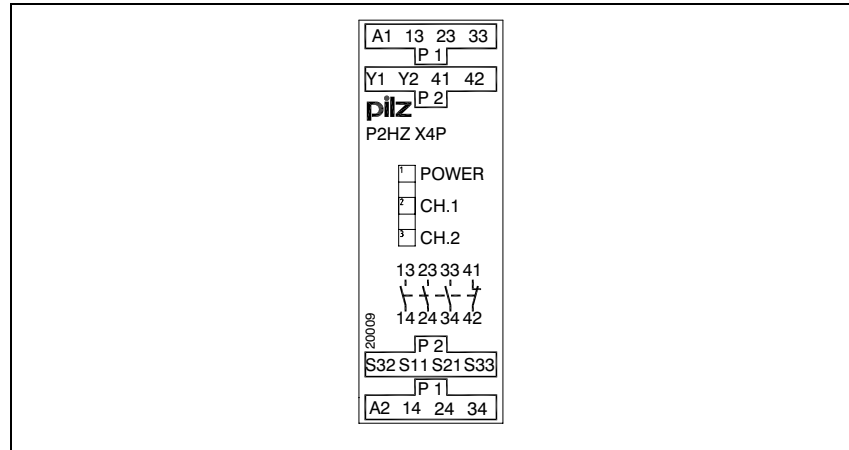
Feedback loop	
Contacts from external contactors	

} Key

S1/S2	Two-hand button

Requirement class IIIC, EN 574 P2HZ X4P

Terminal configuration



Installation

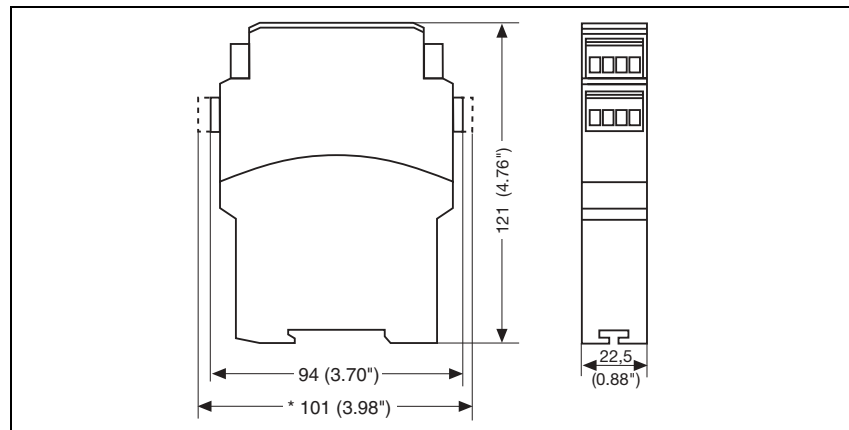
- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Notice

The distance of the button connected to the two-hand relay from the nearest danger zone must be large enough that if one of the buttons is released, the dangerous moment is interrupted before the operator can reach into the danger zone (see EN 999 "The positioning of protective equipment in respect of approach speeds of parts of the human body").

Dimensions

* with cage clamp terminals

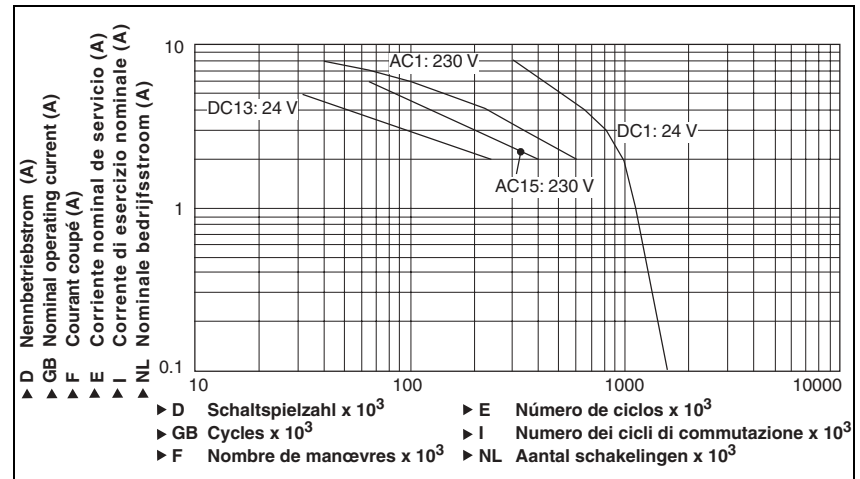


Requirement class IIIC, EN 574 P2HZ X4P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage	
Supply voltage U_B AC	24 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B AC	4.0 VA Order no.: 777354, 787354
Power consumption at U_B DC	2.5 W Order no.: 777355, 787355
Frequency range AC	50 - 60 Hz
Residual ripple DC	10 %
Voltage and current at input circuit DC: 24.0 V	
N/O contact	15 mA
N/C contact	20 mA Order no.: 777355, 787355
	25 mA Order no.: 777354, 787354
feedback loop DC: 24.0 V	25.0 mA Order no.: 777354, 787354
	30.0 mA Order no.: 777355, 787355
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 3
	Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 5.0 A
	P_{max} : 1250 VA
Safety contacts: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 5.0 A
	P_{max} : 125 W
Auxiliary contacts: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 2.5 A
	P_{max} : 600 VA
Auxiliary contacts: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 2.5 A
	P_{max} : 60 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I_{max} : 2.5 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 1.5 A
Auxiliary contacts: AC15 at 230 V	I_{max} : 2.5 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 1.5 A
Contact material	AgSnO2 + 0.2 µm Au

Requirement class IIIC, EN 574 P2HZ X4P

2.2

Electrical data

External contact fuse protection to **EN 60947-5-1**

Blow-out fuse, quick

Safety contacts: **6 A**

Auxiliary contacts: **4 A**

Blow-out fuse, slow

Safety contacts: **4 A**

Auxiliary contacts: **2 A**

Circuit breaker 24 VAC/DC, characteristic B/C

Safety contacts: **4 A**

Auxiliary contacts: **2 A**

Max. overall cable resistance R_{lmax} per input circuit **14 Ohm**

Times

Delay-on de-energisation (reaction time in accordance with EN 574)

N/O contact **15 ms**

N/C contact **30 ms**

Recovery time **250 ms**

Simultaneity, channel 1 and 2 **500 ms**

Environmental data

EMC **EN 60947-5-1, EN 61000-6-2**

Vibration in accordance with **EN 60068-2-6**

Frequency **10 - 55 Hz**

Amplitude **0.35 mm**

Climatic suitability **EN 60068-2-78**

Airgap creepage **VDE 0110-1**

Ambient temperature **-25 - 55 °C**

Storage temperature **-25 - 85 °C**

Protection type

Mounting (e.g. control cabinet) **IP54**

Housing **IP40**

Terminals **IP20**

Mechanical data

Housing material

Housing **PPO UL 94 V0**

Front **ABS UL 94 V0**

Max. cross section of external conductors with screw terminals

1 core flexible **0.25 - 2.50 mm² , 24 - 12 AWG** Order no.: 777354, 777355

2 core, same cross section, flexible:

with crimp connectors, without insulating sleeve **0.25 - 1.00 mm² , 24 - 16 AWG** Order no.: 777354, 777355

without crimp connectors or with TWIN crimp connectors **0.20 - 1.50 mm² , 24 - 16 AWG** Order no.: 777354, 777355

Torque setting with screw terminals **0.50 Nm** Order no.: 777354, 777355

Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors **0.20 - 1.50 mm² , 24 - 16 AWG** Order no.: 787354, 787355

Cage clamp terminals: terminal points per connection **2** Order no.: 787354, 787355

Stripping length **8 mm** Order no.: 787354, 787355

Dimensions

Height **101.0 mm** Order no.: 787354, 787355

94.0 mm Order no.: 777354, 777355

Width **22.5 mm**

Depth **121.0 mm**

Weight **215 g** Order no.: 787354, 787355

220 g Order no.: 777354, 777355

The standards current on **08/03** apply.

Requirement class IIIC, EN 574 P2HZ X4P

Order reference

Type	Features	Terminals	Order no.
P2HZ X4P C	24 VAC	Cage clamp terminals	787 354
P2HZ X4P	24 VAC	Screw terminals	777 354
P2HZ X4P C	24 VDC	Cage clamp terminals	787 355
P2HZ X4P	24 VDC	Screw terminals	777 355

Up to Category 3, EN 954-1 PSWZ X1P



Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } LED indicator for:
 - Supply voltage
 - Standstill on channel 1/2
 - Switch status
 - Fault signal if simultaneity time is exceeded
- } Semiconductor outputs signal:
 - Error
 - Switch status
- } Semiconductor input for reset function
- } Measuring inputs for single or three-phase motors
- } Measuring voltage selectable
- } Feedback loop
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit description

The unit is used for safe standstill monitoring. It is designed for use on

- } Standstill monitoring on plants with dangerous machine parts or tools (EN 1088 clause 7.4),
- } Safety circuits in accordance with EN 60204-1 and IEC 60204-1.

Safety features

- } Relays K1 and K2 are interlocked in such a way that the unit cannot be switched back on in the case of contact welding or an open circuit.
- } The unit monitors the measuring circuits for open circuit. If an open circuit occurs between the unit and the motor or on the motor itself, the unit immediately switches off.
- } The standstill monitor prevents the plant from being enabled in the following cases
 - Power supply failure
 - Component failure
 - Measuring circuits are open circuit
 - Coil defect/open circuit

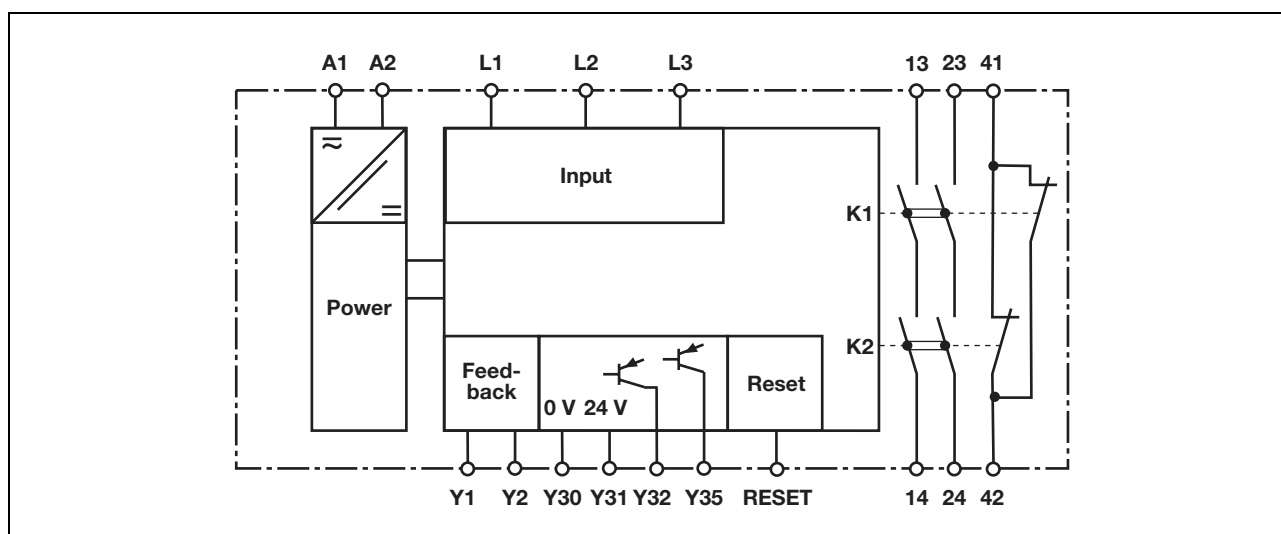
2.2

Standstill monitor for safe standstill monitoring

Approvals

	PSWZ X1P
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Block diagram



Up to Category 3, EN 954-1 PSWZ X1P

Function description

The device uses two separate measuring channels to measure the regenerated voltage, induced from the motor during the rundown period or during start-up. If the voltage falls below the set response value (standstill threshold), the standstill monitor enables the monitored plant. If the voltage exceeds the set release value, the standstill monitor disables the monitored plant.

To reactivate, the voltage at both channels must fall below the response value U_{on} within the time t_g (simultaneity monitoring). To do this the feedback loop Y1-Y2 must be closed. If the

simultaneity requirement is exceeded, the standstill monitor does not enable the monitored plant. The unit can be reactivated by switching 24 VDC on and off at the RESET input.

The response value U_{on} can be set jointly for both channels in order to suit the motor that is to be monitored. The release value U_{off} (hysteresis) corresponds to twice the response value. When used with frequency converters, the PSWZ X1P cannot detect standstill until the controller inhibit has been switched off.

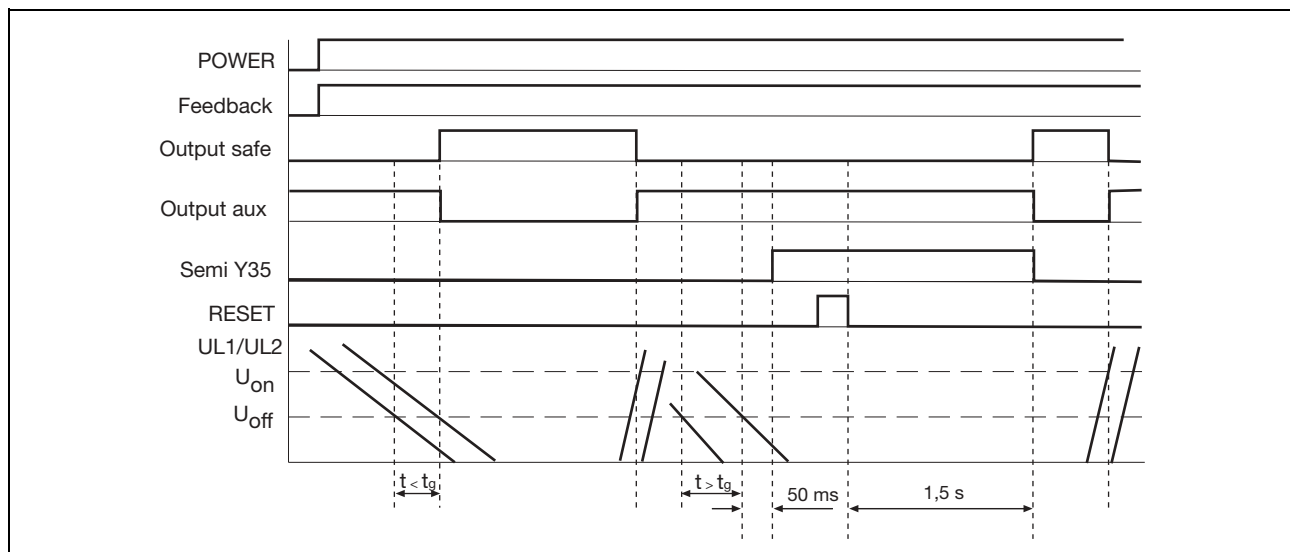
After the supply voltage is switched on, the unit performs a self test. The unit simulates a situation in which the release value is exceeded and the

measuring circuit has an open circuit. The correct function of the output relay and feedback loop is also tested. The test takes ca. 1.5 s.

Operating modes:

- } Single-channel operation:
 - One measuring circuit affects both channels
 - No redundancy (failsafe) in the measuring circuits
- } Dual-channel operation:
 - Two redundant (identical) measuring circuits affect channel 1 and 2
 - Monitoring of voltages in the measuring circuit (failsafe in the event of a short circuit)

Timing diagram



Key

} POWER: Supply voltage	} Output aux: Auxiliary contact 41-42	} U_{off} : Release value
} UL1/UL2: Input circuit L1, L2, L3	} Semi Y35: Semiconductor output for fault signal	} t_g : Simultaneity
} Feedback: Feedback loop Y1-Y2		
} Output safe: Safety contacts 13-14, 23-24	} RESET: Reset input RESET	
	} U_{on} : Response value	

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the

output contacts (see technical details).

- } Use copper wire that can withstand 60/75 °C.
- } When used with converters: Use screened cable for the wiring between the standstill monitor and the

motor. Connect the cable screening on the motor.

Up to Category 3, EN 954-1
PSWZ X1P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-phase motor	Three-phase motor

} Feedback loop

Contacts from external contactors or link		

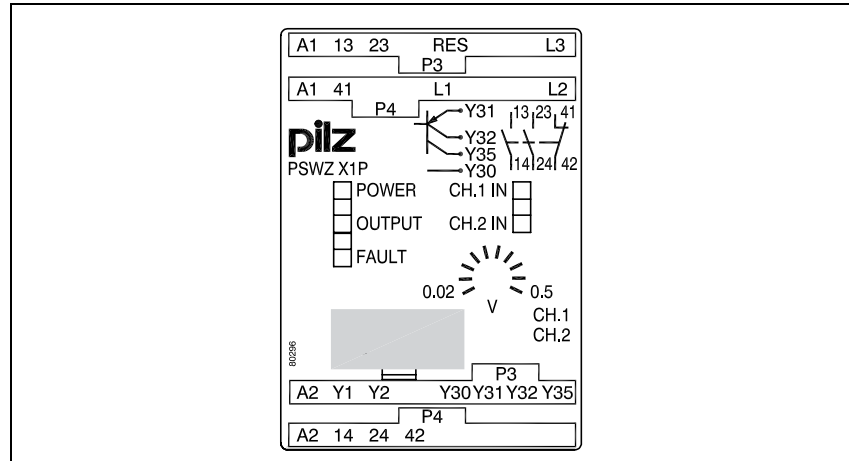
} Semiconductor output

Y32: Semiconductor output for switch status Y35: Semiconductor output for fault signal	

} Semiconductor input

Up to Category 3, EN 954-1 PSWZ X1P

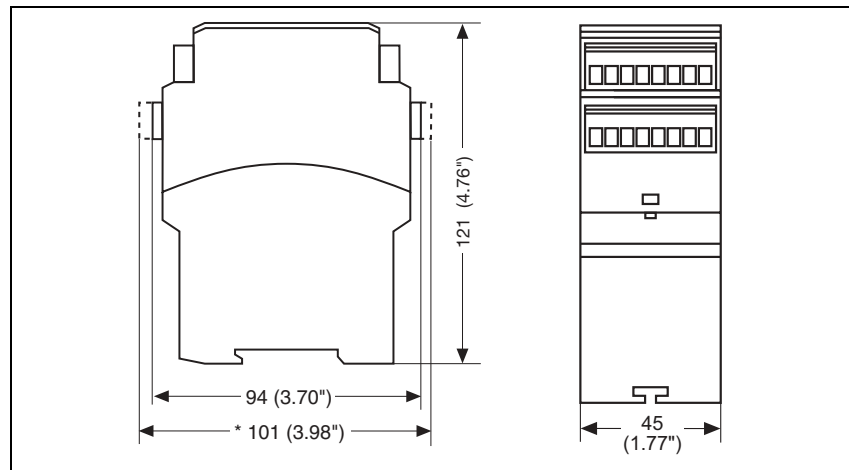
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

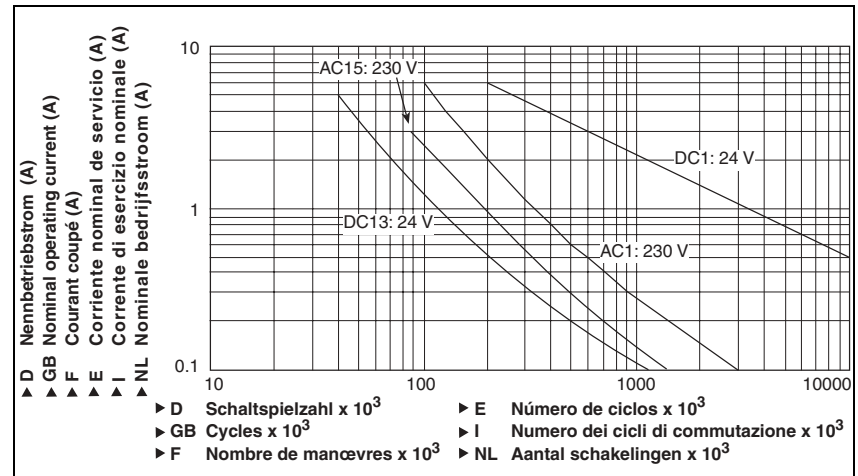


Up to Category 3, EN 954-1 PSWZ X1P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U _B AC/DC	24 - 240 V
Voltage tolerance	-15 %/+10 %
Power consumption at U _B AC	5.0 VA
Power consumption at U _B DC	3.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at feedback loop DC: 24.0 V	35.0 mA
Output contacts in accordance with EN 954-1 Category 3	Safety contacts (N/O): 2 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 6.00 A P _{max} : 1500 VA
Safety contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 6.0 A P _{max} : 150 W
Auxiliary contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 6.0 A P _{max} : 1500 VA
Auxiliary contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 6.0 A P _{max} : 150 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I _{max} : 3.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 4.0 A
Auxiliary contacts: AC15 at 230 V	I _{max} : 3.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 4.0 A
Contact material	AgCuNi + 0.2 µm Au

Up to Category 3, EN 954-1 PSWZ X1P

Electrical data	
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	6 A
Auxiliary contacts:	6 A
Blow-out fuse, slow	
Safety contacts:	4 A
Auxiliary contacts:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	4 A
Auxiliary contacts:	4 A
Semiconductor outputs (short circuit proof)	24.0 V DC, 50 mA
External supply voltage	24.0 V DC237
Voltage tolerance	
	-20 %/+20 %
Semiconductor input	
High	15 VDC
Low	5 VDC
Input current	20 mA
Measuring circuit	
Input voltage L1-L3, L1-L2, L2-L3	0 – 690 VAC/DC
Input voltage in accordance with UL	0 – 600 VAC
Frequency range	0 – 3000 Hz
Input impedance	1300 kOhm
Switching threshold per channel	
Response value U_{on}	20 - 500 mV Order no.: 777949, 787949 120 - 3000 mV Order no.: 777950, 787950
Release value U_{off}	2 x U_{on}
Max. inrush current:	10 A, max. 20 ms
Times	
Switch-on delay at motor standstill	
Max.	1,500 ms
After power on max.	2,200 ms
Delay-on de-energisation after motor on max.	170 ms
Recovery time at max. switching frequency 1/s after power failure	
	2200 ms
Simultaneity, channel 1 and 2	3 s
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2, EN 61000-6-4
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0

Up to Category 3, EN 954-1 PSWZ X1P

Mechanical data

Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm² , 24 - 14 AWG Order no.: 777949, 777950
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm² , 24 - 16 AWG Order no.: 777949, 777950
without crimp connectors or with TWIN crimp connectors	0.50 - 1.50 mm² , 24 - 16 AWG Order no.: 777949, 777950
Torque setting with screw terminals	0.60 Nm Order no.: 777949, 777950
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm² , 24 - 16 AWG Order no.: 787949, 787950
Cage clamp terminals: terminal points per connection	2 Order no.: 787949, 787950
Stripping length	8 mm Order no.: 787949, 787950
Dimensions	
Height	101.0 mm Order no.: 787949, 787950 94.0 mm Order no.: 777949, 777950
Width	45.0 mm
Depth	121.0 mm
Weight	315 g Order no.: 787949, 787950 320 g Order no.: 777949, 777950

The standards current on **03/05** apply.

Order reference

Type	Features		Terminals	Order no.
PSWZ X1P C	24 - 240 VAC/DC	0.5 V	Cage clamp terminals	787 949
PSWZ X1P	24 - 240 VAC/DC	0.5 V	Screw terminals	777 949
PSWZ X1P C	24 - 240 VAC/DC	3 V	Cage clamp terminals	787 950
PSWZ X1P	24 - 240 VAC/DC	3 V	Screw terminals	777 950

instantaneous PZE X4P



Contact expander module for increasing the number of available contacts

Approvals

	PZE X4P
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Unit features

- } Positive-guided relay outputs:
 - 4 safety contacts (N/O), instantaneous
- } LED indicator for:
 - Switch status channel 1/2
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit description

The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all safety relays with feedback loop. The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this.

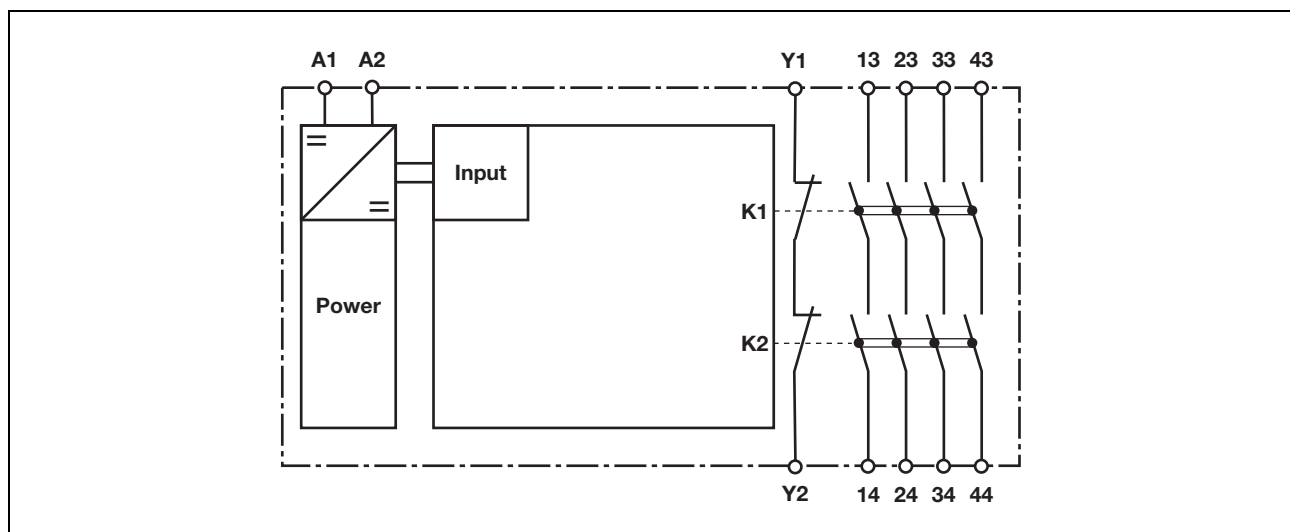
Safety features

The unit meets the following safety requirements:

- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

2.2

Block diagram

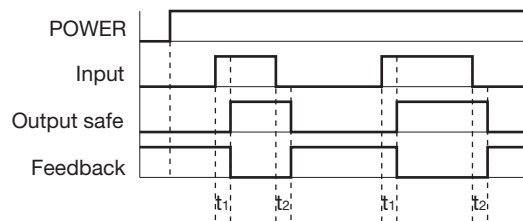


instantaneous PZE X4P

Function description

- } Single-channel operation: one input circuit affects both output relays

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits A1
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44
- } Feedback: Feedback loop Y1-Y2
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs $I_{\max}$ in the input circuit:

$$I_{\max} = \frac{R_{I\max}}{R_l / \text{km}}$$

$R_{I\max}$ = max. overall cable resistance (see technical details)

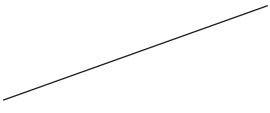
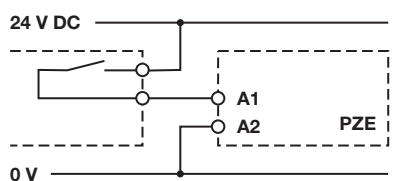
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

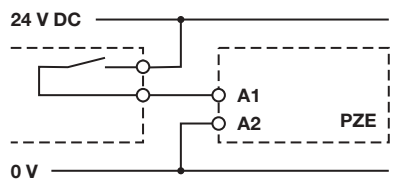
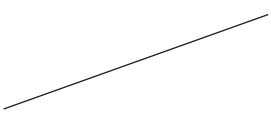
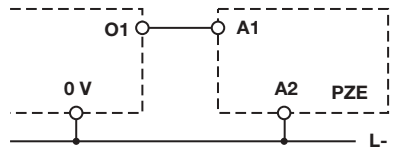
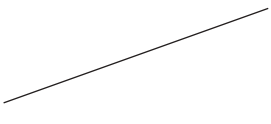
instantaneous PZE X4P

Preparing for operation

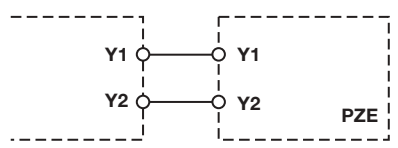
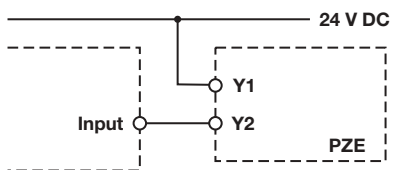
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

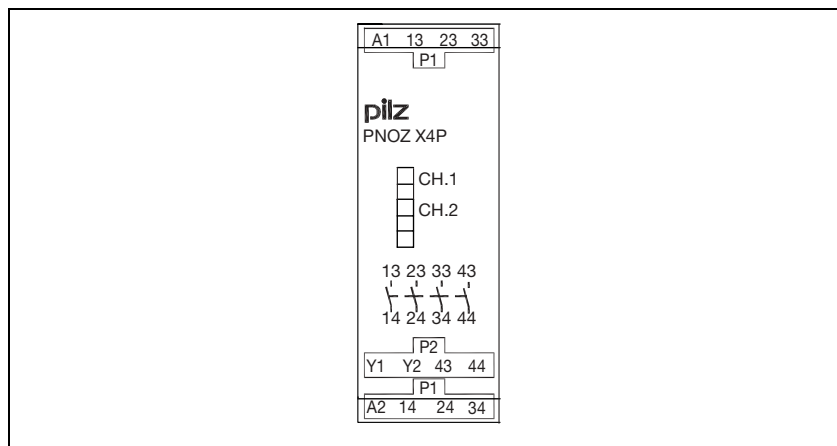
Input circuit	Single-channel	Dual-channel
Base unit: PNOZ X safety relay		
Base unit: PNOZelog safety relay Driven via semiconductor outputs (24 VDC)		

} Feedback loop

Feedback loop	Base unit: PNOZ X safety relay	Base unit: PNOZelog safety relay
Y1, Y2 and Input are inputs on the base unit; they evaluate the feedback loop		

instantaneous PZE X4P

Terminal configuration

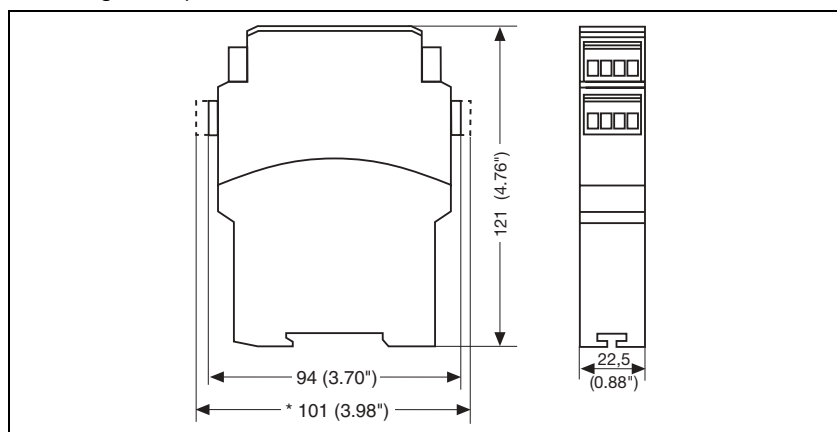


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

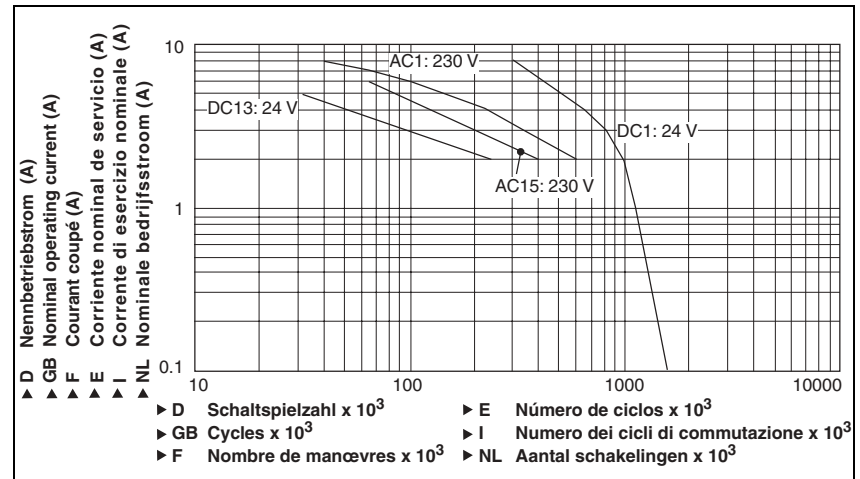


instantaneous PZE X4P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / + 10 %
Power consumption at U_B DC	2.5 W
Residual ripple DC	20 %
Voltage and current at input circuit: 24 V DC	85 mA
Output contacts in accordance with EN 954-1	Safety contacts (N/O): 4
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5 \text{ A}$ $P_{max}: 1200 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5 \text{ A}$ $P_{max}: 120 \text{ W}$
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V DC13 (6 cycles/min): 24 V	$I_{max}: 3 \text{ A}$ $I_{max}: 4 \text{ A}$
Contact material	AgSnO₂ + 0.2 µm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} Input circuits, reset circuits	
Single-channel at U_B DC	30 Ohm
Times	
Switch-on delay with automatic reset typ.	23 ms
with automatic reset max.	40 ms
Delay-on de-energisation with E-STOP typ.	60 ms
with E-STOP max.	90 ms
with power failure typ.	60 ms
with power failure max.	90 ms
Supply interruption before de-energisation	20 ms

instantaneous PZE X4P

2.2

Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 – 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 – 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 1.50 mm ²
Torque setting with screw terminals	0.5 Nm
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 – 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
with screw terminals	94 mm x 45 mm x 121 mm
with cage clamp terminals	101 mm x 45 mm x 121 mm
Weight	190 g Order no.: 777585 185 g Order no.: 787585

The standards current on 10/04 apply.

Max. continuous current	
Number of contacts	I _{max} (A) at U _B DC
1	5.00 A
2	5.00 A
3	4.50 A
4	4.00 A

Order reference			
Type	Features	Terminals	Order no.
PZE X4P C	24 VDC	Cage clamp terminals	787 585
PZE X4P	24 VDC	Screw terminals	777 585

instantaneous PZE X4.1P



Contact expander module for increasing the number of available contacts

Approvals

	PZE X4.1P	
	É	
	É	

Unit features

- } Positive-guided relay outputs:
 - 4 safety contacts (N/O), instantaneous
- } Safe separation of safety contacts 13-14, 23-24, 33-34 from input circuits K1-U-K2 and feedback loop Y1-Y2
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } Suitable to be driven via a semiconductor output
- } See order reference for unit types

Unit description

The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all

- } Safety relays with feedback loop
- } Programmable safety systems with feedback loop

} Units with OSSD semiconductor outputs and feedback loop
The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this.

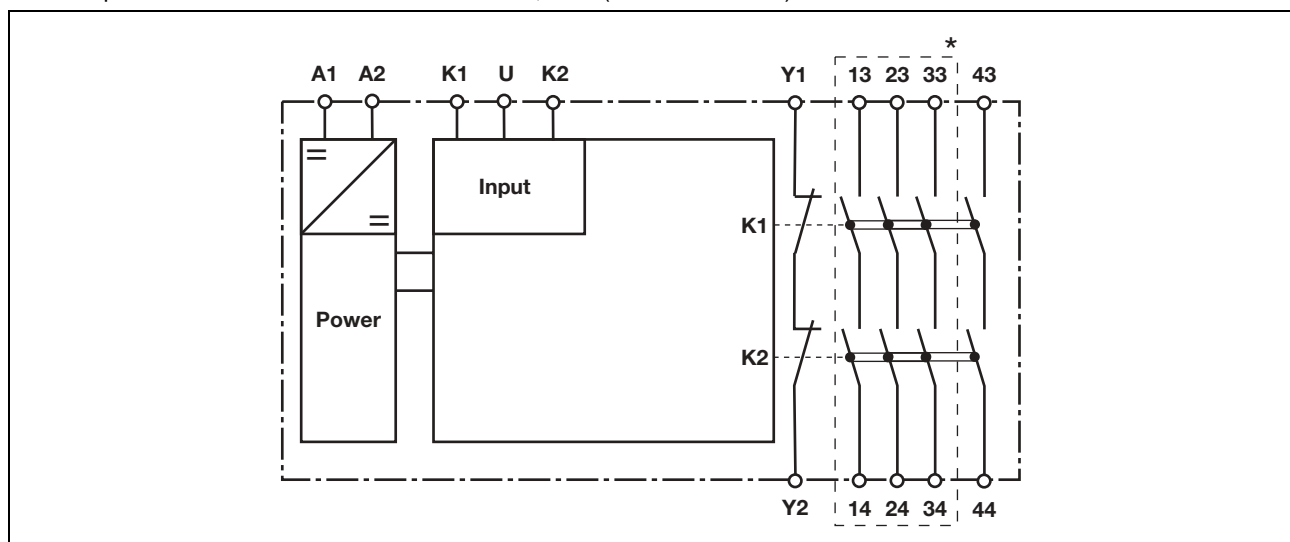
Safety features

The unit meets the following safety requirements:

- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Block diagram

* Safe separation in accordance with EN 60947-1, 6 kV (see unit features)

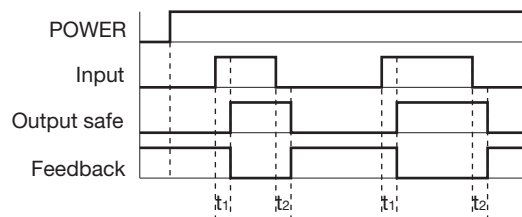


instantaneous PZE X4.1P

Function description

- } Single-channel operation: one input circuit affects both output relays
- } Dual-channel operation:
 - two redundant input circuits affect one output relay
 - Detection of shorts across contacts only possible with pulsed inputs

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits K1-U-K2
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44
- } Feedback: Feedback loop Y1-Y2
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{\max} = \frac{R_{I\max}}{R_l / \text{km}}$$

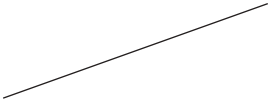
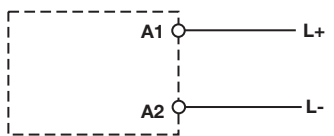
R_{I_{max}} = max. overall cable resistance (see technical details)
R_l /km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

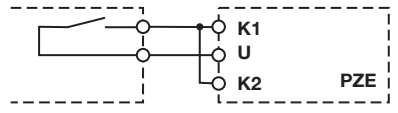
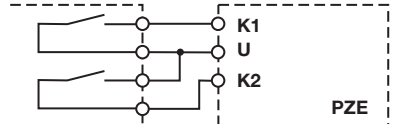
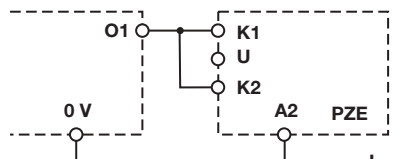
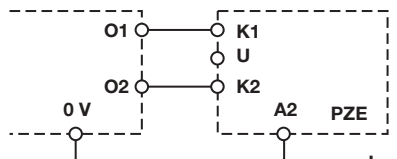
instantaneous PZE X4.1P

Preparing for operation

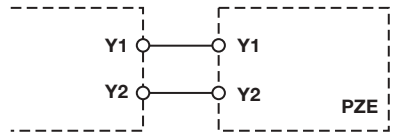
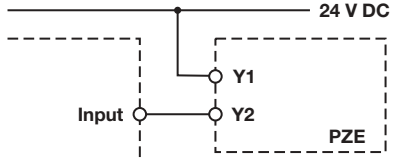
} Supply voltage

Supply voltage	AC	DC
Only when driven via safety relay with safety contacts		

} Input circuit

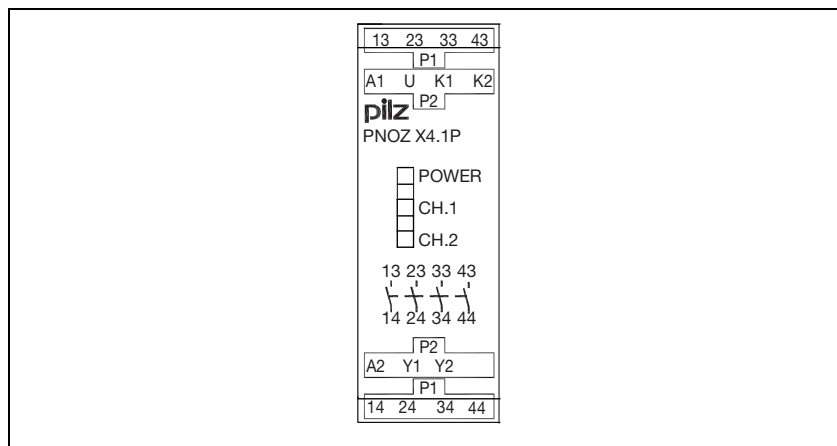
Input circuit	Single-channel	Dual-channel
Base unit: PNOZ X safety relay Driven via safety contacts		
Base unit: PNOZelog safety relay, programmable safety system or PNOZmulti Driven via safe semiconductor outputs (24 VDC)		

} Feedback loop

Feedback loop	Base unit: PNOZ X safety relay	Base unit: PNOZelog safety relay, programmable safety system or PNOZ-multi
Y1, Y2 and Input are inputs on the base unit; they evaluate the feedback loop		

instantaneous PZE X4.1P

Terminal configuration

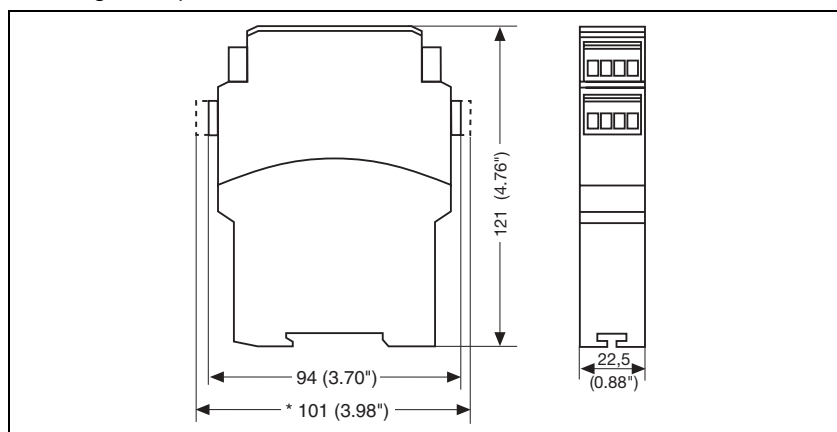


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

*with cage clamp terminals

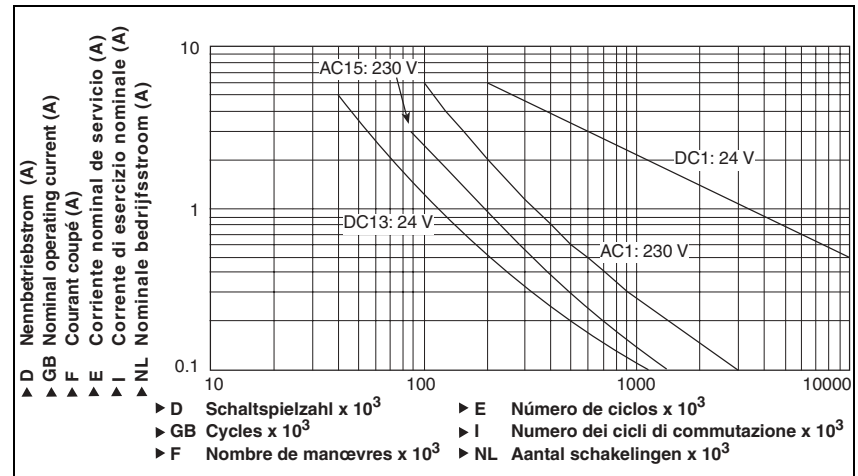


instantaneous PZE X4.1P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B DC	2.5 W
Residual ripple DC	20 %
Voltage and current at input circuit: 24 V DC	35 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 4
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	I_{min} : 0.01 A, I_{max} : 6 A P_{max} : 1500 VA I_{min} : 0.01 A, I_{max} : 6 A P_{max} : 150 W
DC1: 24 V	
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V DC13 (6 cycles/min): 24 V	I_{max} : 3 A I_{max} : 4 A
Contact material	AgCuNi + 0,2 σ m Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} Input circuits, reset circuits	
Single-channel at U_B DC	30 Ohm
Dual-channel without detect. of shorts across contacts at U_B DC	60 Ohm

Times

Switch-on delay with automatic reset typ.	13 ms
with automatic reset max.	20 ms
Delay-on de-energisation with E-STOP typ.	10 ms
with E-STOP max.	20 ms
with power failure typ.	58 ms
with power failure max.	80 ms
Supply interruption before de-energisation	
Supply voltage	20 ms
Input circuit	2.5 ms

instantaneous PZE X4.1P

2.2

Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ²
Torque setting with screw terminals	0.5 Nm
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
with screw terminals	94 mm x 22.5 mm x 121 mm
with cage clamp terminals	101 mm x 22.5 mm x 121 mm
Weight	185 g

The standards current on **07/04** apply.

Max. continuous current				
Number of contacts	1	2	3	4
I _{max} (A) at U _B DC	6 A	6 A	4.5	3.5

Order reference			
Type	Features	Terminals	Order no.
PZE X4.1P C	24 VDC	Cage clamp terminals	787 587
PZE X4.1P	24 VDC	Screw terminals	777 587

delayed PZE X4VP



Contact expander module for increasing the number of available contacts

Approvals

	PZE X4VP	
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	É	

Unit features

- } Positive-guided relay outputs:
 - 4 safety contacts (N/O), delay-on de-energisation
- } LED indicator for:
 - Switch status channel 1/2
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit description

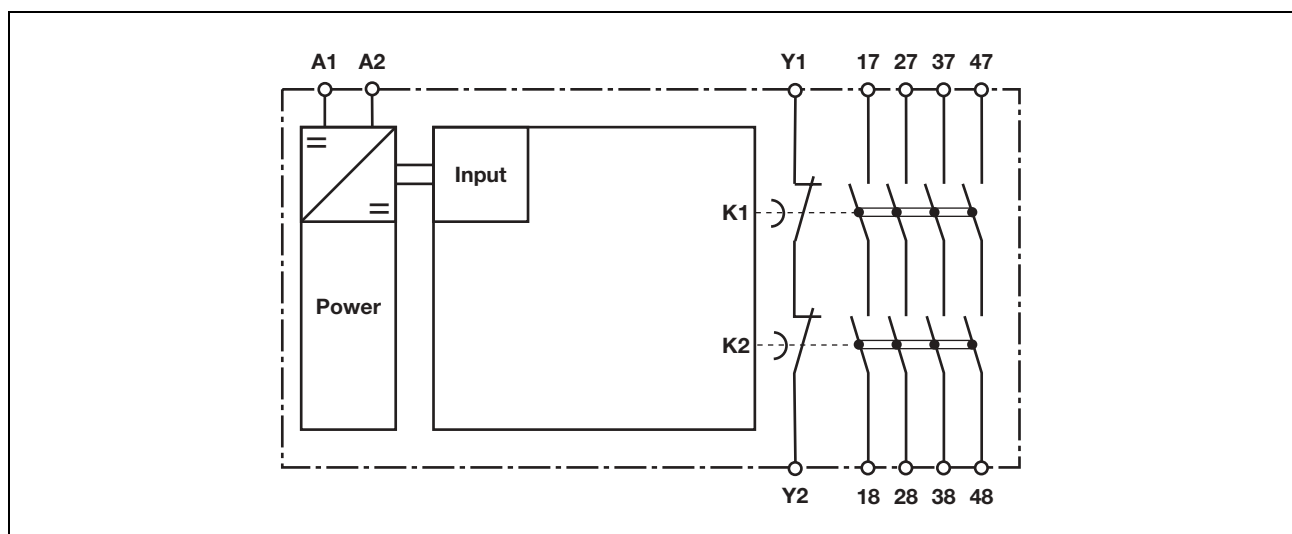
The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all safety relays with feedback loop. The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this. The delay-on de-energisation safety contacts may only be used up to category 3.

Safety features

The unit meets the following safety requirements:

- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Block diagram

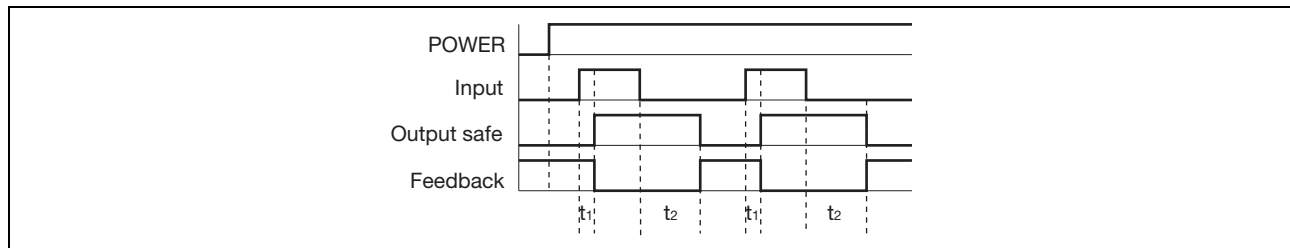


delayed PZE X4VP

Function description

- } Single-channel operation: one input circuit affects both output relays

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits A1
- } Output safe: Safety contacts 17-18, 27-28, 37-38, 47-48
- } Feedback: Feedback loop Y1-Y2
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 17-18, 27-28, 37-38, 47-48 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs l_{max} in the input circuit:

$$l_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

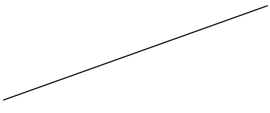
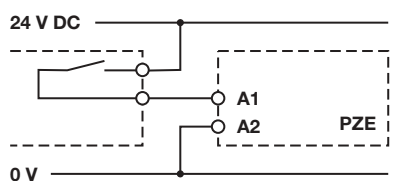
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

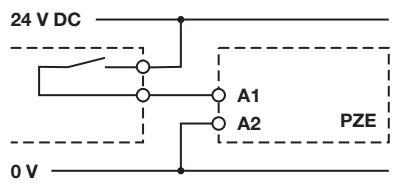
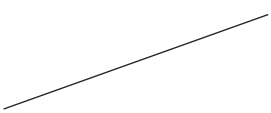
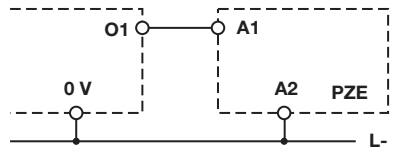
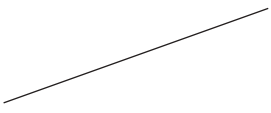
delayed
PZE X4VP

Preparing for operation

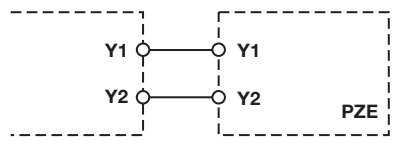
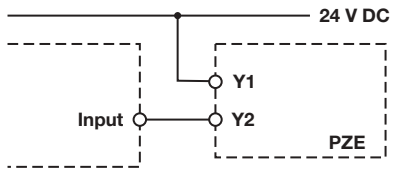
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

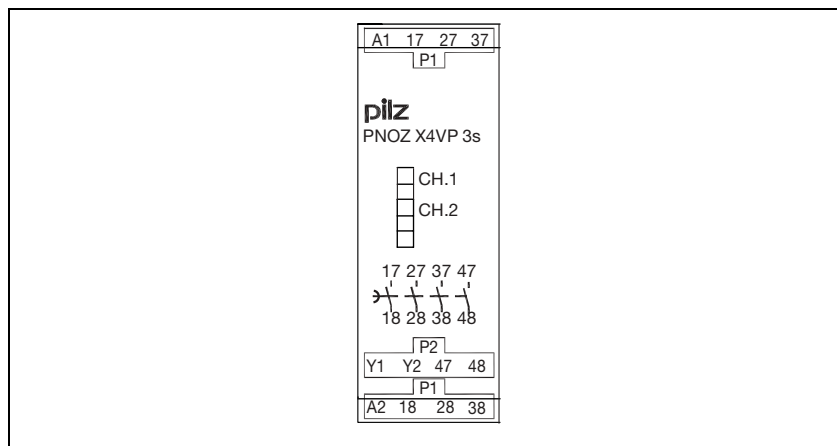
Input circuit	Single-channel	Dual-channel
Base unit: PNOZ X safety relay Driven via safety contacts		
Base unit: PNOZelog safety relay Driven via semiconductor outputs (24 VDC)		

} Feedback loop

Feedback loop	Base unit: PNOZ X safety relay	Base unit: PNOZelog safety relay
Y1, Y2 and Input are inputs on the base unit; they evaluate the feedback loop		

delayed PZE X4VP

Terminal configuration

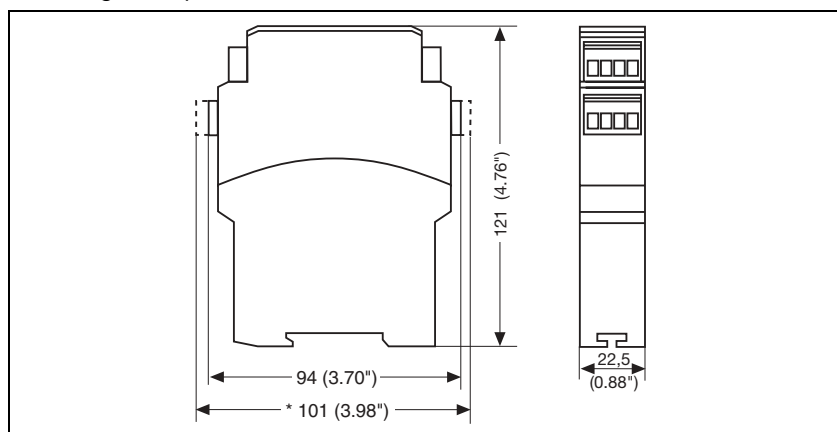


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

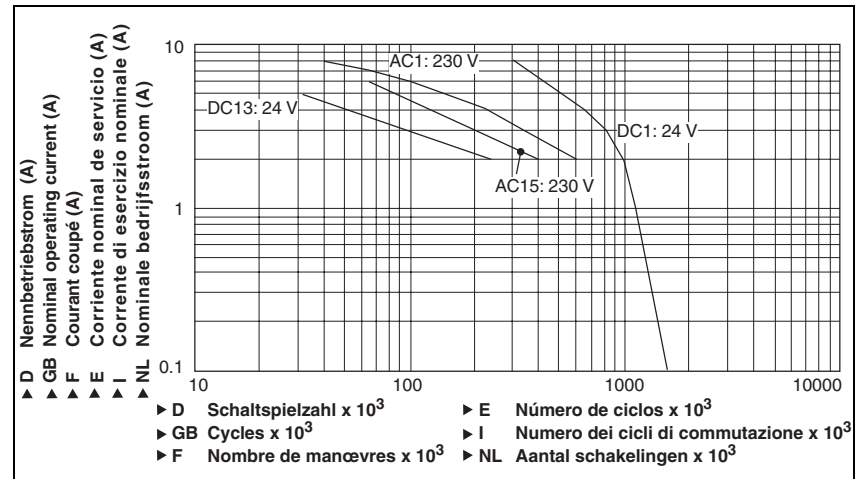


delayed PZE X4VP

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B DC	2.5 W
Residual ripple DC	20 %
Voltage and current at input circuit: 24 V DC	85 mA
Output contacts in accordance with EN 954-1	Safety contacts (N/O), delayed (<30 s): 4
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5 \text{ A}$ $P_{max}: 1200 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5 \text{ A}$ $P_{max}: 120 \text{ W}$
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V	$I_{max}: 3 \text{ A}$
DC13 (6 cycles/min): 24 V	$I_{max}: 4 \text{ A}$
Contact material	AgSnO₂ + 0.2 µm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} Input circuits Single-channel at U_B DC	30 Ohm
Times	
Switch-on delay with automatic reset typ.	130 ms
with automatic reset max.	220 ms
Delay-on de-energisation with E-STOP typ.	0.5 s Order no.: 787580, 777580 1 s Order no.: 787581, 777581 2 s Order no.: 787582, 777582 3 s Order no.: 787583, 777583
with power failure typ.	0.5 s Order no.: 787580, 777580 1 s Order no.: 787581, 777581 2 s Order no.: 787582, 777582 3 s Order no.: 787583, 777583
Tolerance	-50% / +50%
Supply interruption before de-energisation	20 ms

delayed PZE X4VP

2.2

Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ²
Torque setting with screw terminals	0.5 Nm
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	
with screw terminals	94 mm x 22.5 mm x 121 mm
with cage clamp terminals	101 mm x 22.5 mm x 121 mm
Weight	250 g Order no.: 787580 255 g Order no.: 787581, 777580 260 g Order no.: 777581 265 g Order no.: 787583, 787582 270 g Order no.: 777583, 777582

The standards current on 09/04 apply.

Max. continuous current	
Number of contacts	I _{max} (A) at U _B DC
1	5.00 A
2	5.00 A
3	4.50 A
4	4.00 A

Order reference				
Type	Features		Terminals	Order no.
PZE X4VP C	24 VDC	0.5 s fixed	Cage clamp terminals	787 580
PZE X4VP	24 VDC	0.5 s fixed	Screw terminals	777 580
PZE X4VP C	24 VDC	1 s fixed	Cage clamp terminals	787 581
PZE X4VP	24 VDC	1 s fixed	Screw terminals	777 581

delayed PZE X4VP

Type	Features			Terminals	Order no.
PZE X4VP C	24 VDC	2 s fixed		Cage clamp terminals	787 582
PZE X4VP	24 VDC	2 s fixed		Screw terminals	777 582
PZE X4VP C	24 VDC	3 s fixed		Cage clamp terminals	787 583
PZE X4VP	24 VDC	3 s fixed		Screw terminals	777 583

delayed PZE X4VP4



Unit features

- } Positive-guided relay outputs:
- } 4 safety contacts (N/O), delay-on de-energisation
 - Switch status channel 1/2
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit description

The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all safety relays with feedback loop. The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this. The delay-on de-energisation safety contacts may only be used up to category 3.

Safety features

The unit meets the following safety requirements:

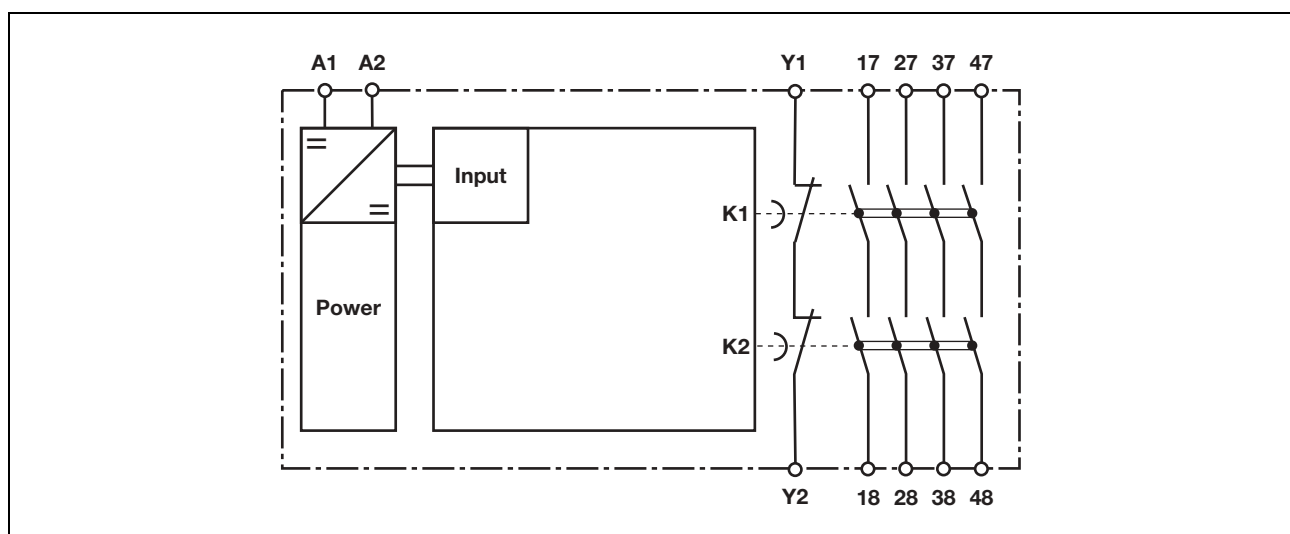
- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Contact expander module for increasing the number of available contacts

Approvals

	PZE X4VP4
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Block diagram

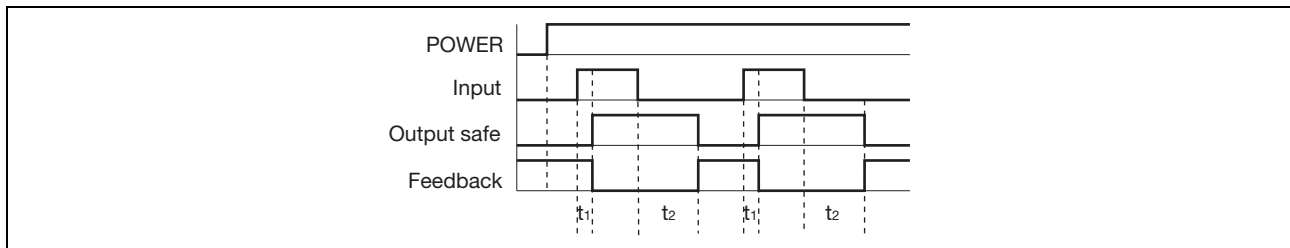


delayed PZE X4VP4

Function description

- } Single-channel operation: one input circuit affects both output relays

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits A1
- } Output safe: Safety contacts 17-18, 27-28, 37-38, 47-48
- } Feedback: Feedback loop Y1-Y2
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 17-18, 27-28, 37-38, 47-48 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs l_{max} in the input circuit:

$$l_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

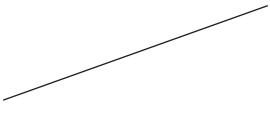
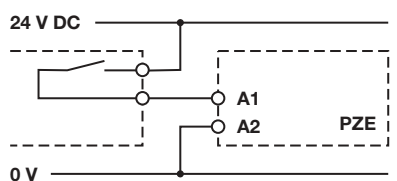
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

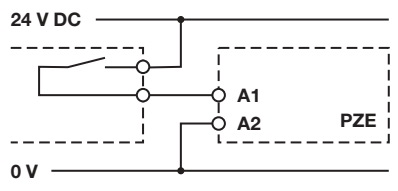
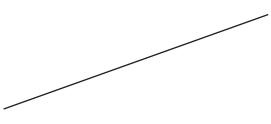
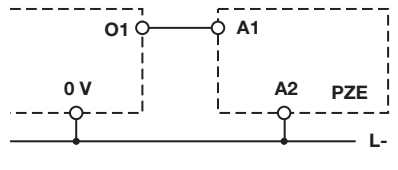
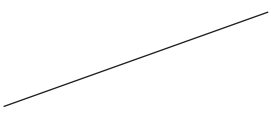
delayed PZE X4VP4

Preparing for operation

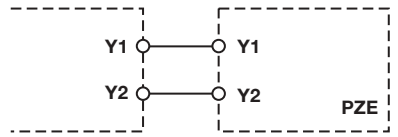
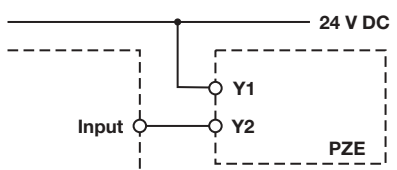
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

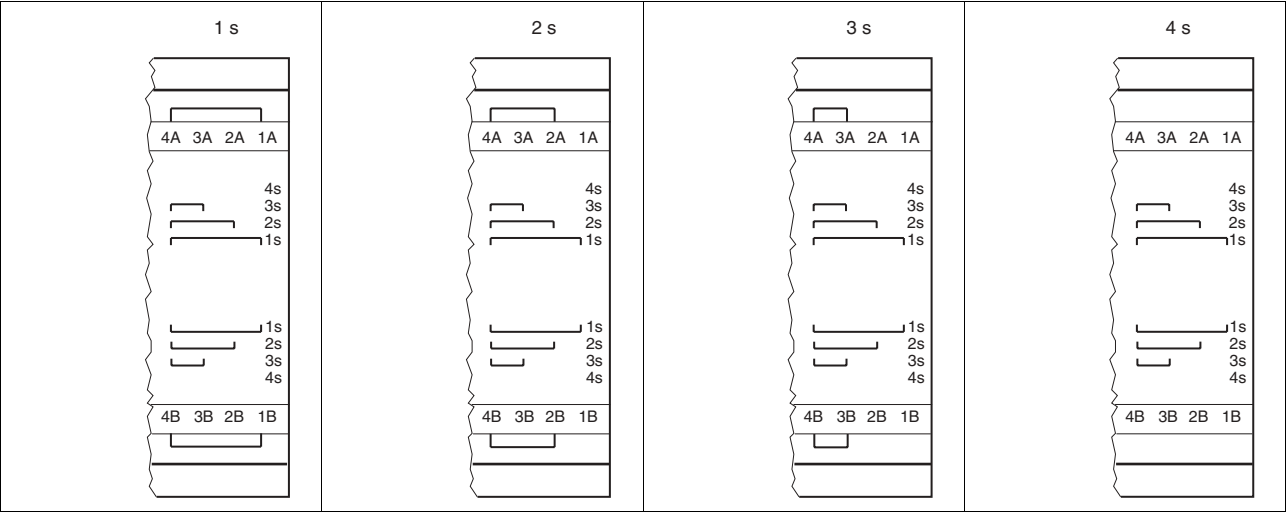
Input circuit	Single-channel	Dual-channel
Base unit: PNOZ X safety relay Driven via safety contacts		
Base unit: PNOZelog safety relay Driven via semiconductor outputs (24 VDC)		

} Feedback loop

Feedback loop	Base unit: Safety relay PNOZ X	Base unit: Safety relay PNOZelog
Y1, Y2 and Input are inputs on the base unit; they evaluate the feedback loop		

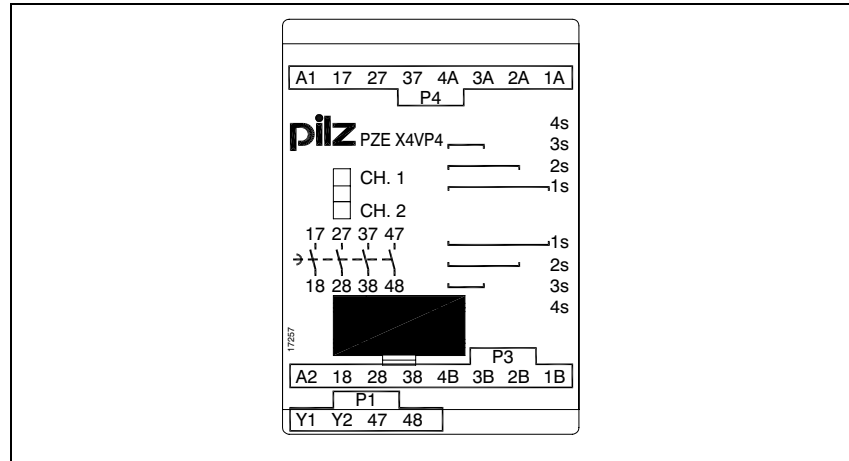
delayed
PZE X4VP4

} Setting the delay time



delayed PZE X4VP4

Terminal configuration

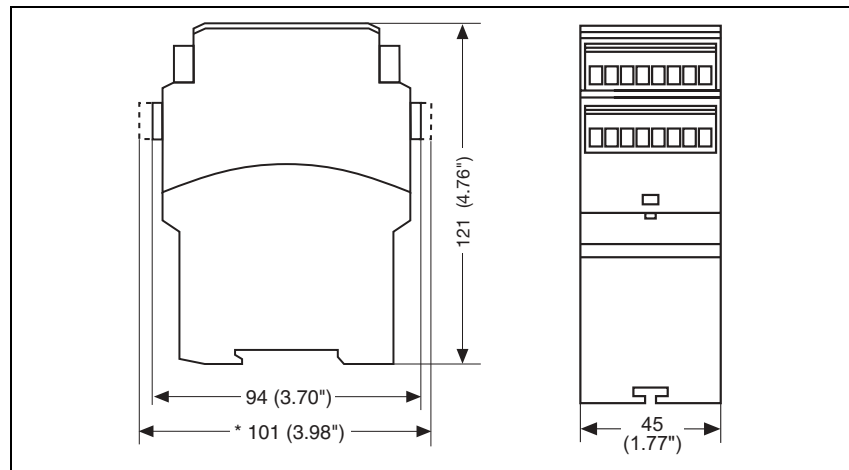


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

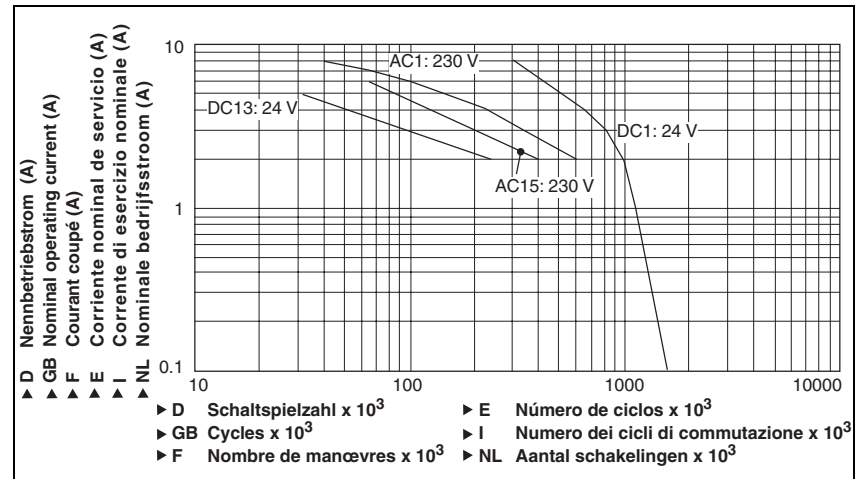


delayed PZE X4VP4

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage	
Supply voltage U_B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B DC	2.5 W
Residual ripple DC	20 %
Voltage and current at input circuit DC: 24.0 V	70.0 mA
Output contacts in accordance with EN 954-1	Safety contacts (N/O), delayed: 4
Utilisation category in accordance with EN 60947-4-1	
Safety contacts, delayed: AC1 at 240 V	$I_{min}: 0.01 A, I_{max}: 5.0 A$ $P_{max}: 1,200 VA$
Safety contacts, delayed: DC1 at 24 V	$I_{min}: 0.01 A, I_{max}: 5.0 A$ $P_{max}: 120 W$
Utilisation category in accordance with EN 60947-5-1	
Safety contacts, delayed: AC15 at 230 V	$I_{max}: 5.0 A$
Safety contacts, delayed: DC13 at 24 V (6 cycles/min)	$I_{max}: 4.0 A$
Contact material	AgSnO2 + 0.2 µm Au
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	6 A
Blow-out fuse, slow	
Safety contacts:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	4 A
Max. overall cable resistance R_{lmax} per input circuit single-channel at U_B DC	30 Ohm
Times	
Switch-on delay	
with automatic reset after power on typ.	230 ms
with automatic reset after power on max.	400 ms
Delay time t_V : selectable	1.00 s; 2.00 s; 3.00 s; 4.00 s Order no.: 777586 1.00 s; 2.00 s; 3.00 s; 4.00 s Order no.: 787586
Time accuracy	-50 %/+50 %
Supply interruption before de-energisation	20 ms

delayed PZE X4VP4

2.2

Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG Order no.: 777586
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG Order no.: 777586
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 777586
Torque setting with screw terminals	0.50 Nm Order no.: 777586
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 787586
Cage clamp terminals: terminal points per connection	2 Order no.: 787586
Stripping length	8 mm Order no.: 787586
Dimensions	
Height	101.0 mm Order no.: 787586 94.0 mm Order no.: 777586
Width	45.0 mm
Depth	121.0 mm
Weight	300 g Order no.: 787586 305 g Order no.: 777586

The current versions **01/03** of the standards apply.

Order reference					
Type	Features			Terminals	Order no.
PZE X4VP4 C	24 VDC	4 s selectable		Cage clamp terminals	787 586
PZE X4VP4	24 VDC	4 s selectable		Screw terminals	777 586

delayed PZE X4VP8



Contact expander module for increasing the number of available contacts

Approvals

	PZE X4VP8
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Unit features

- } Positive-guided relay outputs:
 - 4 safety contacts (N/O), delay-on de-energisation
- } LED indicator for:
 - Switch status channel 1/2
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit description

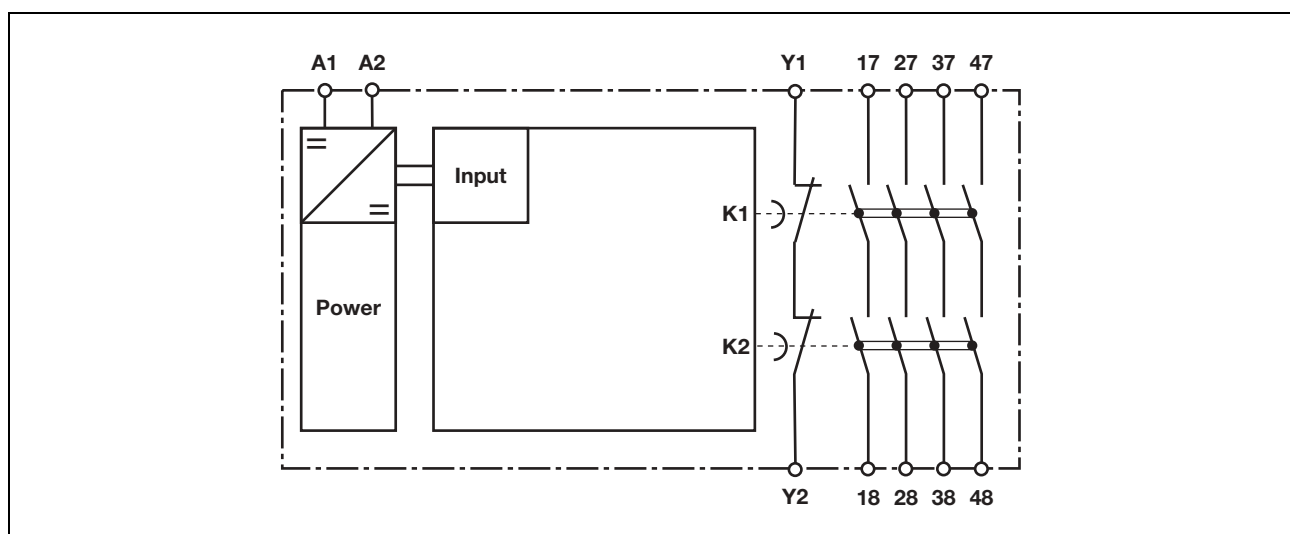
The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all safety relays with feedback loop. The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this. The delay-on de-energisation safety contacts may only be used up to category 3.

Safety features

The unit meets the following safety requirements:

- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Block diagram

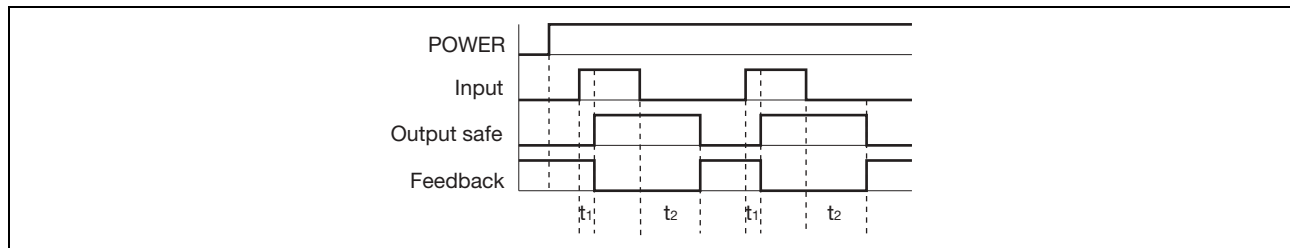


delayed PZE X4VP8

Function description

- } Single-channel operation: one input circuit affects both output relays

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits A1
- } Output safe: Safety contacts 17-18, 27-28, 37-38, 47-48
- } Feedback: Feedback loop Y1-Y2
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 17-18, 27-28, 37-38, 47-48 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs l_{max} in the input circuit:

$$l_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

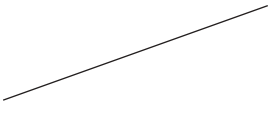
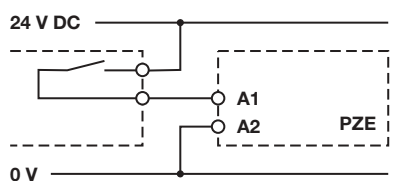
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

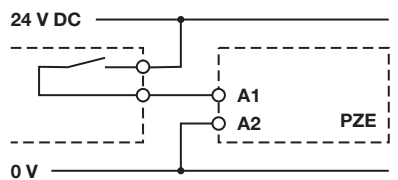
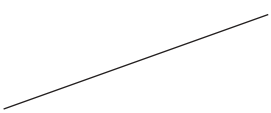
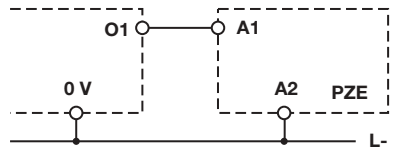
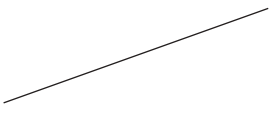
delayed PZE X4VP8

Preparing for operation

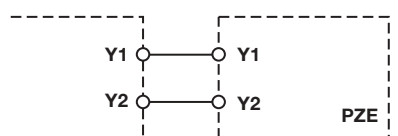
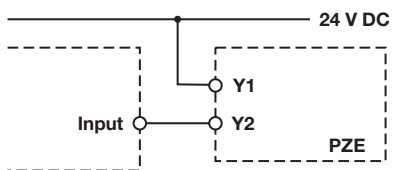
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

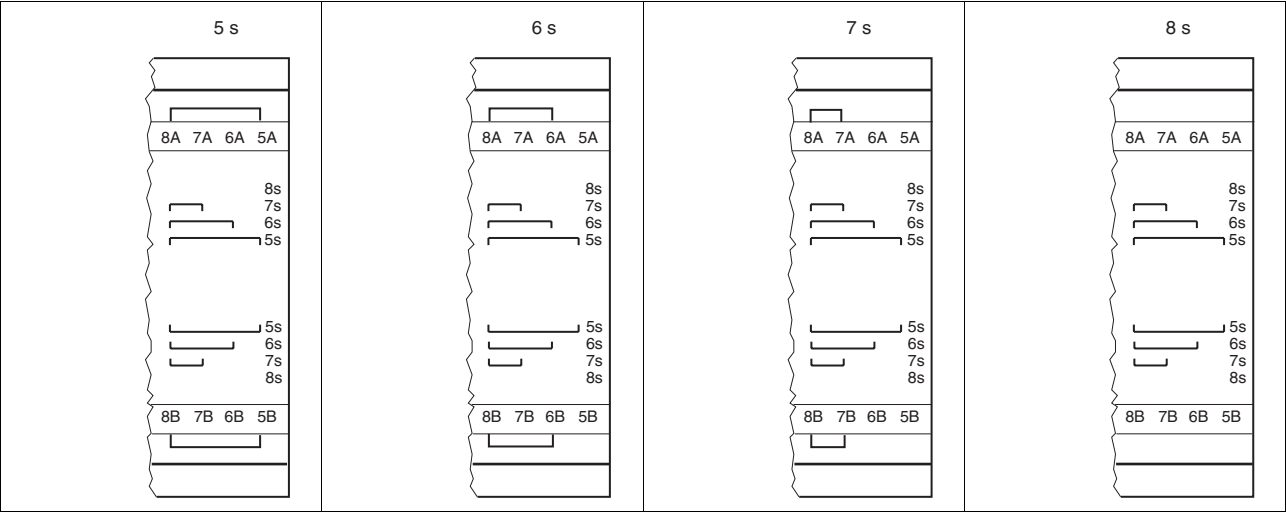
Input circuit	Single-channel	Dual-channel
Base unit: PNOZ X safety relay Driven via safety contacts		
Base unit: PNOZelog safety relay Driven via semiconductor outputs (24 VDC)		

} Feedback loop

Feedback loop	Automatic reset	Monitored reset
Y1, Y2 and Input are inputs on the base unit; they evaluate the feedback loop		

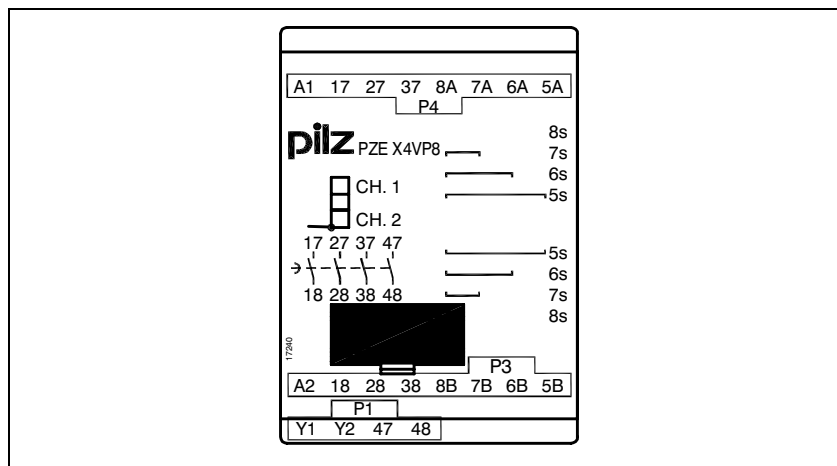
delayed
PZE X4VP8

} Setting the delay time



delayed PZE X4VP8

Terminal configuration

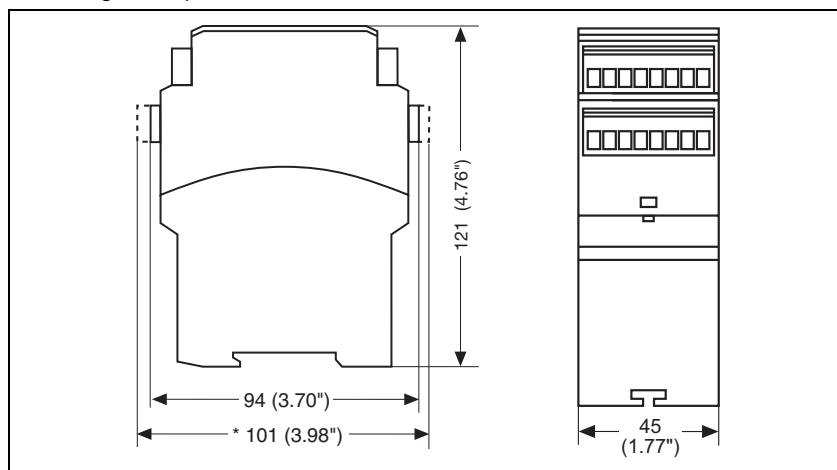


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

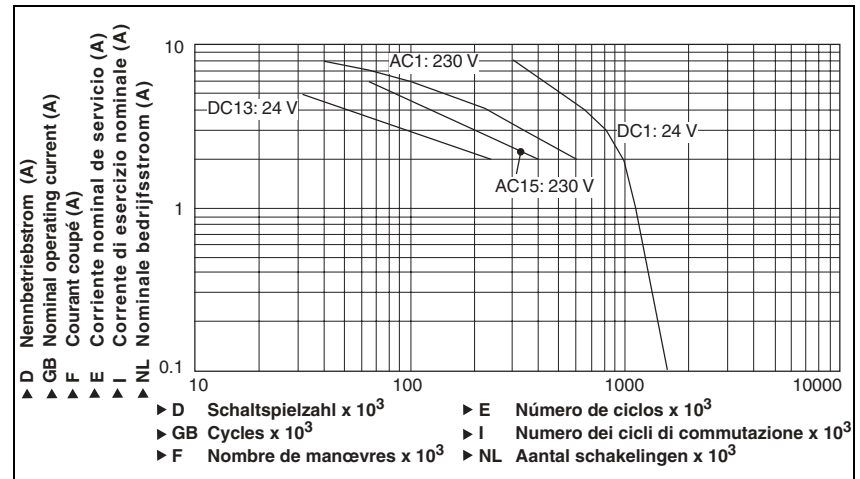


delayed PZE X4VP8

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U_B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B DC	2.5 W
Residual ripple DC	20 %
Voltage and current at input circuit DC: 24.0 V	70.0 mA
Output contacts in accordance with EN 954-1	Safety contacts (N/O), delayed: 4
Utilisation category in accordance with EN 60947-4-1	
Safety contacts, delayed: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 5.0 A P_{max} : 1,200 VA
Safety contacts, delayed: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 5.0 A P_{max} : 120 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts, delayed: AC15 at 230 V	I_{max} : 5.0 A
Safety contacts, delayed: DC13 at 24 V (6 cycles/min)	I_{max} : 4.0 A
Contact material	AgSnO2 + 0.2 µm Au
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	6 A
Blow-out fuse, slow	
Safety contacts:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	4 A
Max. overall cable resistance R_{lmax} per input circuit single-channel at U_B DC	30 Ohm
Times	
Switch-on delay	
with automatic reset after power on typ.	320 ms
with automatic reset after power on max.	500 ms
Delay time t_V : selectable	5.00 s; 6.00 s; 7.00 s; 8.00 s Order no.: 777584 5.00 s; 6.00 s; 7.00 s; 8.00 s Order no.: 787584
Time accuracy	-50 %/+50 %
Supply interruption before de-energisation	20 ms

delayed PZE X4VP8

Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG Order no.: 777584
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG Order no.: 777584
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 777584
Torque setting with screw terminals	0.50 Nm Order no.: 777584
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG Order no.: 787584
Cage clamp terminals: terminal points per connection	2 Order no.: 787584
Stripping length	8 mm Order no.: 787584
Dimensions	
Height	101.0 mm Order no.: 787584 94.0 mm Order no.: 777584
Width	45.0 mm
Depth	121.0 mm
Weight	325 g Order no.: 787584 330 g Order no.: 777584

The current versions **01/03** of the standards apply.

Order reference					
Type	Features			Terminals	Order no.
PZE X4VP8 C	24 VDC	8 s selectable		Cage clamp terminals	787 584
PZE X4VP8	24 VDC	8 s selectable		Screw terminals	777 584

instantaneous PZE X5P



Contact expander module for increasing the number of available contacts

Approvals

	PZE X5P
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Unit features

- } Positive-guided relay outputs:
 - 5 safety contacts (N/O), instantaneous
- } 2 semiconductor outputs
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Semiconductor outputs signal:
 - Switch status channel 1/2
 - Supply voltage is present
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit description

The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all safety relays with feedback loop. The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The

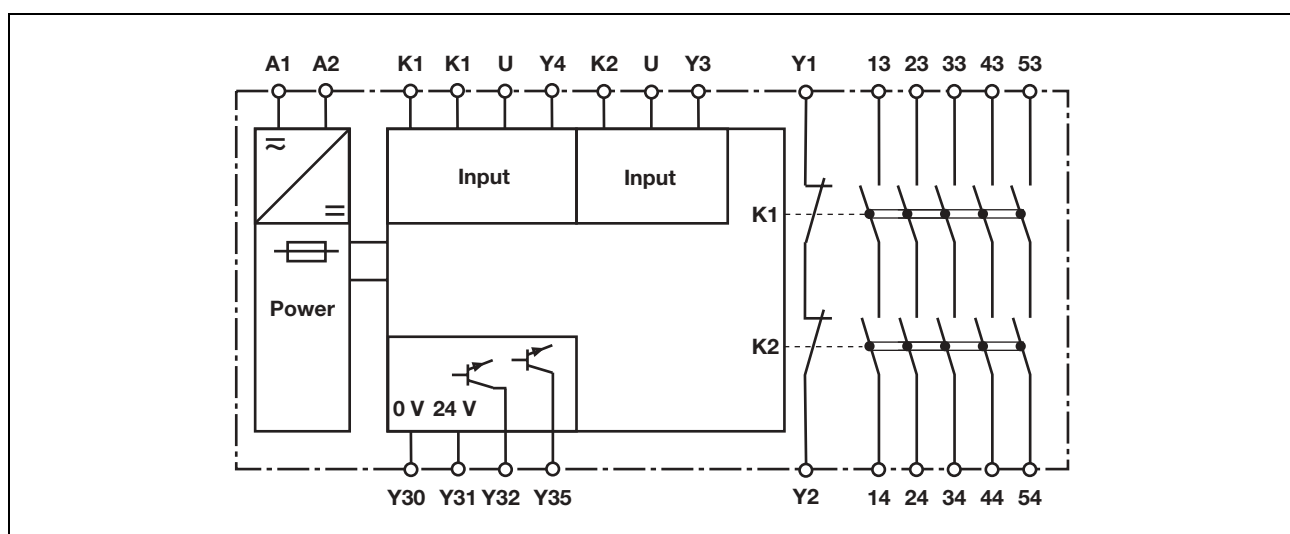
contact expander module may not exceed this.

Safety features

The unit meets the following safety requirements:

- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Block diagram

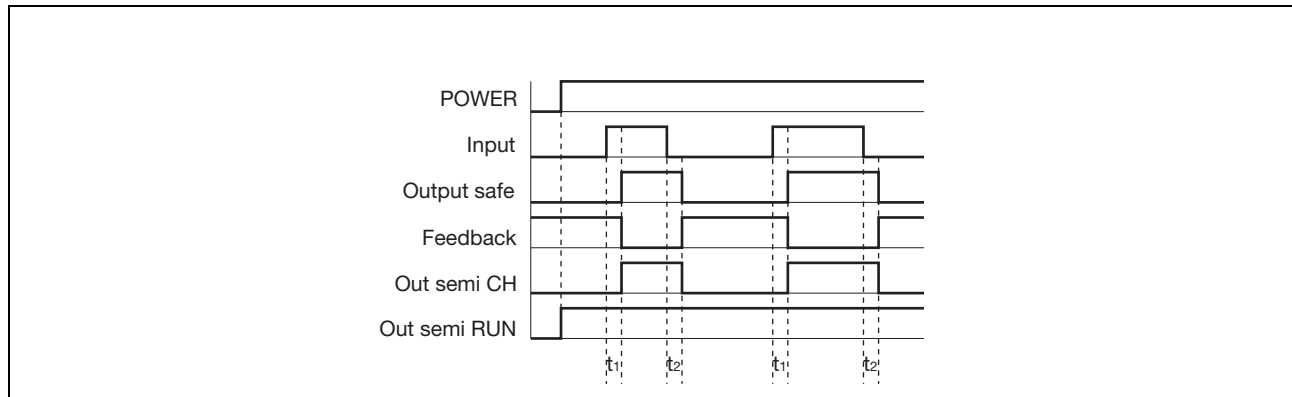


instantaneous PZE X5P

Function description

- } Single-channel operation: one input circuit affects both output relays
- } Dual-channel operation:
- two redundant input circuits affect one output relay
- Detection of shorts across contacts is also possible

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits K1, K2
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54
- } Out semi CH: Semiconductor output switch status channel 1/2
- } Out semi RUN: Semiconductor output supply voltage
- } Feedback: Feedback loop Y1-Y2
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{\max} = \frac{R_{I\max}}{R_l / \text{km}}$$

R_{I_{max}} = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

instantaneous
PZE X5P

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		

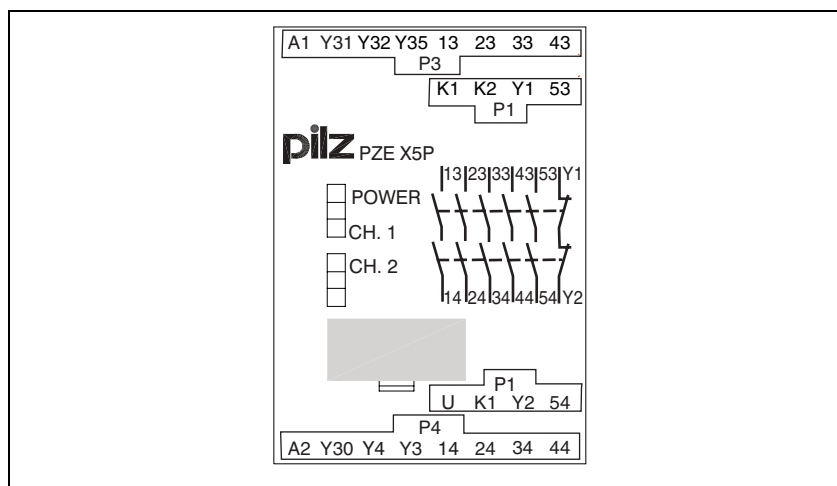
} Feedback loop

Y1 and Y2 are feedback loop inputs on the base unit	

} Semiconductor output

instantaneous PZE X5P

Terminal configuration

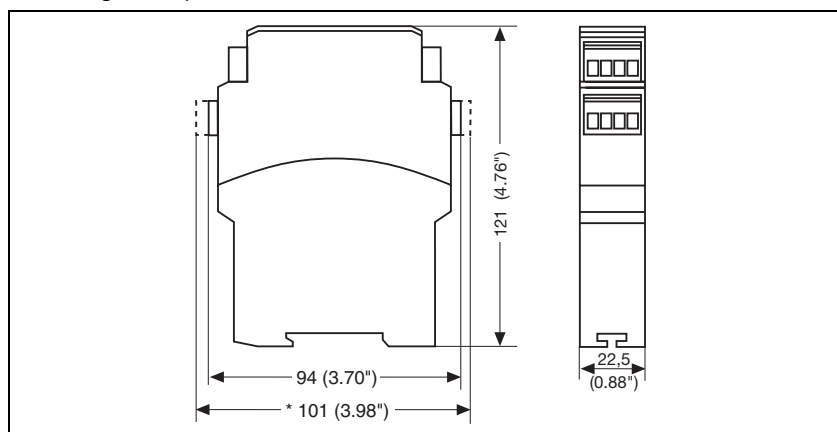


Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

* with cage clamp terminals

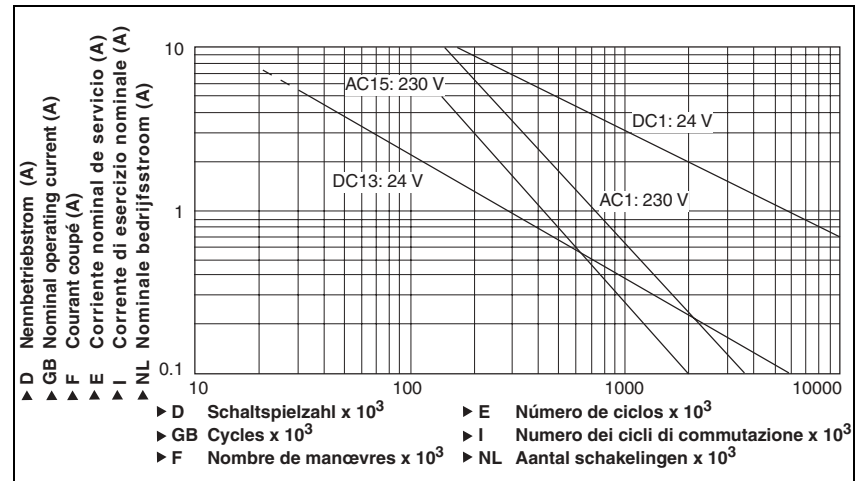


instantaneous PZE X5P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B DC	3.5 W
Residual ripple DC	20 %
Voltage and current at input circuit: 24 V DC	40 mA
Output contacts in accordance with EN 954-1	Safety contacts (N/O): 5
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 8 \text{ A}$ $P_{max}: 2000 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 8 \text{ A}$ $P_{max}: 200 \text{ W}$
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	$I_{max}: 5 \text{ A}$
DC13 (6 cycles/min): 24 V	$I_{max}: 7 \text{ A}$
Contact material	AgSnO₂ + 0.2 μm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A, 24 VAC/DC, characteristic B/C
Semiconductor outputs (short circuit proof)	24 V DC, 20 mA
External supply voltage	24 V DC
Voltage tolerance	-20 % / +20 %
Max. overall cable resistance R_{lmax} Input circuits, reset circuits	
Single-channel at U_B DC	120 Ohm
Dual-channel without detect. of shorts across contacts at U_B DC	240 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	4 Ohm

instantaneous PZE X5P

Times	
Switch-on delay with automatic reset typ. with automatic reset max.	16 ms 30 ms
Delay-on de-energisation with E-STOP typ. with E-STOP max.	13 ms 30 ms 110 ms 150 ms
Supply interruption before de-energisation Supply voltage Input circuit	20 ms 8 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6 Frequency Amplitude Climatic suitability Airgap creepage Ambient temperature Storage temperature	10 - 55 Hz 0.35 mm EN 60068-2-78 VDE 0110-1 -10 - 55 °C -40 - 85 °C
Protection type Mounting (e.g. cabinet) Housing Terminals	IP54 IP40 IP20
Mechanical data	
Housing material Housing Front	PPO UL 94 V0 ABS UL 94 V0
Max. cross section of external conductors with screw terminals 1 core flexible 2 core, same cross section, flexible: with crimp connectors, without insulating sleeve without crimp connectors or with TWIN crimp connectors Torque setting with screw terminals	0.25 – 2.50 mm ² 0.25 – 1.00 mm ² 0.20 – 1.50 mm ² 0.5 Nm
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors Cage clamp terminals Terminal points per connection Stripping length	0.20 – 1.50 mm ² 2 8 mm
Dimensions (H x W x D) with screw terminals with cage clamp terminals Weight	94 mm x 45 mm x 121 mm 101 mm x 45 mm x 121 mm 260 g Order no.: 777150 255 g Order no.: 787150

The standards current on **09/04** apply.

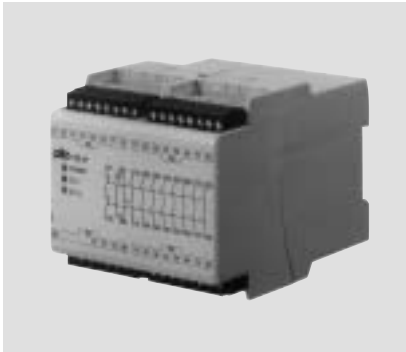
Max. continuous current	
Number of contacts	I _{max} (A) at U _B DC
1	8.00 A
2	8.00 A
3	6.50 A
4	5.60 A
5	5.00 A

instantaneous PZE X5P

Order reference

Type	Features	Terminals	Order no.
PZE X5P C	24 VDC	Cage clamp terminals	787 150
PZE X5P	24 VDC	Screw terminals	777 150

instantaneous PZE 9P



Contact expander module for increasing the number of available contacts

Approvals

	PZE 9P
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Unit features

- } Positive-guided relay outputs:
 - 8 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Safe separation of safety contacts 23-24 ... 83-84 from input circuits K1-U2, K2-U2, Y3-Y4, feedback loop Y1-Y2 and auxiliary contact 91-92.
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Plug-in connection terminals (either cage clamp terminal or screw terminal)
- } See order reference for unit types

Unit description

The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all

- } Safety relays with feedback loop

- } Programmable safety systems with feedback loop

The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this.

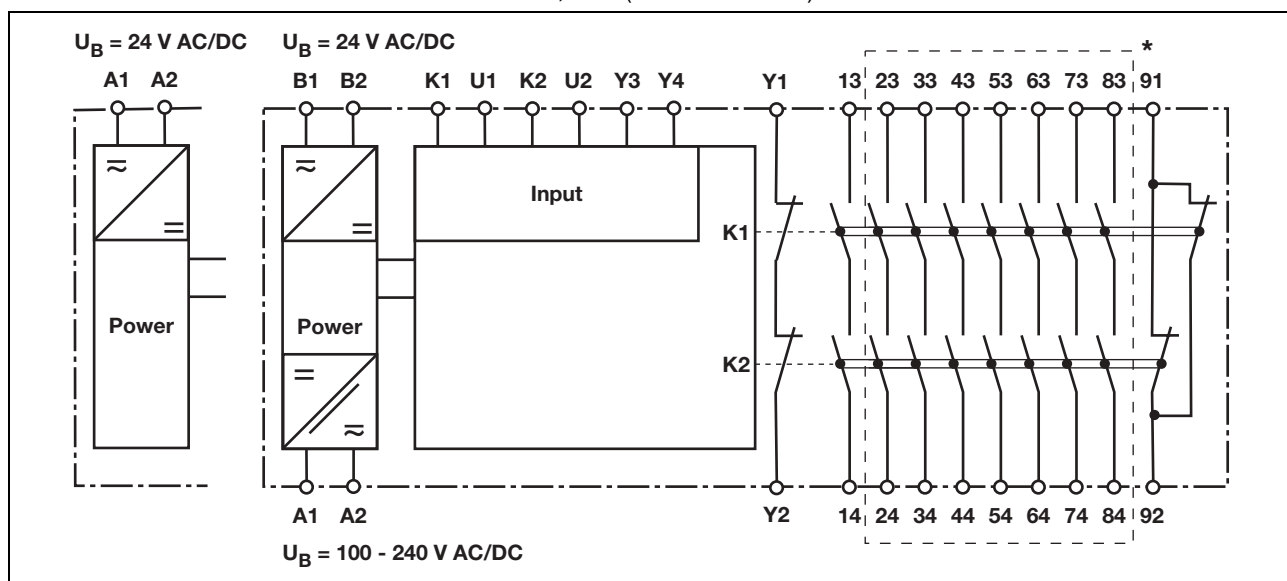
Safety features

The unit meets the following safety requirements:

- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Block diagram

* Galvanic isolation in accordance with EN 60947-1, 6 kV (see unit features)

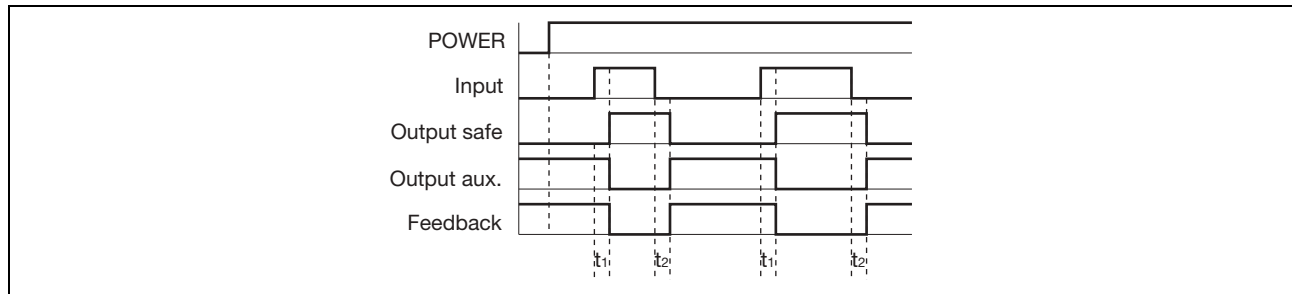


instantaneous PZE 9P

Function description

- } Single-channel operation: one input circuit affects both output relays
- } Dual-channel operation:
 - two redundant input circuits affect one output relay
 - Detection of shorts across contacts is also possible

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits K1-U1, K2-U2, Y3-Y4
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74, 83-84
- } Output aux: Auxiliary contacts 91-92
- } Feedback: Feedback loop Y1-Y2
- } t₁: Switch-on delay

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74, 83-84 are safety contacts, output 91-92 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

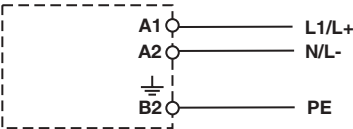
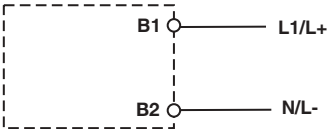
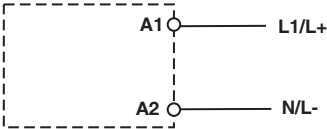
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

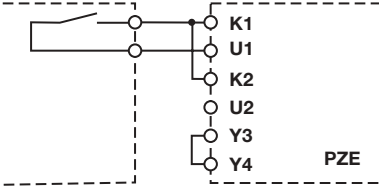
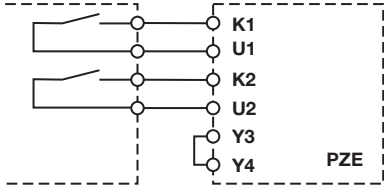
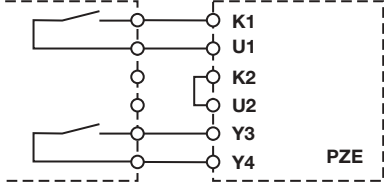
instantaneous
PZE 9P

Preparing for operation

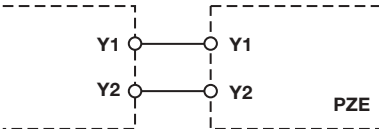
} Supply voltage

Supply voltage	AC/DC	AC/DC
	Order no.: 777148, 787148 $U_B = 100 - 240\text{ V}$ 	Order no. 777148, 787148 $U_B = 24\text{ V}$ 
		Order no. 777140, 787140 $U_B = 24\text{ V}$ 

} Input circuit

Input circuit	Single-channel	Dual-channel
without detection of shorts across contacts		
with detection of shorts across contacts		

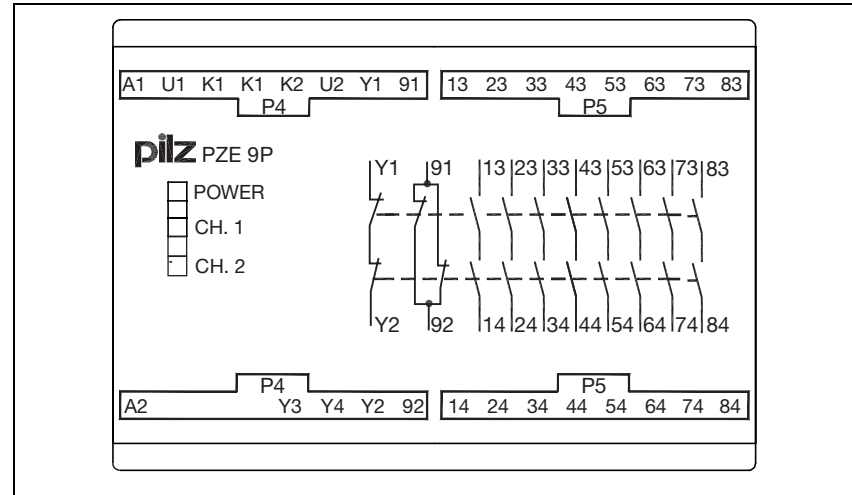
} Feedback loop

Y1 and Y2 are feedback loop inputs on the base unit	

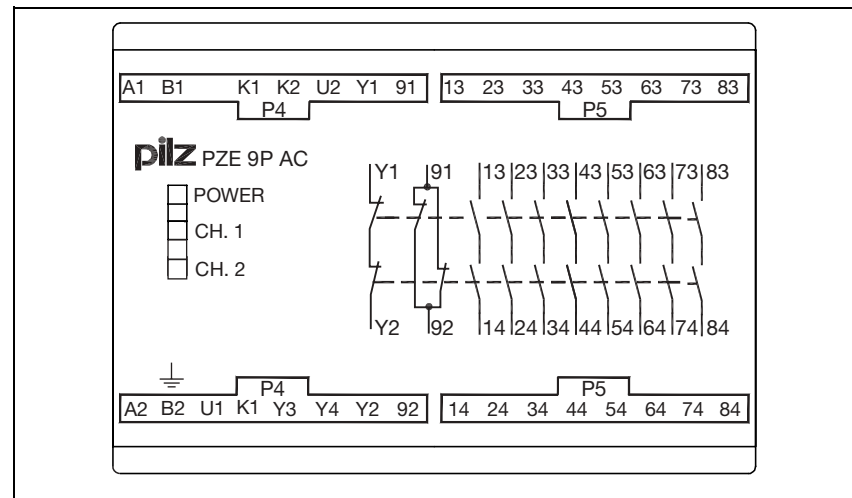
instantaneous PZE 9P

Terminal configuration

$U_B = 24 \text{ VAC/DC}$



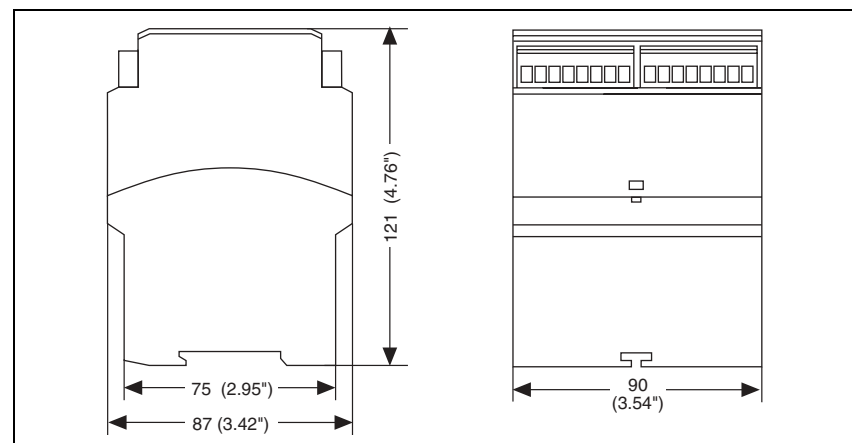
$U_B = 24 \text{ VAC/DC}, 100 - 240 \text{ VAC/DC}$



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

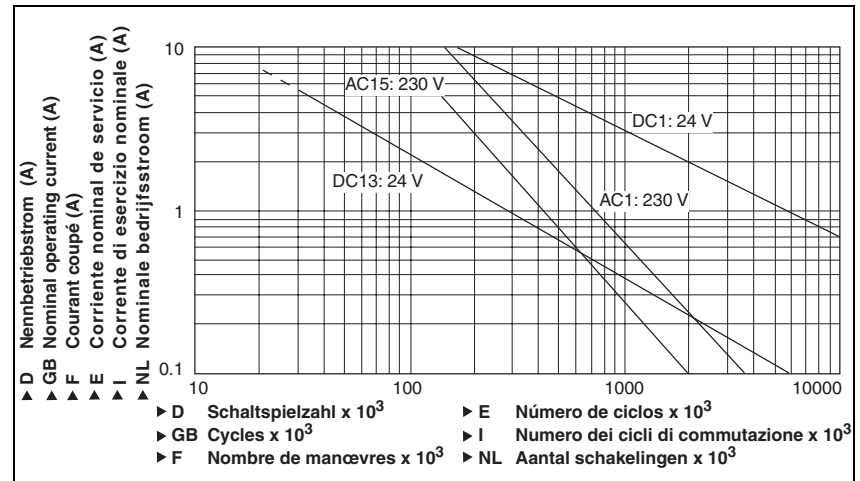


instantaneous PZE 9P

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.2

Technical details

Electrical data

Supply voltage U_B AC	24 V, 100 - 240 V
Supply voltage U_B DC	24 V, 100 - 240 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B AC	9.5 VA Order no.: 777140, 787140 6 VA Order no.: 777148, 787148
Power consumption at U_B DC	3.5 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at Input circuit: 24 V DC	40 mA
Output contacts in accordance with EN 954-1	Safety contacts (N/O): 8 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1 Safety contacts AC1: 240 V	I_{min} : 0.01 A, I_{max} : 8 A P_{max} : 2000 VA
DC1: 24 V	I_{min} : 0.01 A, I_{max} : 8 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V DC13 (6 cycles/min): 24 V	I_{max} : 5 A I_{max} : 7 A
Utilisation category in accordance with EN 60947-4-1 Auxiliary contacts AC1: 240 V	I_{min} : 0.01 A, I_{max} : 2 A P_{max} : 500 VA
DC1: 24 V	I_{min} : 0.01 A, I_{max} : 2 A P_{max} : 50 W
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V DC13 (6 cycles/min): 24 V	I_{max} : 2 A I_{max} : 2 A
Contact material	AgSnO ₂ + 0.2 σ m Au
External contact fuse protection (EN 60947-5-1)	
Safety contacts	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A, 24 VAC/DC, characteristic B/C

instantaneous PZE 9P

2.2

External contact fuse protection (EN 60947-5-1)

Auxiliary contacts

Blow-out fuse, quick

4 A

Blow-out fuse, slow

2 A

Circuit breaker

2 A, 24 VAC/DC, characteristic B/C

Max. overall cable resistance R_{lmax} Input circuits, reset circuits

Single-channel at U_B DC

50 Ohm

Single-channel at U_B AC

80 Ohm

Dual-channel without detect. of shorts across contacts at U_B DC

100 Ohm

Dual-channel without detect. of shorts across contacts at U_B AC

160 Ohm

Dual-channel with detect. of shorts across contacts at U_B DC

5 Ohm Order no.: 777140, 787140

3 Ohm Order no.: 777148, 787148

Dual-channel with detect. of shorts across contacts at U_B AC

10 Ohm Order no.: 777140, 787140

8 Ohm Order no.: 777148, 787148

Times

Switch-on delay

after closing the input circuits typ.

30 ms Order no.: 777140, 787140

25 ms Order no.: 777148, 787148

after closing the input circuits max.

40 ms Order no.: 777140, 787140

30 ms Order no.: 777148, 787148

after power on typ.

30 ms Order no.: 777140, 787140

40 ms Order no.: 777148, 787148

after power on max.

40 ms Order no.: 777140, 787140

50 ms Order no.: 777148, 787148

Delay-on de-energisation

after opening the input circuits typ.

20 ms

after opening the input circuits max.

30 ms

with power failure typ. $U_B = 24$ VAC/DC

110 ms Order no.: 777140, 787140

125 ms Order no.: 777148, 787148

with power failure max. $U_B = 24$ VAC/DC

200 ms Order no.: 777140, 787140

200 ms Order no.: 777148, 787148

with power failure typ. $U_B = 100$ VAC/DC

150 ms Order no.: 777148, 787148

with power failure max. $U_B = 100$ VAC/DC

200 ms Order no.: 777148, 787148

with power failure typ. $U_B = 240$ VAC/DC

270 ms Order no.: 777148, 787148

with power failure max. $U_B = 240$ VAC/DC

400 ms Order no.: 777148, 787148

Supply interruption before de-energisation

Supply voltage

20 ms

Input circuit

10 ms

Environmental data

EMC

EN 60947-5-1, EN 61000-6-2

Vibration in accordance with **EN 60068-2-6**

Frequency

10 - 55 Hz

Amplitude

0.35 mm

Climatic suitability

EN 600682-78

Airgap creepage

EN 60947-1

Ambient temperature

-10 - 55 °C

Storage temperature

-40 - 85 °C

Protection type

Mounting (e.g. cabinet)

IP54

Housing

IP40

Terminals

IP20

instantaneous PZE 9P

Mechanical data

Housing material	PPO UL 94 V0
Housing Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.25 – 2.50 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 – 1.00 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 1.50 mm ²
Torque setting with screw terminals	0.5 Nm
Max. cross section of external conductors with cage clamp terminals: flexible without crimp connectors	0.20 – 1.50 mm ²
Cage clamp terminals	
Terminal points per connection	2
Stripping length	8 mm
Dimensions (H x W x D)	87 mm x 90 mm x 121 mm
Weight	430 g Order no.: 777140 450 g Order no.: 777148 425 g Order no.: 787140 445 g Order no.: 787148

The standards current on 10/02 apply.

Max. continuous current

Number of contacts	I _{max} (A) at U _B DC	I _{max} (A) at U _B AC
1	8.0 A	8.0 A
2	8.0 A	8.0 A
3	8.0 A	8.0 A
4	7.1 A	7.1 A
5	6.3 A	6.3 A
6	5.8 A	5.8 A
7	5.4 A	5.4 A
8	5.0 A	5.0 A

Order reference

Type	Features	Terminals	Order no.
PZE 9P C	24 VAC/DC	Cage clamp terminals	787 140
PZE 9P	24 VAC/DC	Screw terminals	777 140
PZE 9P C	24 VAC/DC, 100 - 240 VAC/DC	Cage clamp terminals	787 148
PZE 9P	24 VAC/DC, 100 - 240 VAC/DC	Screw terminals	777 148

Content	Page
Safety relays PNOZ X – with screw terminals	
E-STOP relays, safety gate monitors	
PNOZ X1	2.3-2
PNOZ X2	2.3-9
PNOZ X2.1	2.3-16
PNOZ X2C	2.3-23
PNOZ X3	2.3-30
PNOZ X4	2.3-38
PNOZ X5	2.3-47
PNOZ X6	2.3-54
PNOZ X7	2.3-62
PNOZ X9	2.3-70
PNOZ X10.1	2.3-78
PNOZ 11	2.3-86
PNOZ X13	2.3-95
PNOZ 16	2.3-103
PNOZ 16S	2.3-111
PNOZ Ex	2.3-119
PNOZ XV2	2.3-127
PNOZ XV3	2.3-135
PNOZ 2VQ	2.3-143
Two-hand control devices	
P1HZ X1	2.3-151
P2HZ X1	2.3-157
P2HZ X2	2.3-164
P2HZ X3	2.3-170
Safe monitoring relays	
PU3Z	2.3-176
Safe timer relays	
PZA	2.3-185
PZW	2.3-192
Contact expansion	
PZE X4	2.3-199
PZE X4V	2.3-205
PZE X5	2.3-212
PZE X5V	2.3-218
PZE 9	2.3-224

Up to Category 2, EN 954-1
PNOZ X1



Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Safety relay for monitoring E-STOP pushbuttons.

Approvals

	PNOZ X1
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Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons

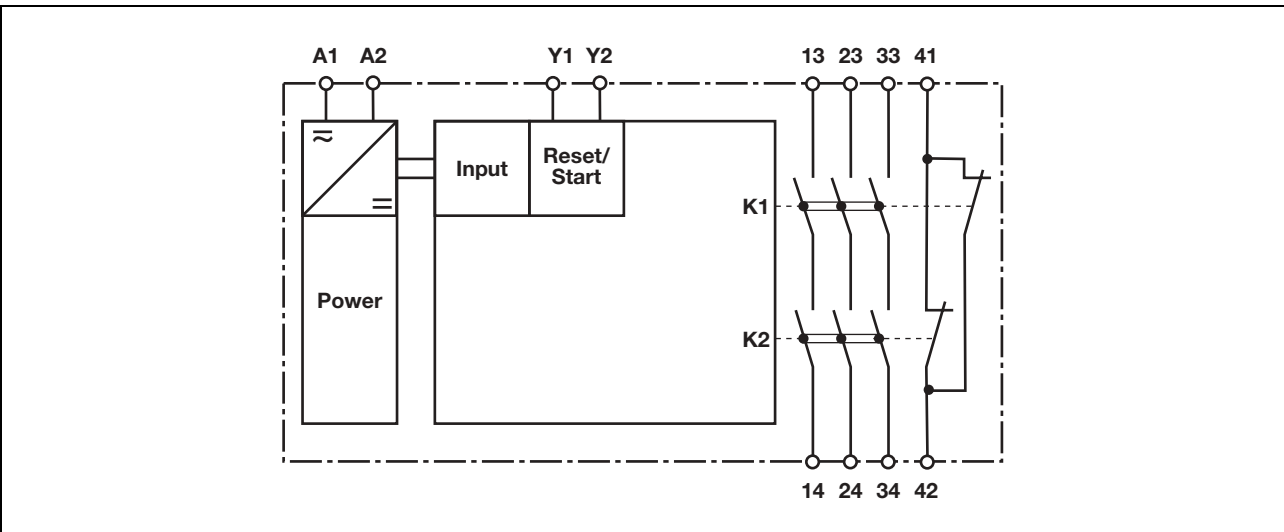
The safety relay is not suitable for non-contact barriers because

- } a dynamic start is not possible
- } the unit can be started during the delay-on de-energisation time.

Safety features

The relay conforms to the following safety criteria:

Block diagram

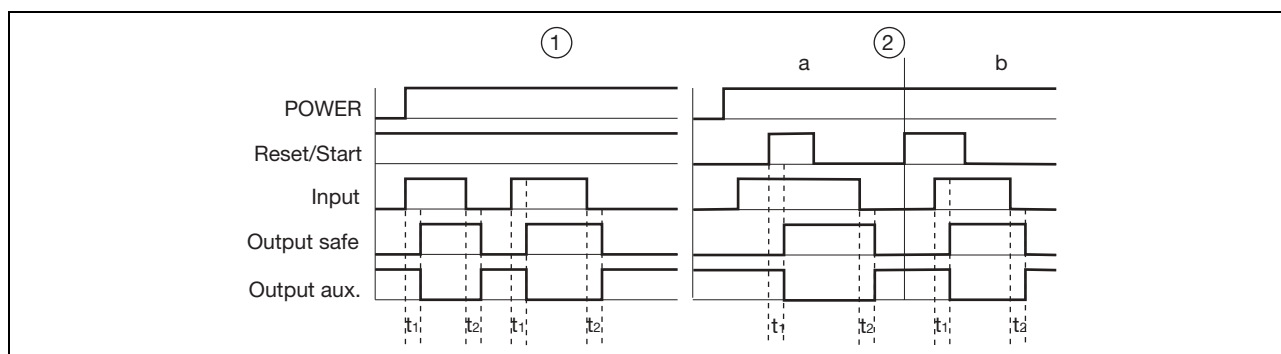


Up to Category 2, EN 954-1 PNOZ X1

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit Y1-Y2
- } Input: Input circuits A1-L+
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } i : Automatic reset
- } ☉ : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t1: Switch-on delay
- } t2: Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 2, EN 954-1 PNOZ X1

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		

} Reset circuit

Reset circuit	E-STOP wiring (single-channel)	E-STOP wiring (dual-channel)
Automatic reset		
Manual reset		

} Feedback loop

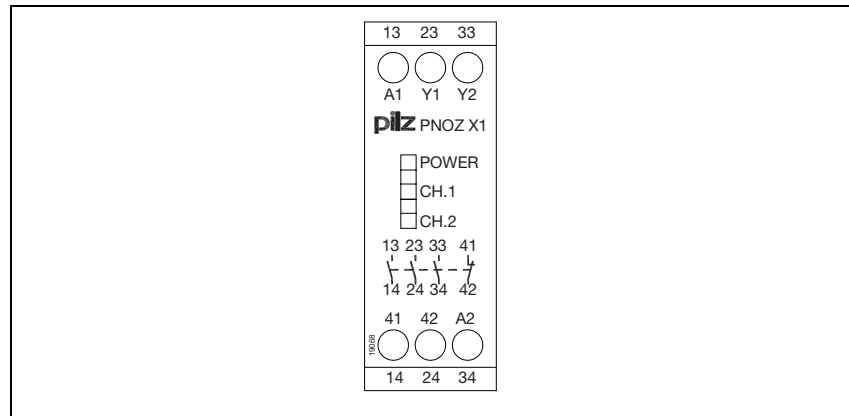
Feedback loop	Automatic reset	Manual reset
Contacts from external contactors		

} Key

S1	E-STOP pushbutton
S3	Reset button

Up to Category 2, EN 954-1 PNOZ X1

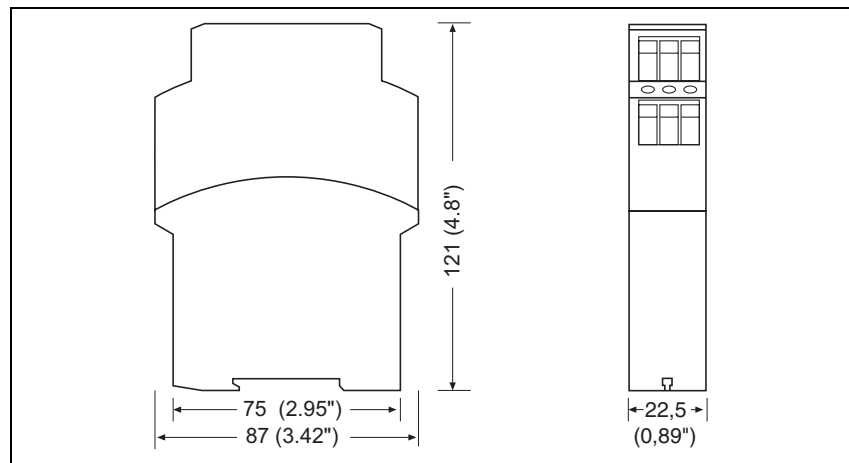
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

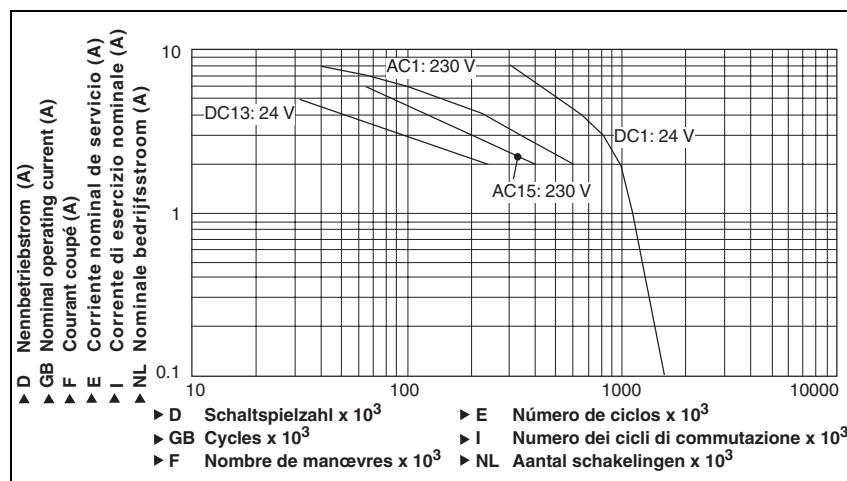


Up to Category 2, EN 954-1 PNOZ X1

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U_B AC/DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B AC	3.5 VA
Power consumption at U_B DC	1.5 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	50.0 mA
reset circuit DC: 24.0 V	30.0 mA
feedback loop DC: 24.0 V	30.0 mA
Output contacts in accordance with EN 954-1 Category 2	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 6.00 A P_{max} : 1500 VA
Safety contacts: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 150 W
Auxiliary contacts: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 1500 VA
Auxiliary contacts: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 6.0 A P_{max} : 150 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I_{max} : 3.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 4.0 A
Auxiliary contacts: AC15 at 230 V	I_{max} : 3.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 4.0 A
Contact material	AgSnO2 + 0.2 µm Au

Up to Category 2, EN 954-1 PNOZ X1

Electrical data	
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	6 A
Auxiliary contacts:	6 A
Blow-out fuse, slow	
Safety contacts:	4 A
Auxiliary contacts:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	4 A
Auxiliary contacts:	4 A
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
single-channel at U_B DC	30 Ohm
single-channel at U_B AC	30 Ohm
Times	
Switch-on delay	
with automatic reset typ.	60 ms
with automatic reset max.	120 ms
with manual reset typ.	60 ms
with manual reset max.	150 ms
Delay-on de-energisation	
with E-STOP typ.	55 ms
with E-STOP max.	90 ms
with power failure typ.	55 ms
with power failure max.	90 ms
Recovery time at max. switching frequency 1/s after E-STOP	150 ms
after power failure	150 ms
Supply interruption before de-energisation	10 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm
Dimensions	
Height	87.0 mm
Width	22.5 mm
Depth	121.0 mm
Weight	185 g

Up to Category 2, EN 954-1 PNOZ X1

The standards current on **09/04** apply.

Order reference

Type	Features		Terminals	Order no.
PNOZ X1	24 VAC	24 VDC	Screw terminals	774 300

Up to Category 4, EN 954-1
PNOZ X2



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ X2
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Unit features

- } Positive-guided relay outputs:
2 safety contacts (N/O), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } See order reference for unit types
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

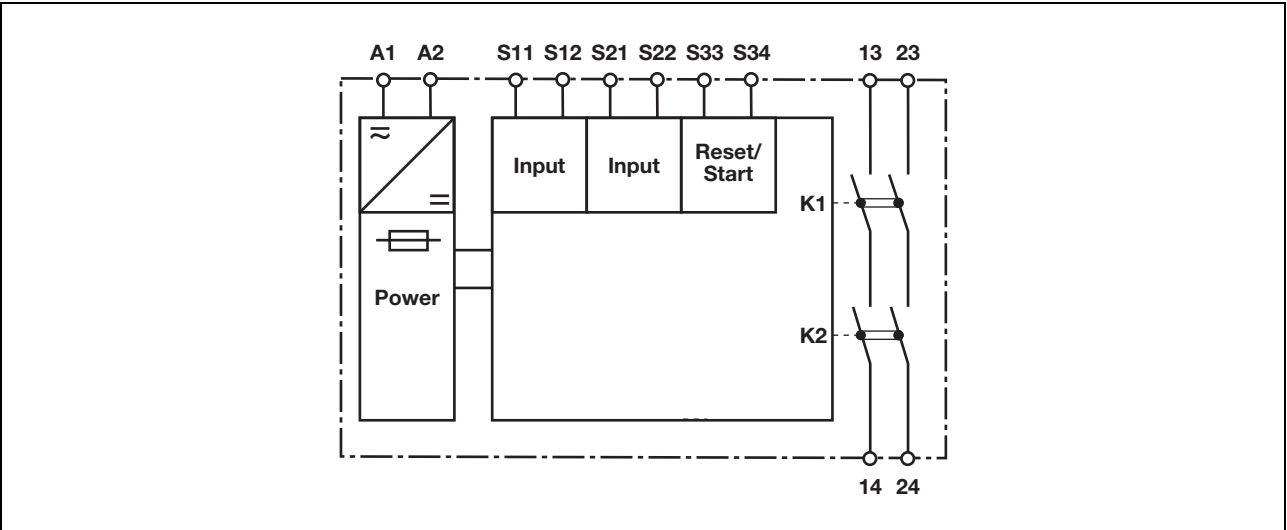
- } E-STOP pushbuttons
- } Safety gates

Safety features

The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.

Block diagram

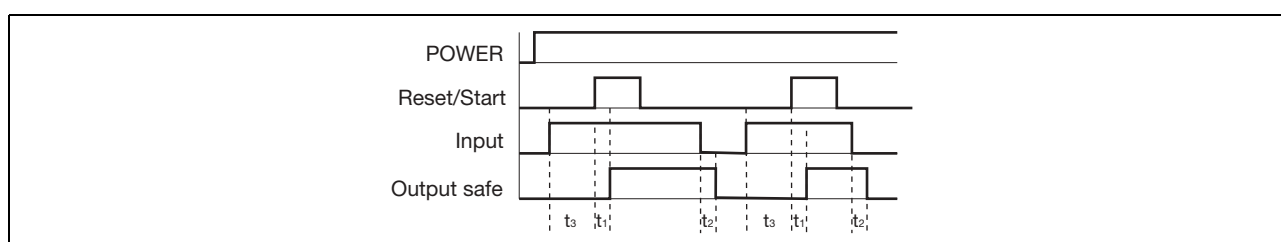


Up to Category 4, EN 954-1 PNOZ X2

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34
- } Input: Input circuits S11-S12, S21-S22
- } Output safe: Safety contacts 13-14, 23-24
- } t₁: Switch-on delay
- } t₂: Delay on de-energisation
- } t₃: Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

R_{lmax} = max. overall cable resistance (see technical details)

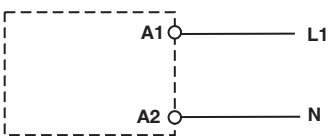
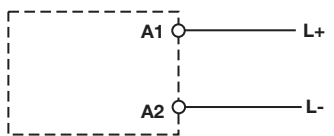
R_l /km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

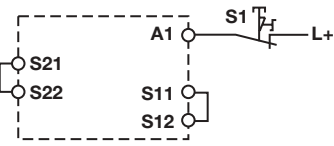
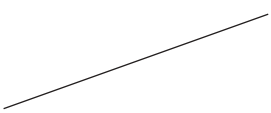
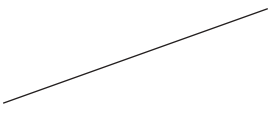
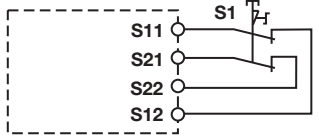
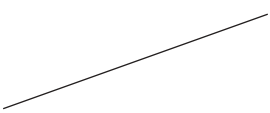
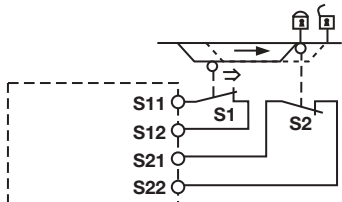
Up to Category 4, EN 954-1 PNOZ X2

Preparing for operation

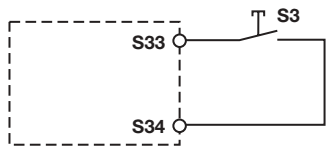
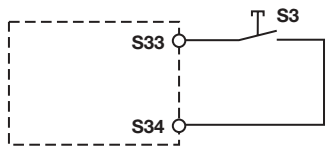
} Supply voltage

Supply voltage	AC	DC
		

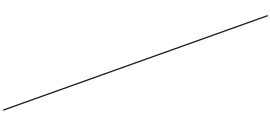
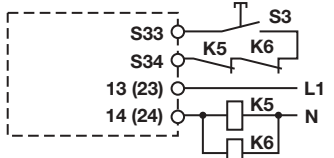
} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Monitored reset		

} Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

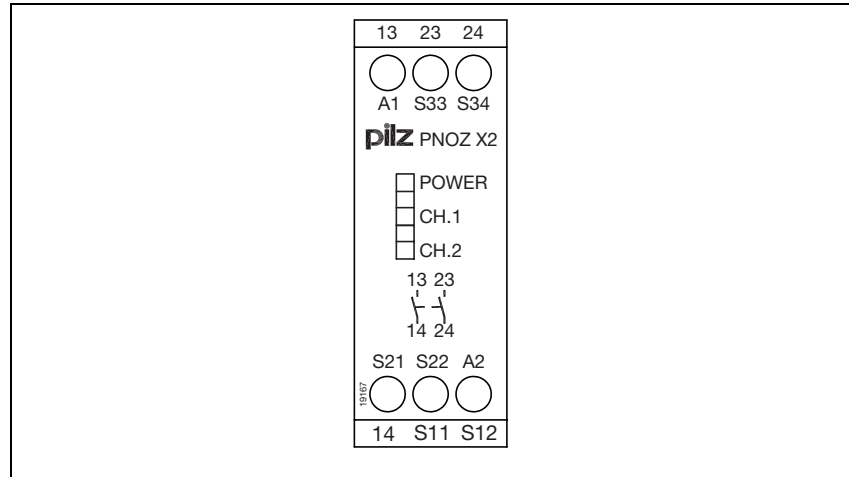
Up to Category 4, EN 954-1 PNOZ X2

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X2

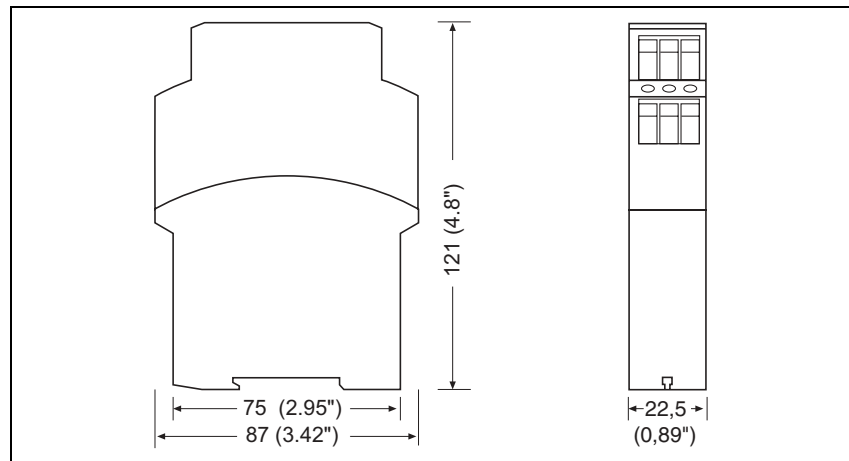
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

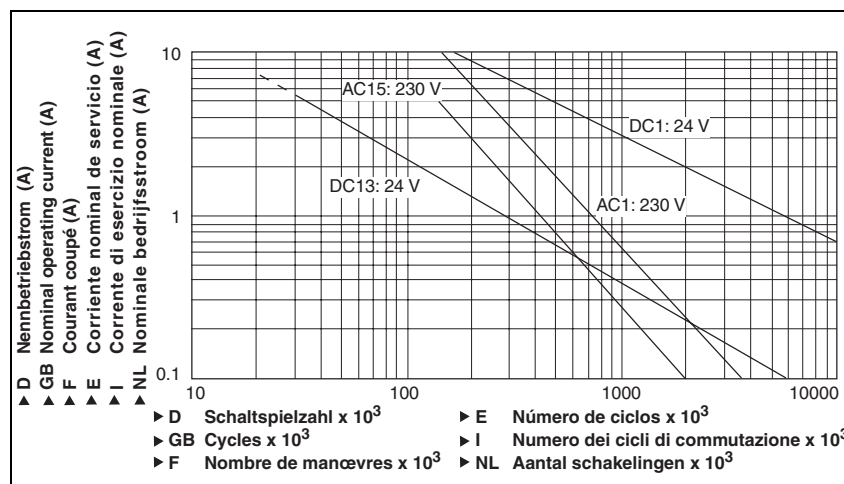


Up to Category 4, EN 954-1 PNOZ X2

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U_B AC	24 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15% / +10%
Power consumption at U_B AC	4.5 VA
Power consumption at U_B DC	2.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	25 mA
reset circuit DC: 24.0 V	50 mA
feedback loop DC: 24.0 V	50 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 2
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A , I_{max} : 6.0 A P: 1500 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 6.0 A P: 150 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : 5.0 A
DC13: 24 V	I_{max} : 4.0 A
(DC13: 6 cycles/min)	
Contact material	AgSnO2 + 0.2 σm Au
External contact fuse protection in accordance with EN 60947-5-1	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	24 VAC/DC, 4 A, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B AC	150 Ohm
Single-channel at U_B DC	150 Ohm
Dual-channel with detect. of shorts across contacts at U_B AC	30 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm

Up to Category 4, EN 954-1 PNOZ X2

Times	
Switch-on delay	
with monitored reset typ.	38 ms
with monitored reset max.	50 ms
Delay-on de-energisation	
with E-STOP typ.	17 ms
with E-STOP max.	30 ms
after power failure typ.	70 ms
after power failure max.	110 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	150 ms
Waiting period with a monitored reset	180 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency:	10 - 55 Hz
Amplitude:	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals:	
1 core flexible	0.20 - 4.00 mm ²
2 core, same cross section, flexible	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	87.0 x 22.5 x 121.0 mm
Weight	200 g

The standards current on **06/04** apply.

Order reference				
Type	Features		Terminals	Order no.
PNOZ X2	24 VAC	24 VDC	Screw terminals	774 303

Up to Category 4, EN 954-1 PNOZ X2.1



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } See order reference for unit types
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

Safety features

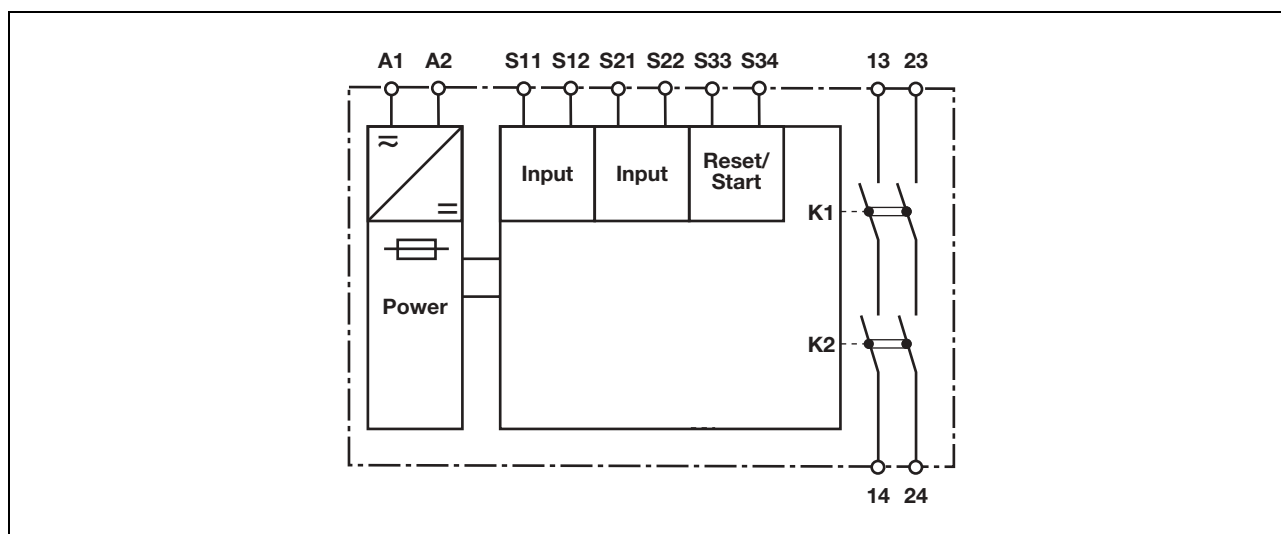
The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.

Approvals

	PNOZ X2.1
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Block diagram

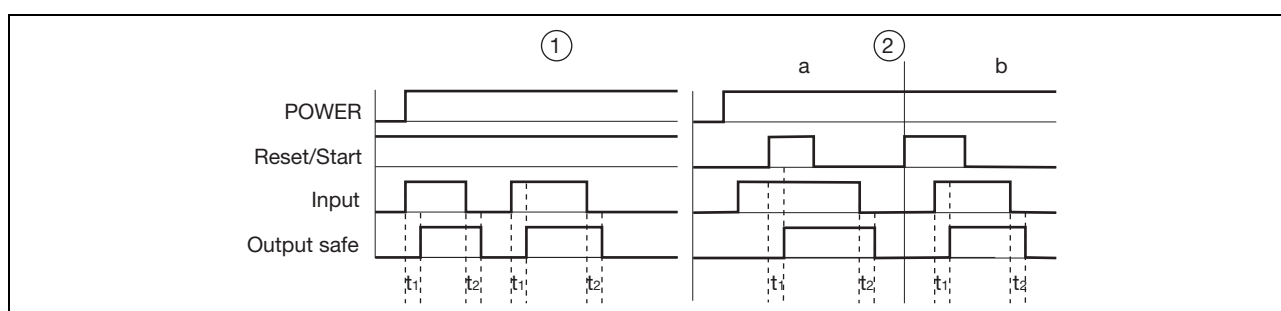


Up to Category 4, EN 954-1 PNOZ X2.1

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset S33-S34
- } Input: Input circuits S11-S12, S21-S22
- } Output safe: Safety contacts 13-14, 23-24
- } i : Automatic reset
- } ☐ : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs $I_{\max}$ in the input circuit:

$$I_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

$R_{l\max}$ = max. overall cable resistance (see technical details)

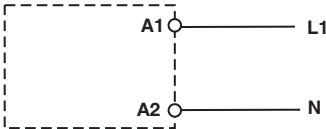
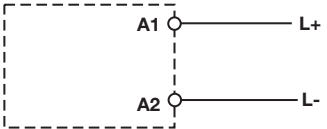
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

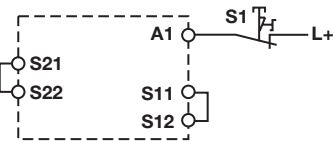
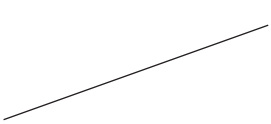
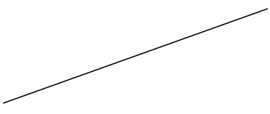
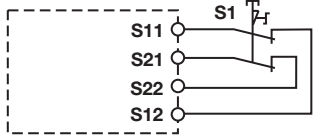
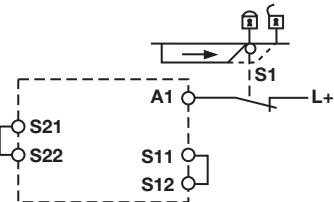
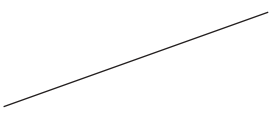
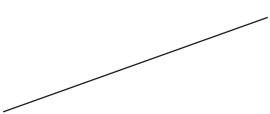
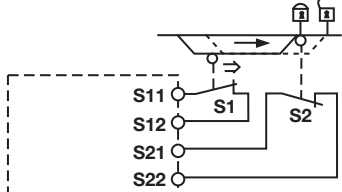
Up to Category 4, EN 954-1
PNOZ X2.1

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ X2.1

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		

} Feedback loop

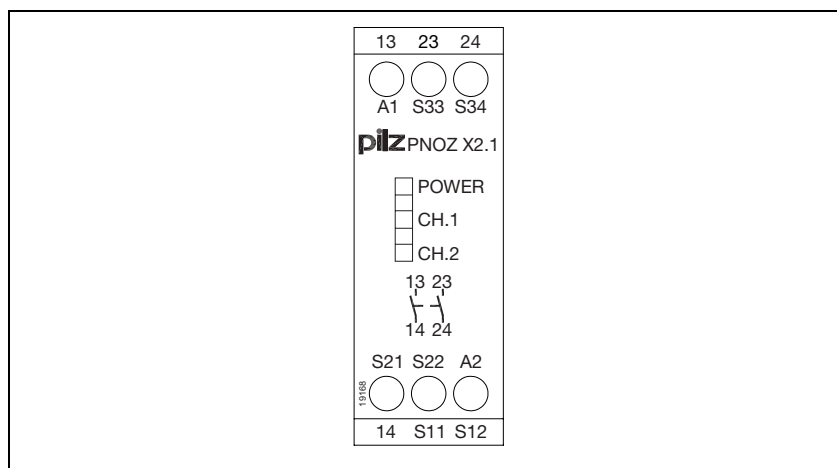
Feedback loop	Automatic reset	Manual reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X2.1

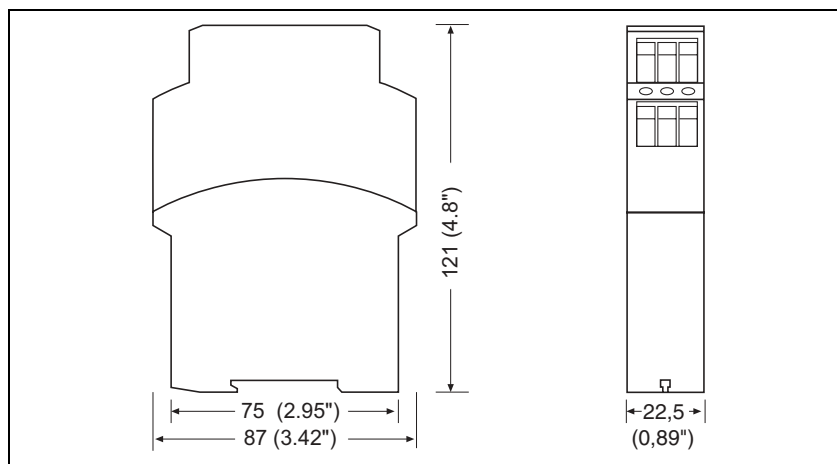
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

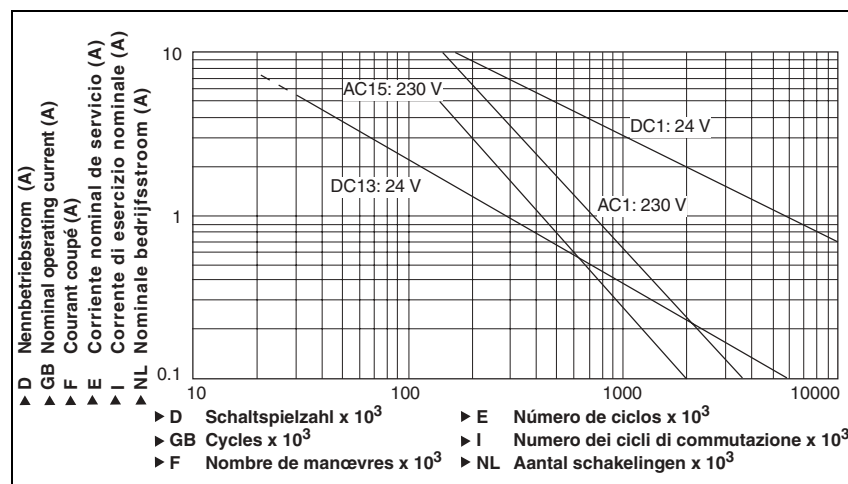


Up to Category 4, EN 954-1 PNOZ X2.1

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage U_B	
Supply voltage U_B AC	24 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15% / +10%
Power consumption at U_B AC	4.5 VA
Power consumption at U_B DC	2.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	25 mA
reset circuit DC: 24.0 V	50 mA
feedback loop DC: 24.0 V	50 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 2
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A , I_{max} : 6.0 A P: 1500 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 6.0 A P: 150 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : 5.0 A
DC13: 24 V	I_{max} : 4.0 A
(DC13: 6 cycles/min)	
Contact material	AgSnO2+ 0.2 μm Au
External contact fuse protection in accordance with EN 60947-5-1	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	24 VAC/DC, 4 A, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B AC	150 Ohm
Single-channel at U_B DC	150 Ohm
Dual-channel with detect. of shorts across contacts at U_B AC	30 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm

Up to Category 4, EN 954-1 PNOZ X2.1

2.3

Times	
Switch-on delay	
with automatic reset typ.	60 ms
with automatic reset max.	90 ms
with manual reset typ.	38 ms
with manual reset max.	90 ms
Delay-on de-energisation	
with E-STOP typ.	17 ms
with E-STOP max.	30 ms
with power failure typ.	70 ms
with power failure max.	110 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	150 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 – 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals:	
1 core flexible	0.20 – 4.00 mm ²
2 core, same cross section, flexible	
with crimp connectors, without insulating sleeve	0.20 – 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	87.0 x 22.5 x 121.0 mm
Weight	200 g

The standards current on **06/04** apply.

Order reference				
Type	Features		Terminals	Order no.
PNOZ X2.1	24 VAC	24 VDC	Screw terminals	774 306

Up to Category 4, EN 954-1
PNOZ X2C



Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ X2C
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Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

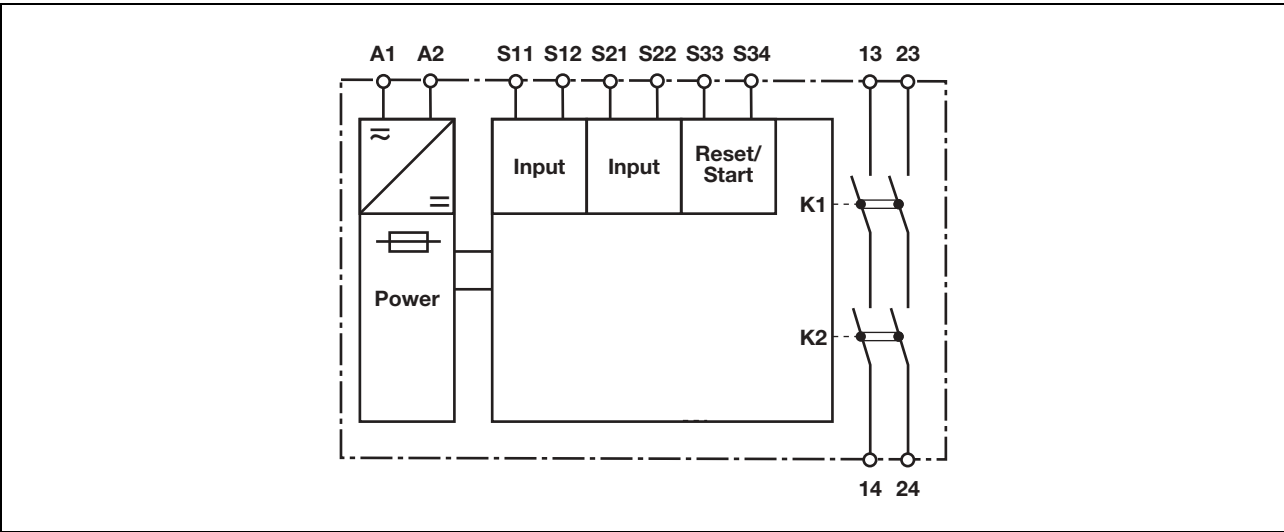
- } E-STOP pushbuttons
- } Safety gates

Safety features

The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.

Block diagram

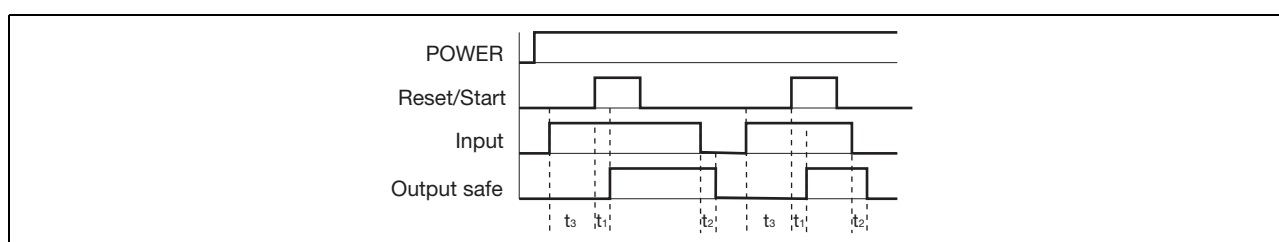


Up to Category 4, EN 954-1 PNOZ X2C

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
- earth faults in the reset and input circuit,
- short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
- shorts between contacts in the input circuit.
- } Monitored reset: Unit is active once the input circuit is closed and once
- the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34
- } Input: Input circuits S11-S12, S21-S22
- } Output safe: Safety contacts 13-14, 23-24
- } t₃: Waiting period
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ X2C

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Monitored reset		

Up to Category 4, EN 954-1
PNOZ X2C

} Feedback loop

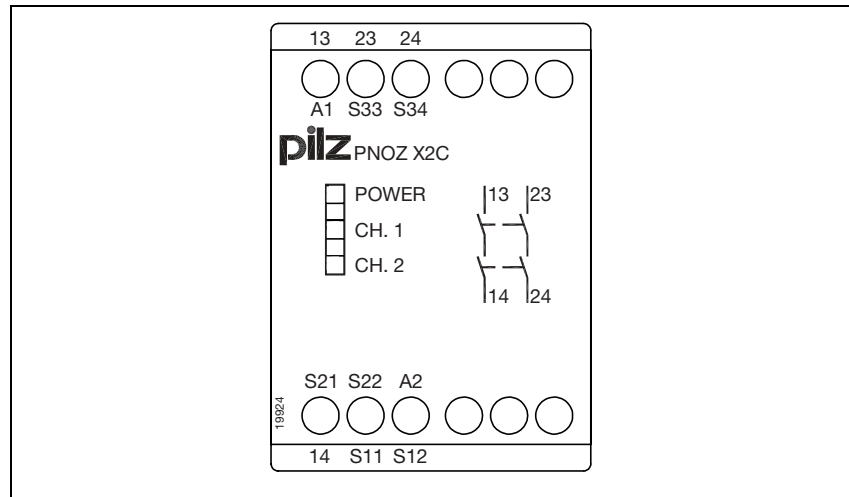
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X2C

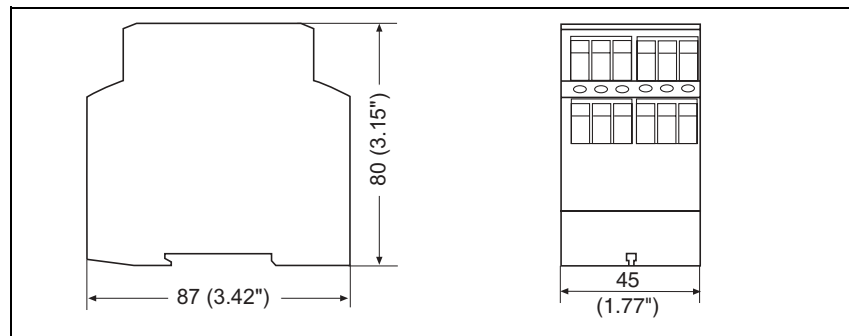
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

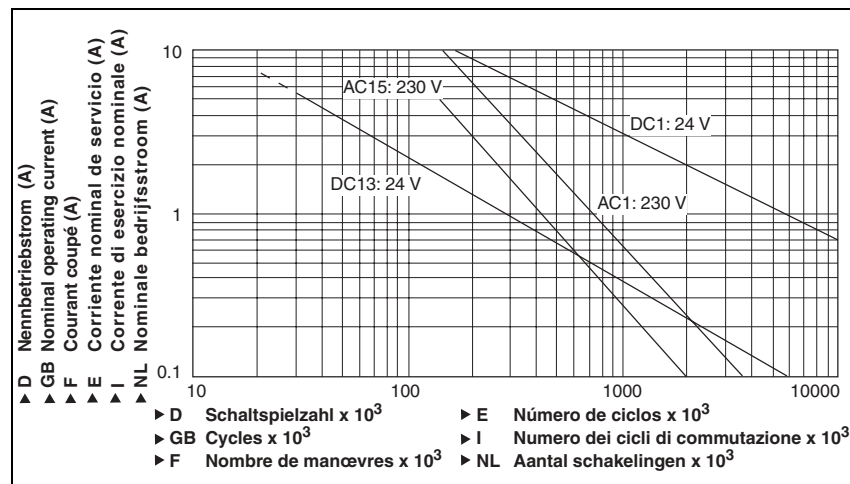


Up to Category 4, EN 954-1 PNOZ X2C

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U_B AC	24 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B AC	4.5 VA
Power consumption at U_B DC	2.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	25 mA
reset circuit DC: 24.0 V	50 mA
feedback loop DC: 24.0 V	50 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 2
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 2000 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : 5.0 A
DC13: 24 V	I_{max} : 7.0 A
(DC13: 6 cycles/min)	
Contact material	AgSnO₂ + 0.2 σm Au
External contact fuse protection in accordance with EN 60947-5-1	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	24 VAC/DC: 6 A, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single channel at U_B DC	150 Ohm
Single channel at U_B AC	150 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm
Dual-channel with detect. of shorts across contacts at U_B AC	30 Ohm

Up to Category 4, EN 954-1 PNOZ X2C

Times	
Switch-on delay	
with monitored reset typ.	38 ms
with monitored reset max.	50 ms
Delay-on de-energisation	
with E-STOP typ.	17 ms
with E-STOP max.	30 ms
with power failure typ.	70 ms
with power failure max.	110 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	150 ms
Waiting period with a monitored reset	180 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors	
1 core flexible	0.20 - 4.0 mm ²
2 core with the same cross section, flexible	
with crimp connectors, no plastic sleeve	0.20 - 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ²
Torque setting	0.60 Nm
Dimensions (H x W x D)	87.0 mm x 45.0 mm x 80.0 mm
Weight	190 g

The standards current on **03/01** apply.

Order reference				
Type	Features		Terminals	Order no.
PNOZ X2C	24 VAC	24 VDC	Screw terminals	774 304

Up to Category 4, EN 954-1 PNOZ X3



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } 1 semiconductor output
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Semiconductor output signals:
 - Switch status channel 1/2
- } See order reference for unit types

Safety features

- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
 - } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

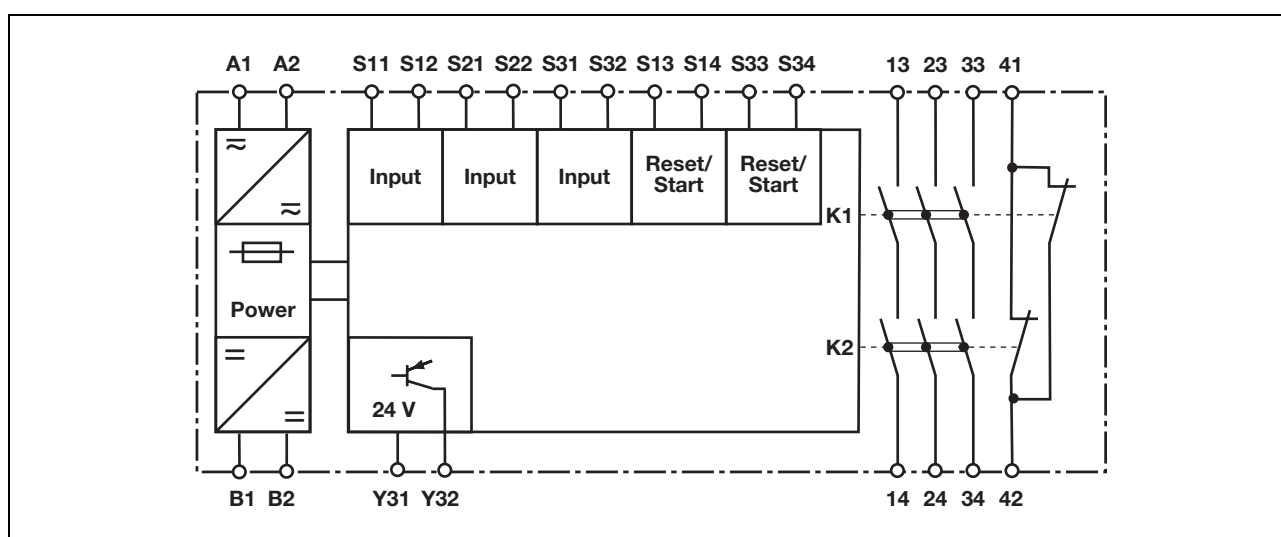
Approvals

	PNOZ X3
	É
	É
	É

Unit description

- The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with
- } E-STOP pushbuttons
 - } Safety gates

Block diagram

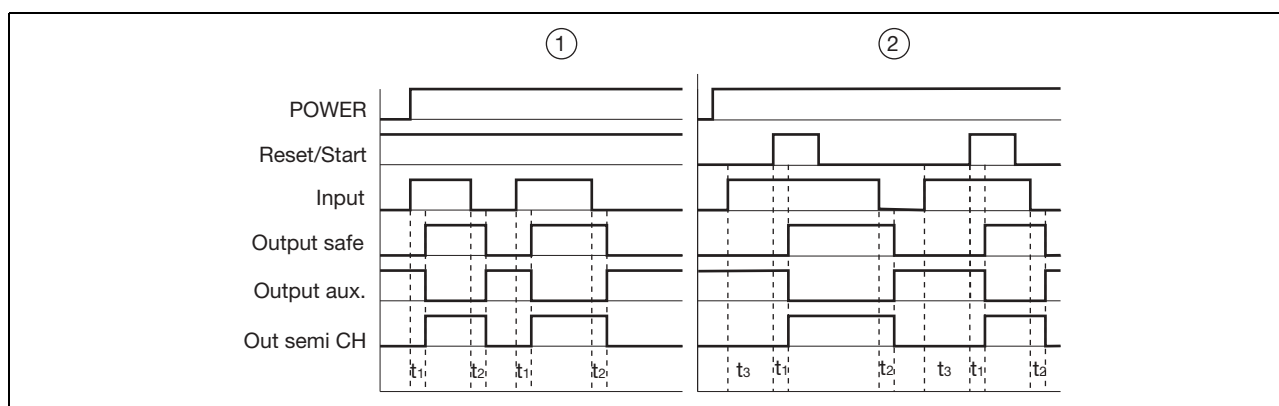


Up to Category 4, EN 954-1 PNOZ X3

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S13-S14, S33-S34
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } Out semi CH: Semiconductor output switch status channel 1/2
- } i : Automatic reset
- } c : Monitored reset
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation
- } t₃: Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs

$I_{\max}$ in the input circuit:

$$I_{\max} = \frac{R_{I\max}}{R_l / \text{km}}$$

$R_{I\max}$ = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.

- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1
PNOZ X3

Preparing for operation

} Supply voltage

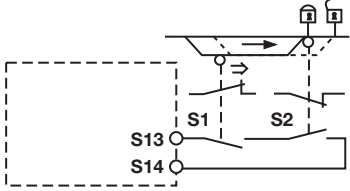
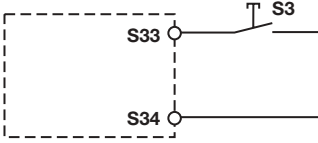
Supply voltage	AC	DC

} Input circuit

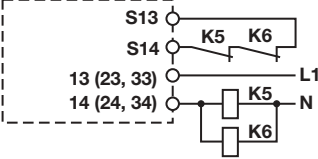
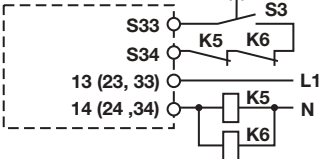
Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1 PNOZ X3

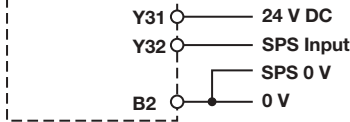
} Reset circuit

Reset circuit	E-STOP wiring, safety gate	Safety gate (dual-channel)
Automatic reset		
Monitored reset		

} Feedback loop

Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Semiconductor output

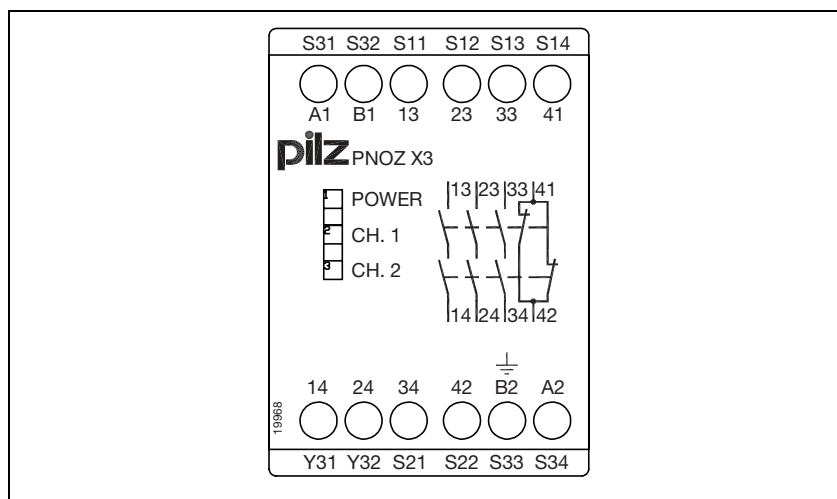


} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X3

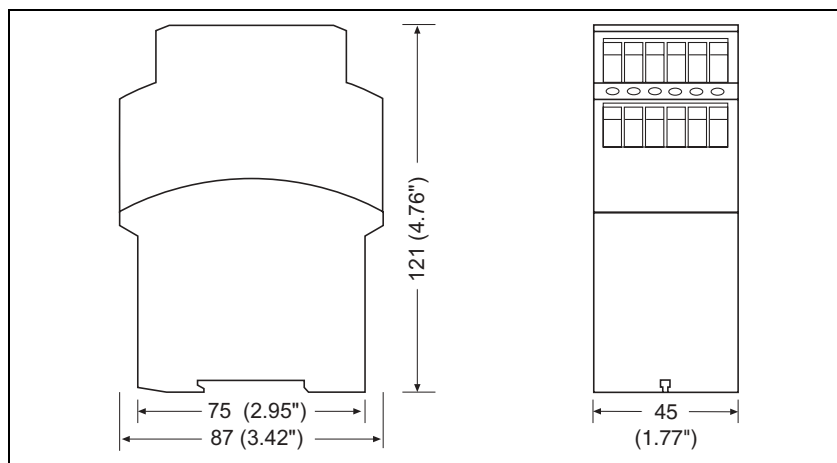
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

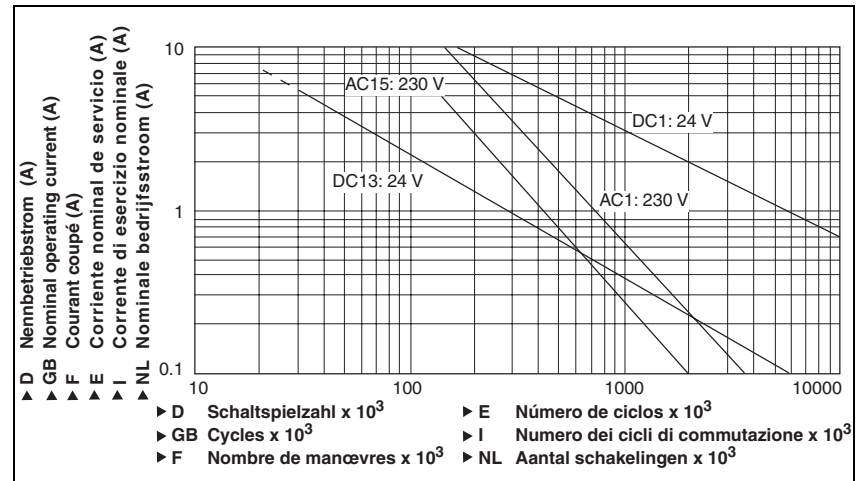


Up to Category 4, EN 954-1 PNOZ X3

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage	
Supply voltage U _B AC	24 V, 42 V, 48 V, 110 V, 115 V, 120 V, 230 V, 240 V
Supply voltage U _B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U _B AC	5.0 VA
Power consumption at U _B DC	2.5 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at	
input circuit DC: 24.0 V	50.0 mA
reset circuit DC: 24.0 V	35.0 mA
feedback loop DC: 24.0 V	20.0 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I _{min} : 0.01 A, I _{max} : 8.0 A P _{max} : 2000 VA
Safety contacts: DC1 at 24 V	I _{min} : 0.01 A, I _{max} : 8.0 A P _{max} : 200 W
Auxiliary contacts: AC1 at 240 V	I _{min} : 0.01 A, I _{max} : 8.0 A P _{max} : 2000 VA
Auxiliary contacts: DC1 at 24 V	I _{min} : 0.01 A, I _{max} : 8.0 A P _{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I _{max} : 5.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 6.0 A
Auxiliary contacts: AC15 at 230 V	I _{max} : 5.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 6.0 A
Contact material	AgSnO2 + 0.2 µm Au

Up to Category 4, EN 954-1 PNOZ X3

2.3

Electrical data

External contact fuse protection to **EN 60947-5-1**

Blow-out fuse, quick

Safety contacts: **10 A**

Auxiliary contacts: **10 A**

Blow-out fuse, slow

Safety contacts: **6 A**

Auxiliary contacts: **6 A**

Circuit breaker 24 VAC/DC, characteristic B/C

Safety contacts: **6 A**

Auxiliary contacts: **6 A**

Semiconductor outputs (short circuit proof) **24.0 V DC, 20 mA**

External supply voltage **24.0 V DC**

Voltage tolerance **-20 %/+20 %**

Max. overall cable resistance R_{lmax} input circuits, reset circuits

single-channel at U_B DC **150 Ohm**

single-channel at U_B AC **180 Ohm**

dual-channel with detect. of shorts across contacts at U_B DC **15 Ohm**

dual-channel with detect. of shorts across contacts at U_B AC **30 Ohm**

Times

Switch-on delay

with automatic reset typ. **250 ms**

with automatic reset max. **500 ms**

with automatic reset after power on typ. **280 ms**

with automatic reset after power on max. **550 ms**

with monitored reset typ. **35 ms**

with monitored reset max. **50 ms**

Delay-on de-energisation

with E-STOP typ. **15 ms**

with E-STOP max. **30 ms**

with power failure typ. **50 ms**

with power failure max. **70 ms**

Recovery time at max. switching frequency 1/s

after E-STOP **50 ms**

after power failure **100 ms**

Waiting period with a monitored reset **300 ms**

Min. start pulse duration with a monitored reset **30 ms**

Simultaneity, channel 1 and 2 **←**

Supply interruption before de-energisation **20 ms**

Environmental data

EMC **EN 60947-5-1, EN 61000-6-2**

Vibration in accordance with **EN 60068-2-6**

Frequency **10 - 55 Hz**

Amplitude **0.35 mm**

Climatic suitability **EN 60068-2-78**

Airgap creepage **VDE 0110-1**

Ambient temperature **-20 - 55 °C**

Storage temperature **-40 - 85 °C**

Protection type

Mounting (e.g. control cabinet) **IP54**

Housing **IP40**

Terminals **IP20**

Mechanical data

Housing material

Housing **PPO UL 94 V0**

Front **ABS UL 94 V0**

Up to Category 4, EN 954-1 PNOZ X3

Mechanical data

Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm
Dimensions	
Height	87.0 mm
Width	45.0 mm
Depth	121.0 mm
Weight	375 g

The standards current on **08/02** apply.

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC	$I_{\max}$ (A) at U_B AC
1	8.00 A	8.00 A
2	8.00 A	7.50 A
3	7.00 A	6.50 A

Order reference

Type	Features	Terminals	Order no.
PNOZ X3	24 VAC/DC	Screw terminals	774 310
PNOZ X3	42 VAC	Screw terminals	774 311
PNOZ X3	48 VAC	Screw terminals	774 312
PNOZ X3	110 VAC	Screw terminals	774 314
PNOZ X3	115 VAC	Screw terminals	774 315
PNOZ X3	120 VAC	Screw terminals	774 316
PNOZ X3	230 VAC	Screw terminals	774 318
PNOZ X3	240 VAC	Screw terminals	774 319

Up to Category 4, EN 954-1 PNOZ X4



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } See order reference for unit types

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

Approvals

	PNOZ X4
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	É
	É

Unit description

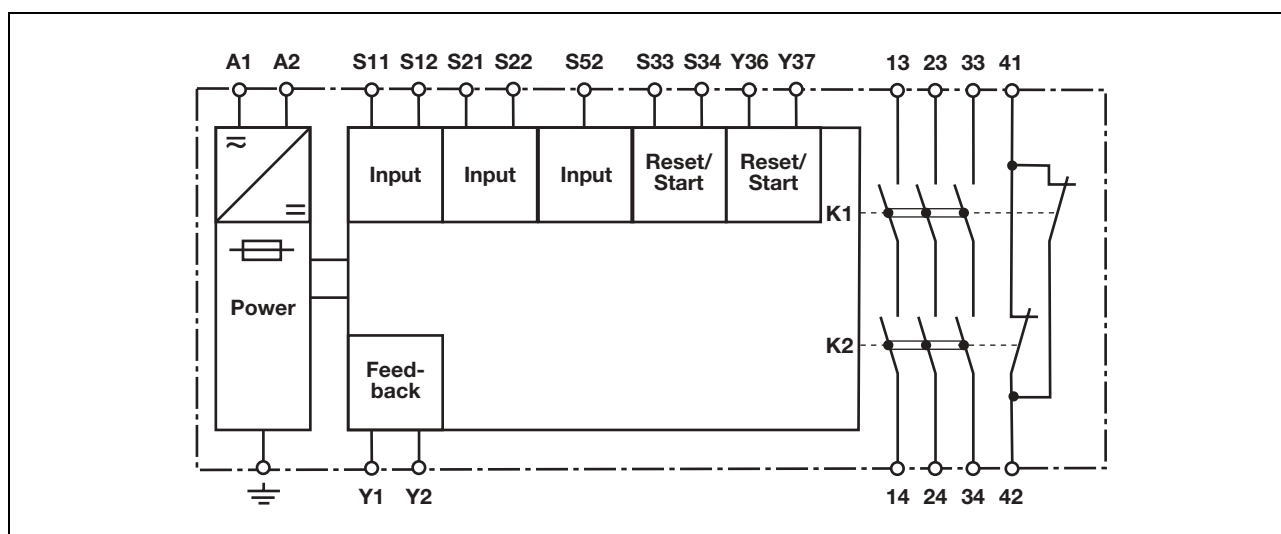
The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates
- } Light barriers

Safety features

The relay conforms to the following safety criteria:

Block diagram

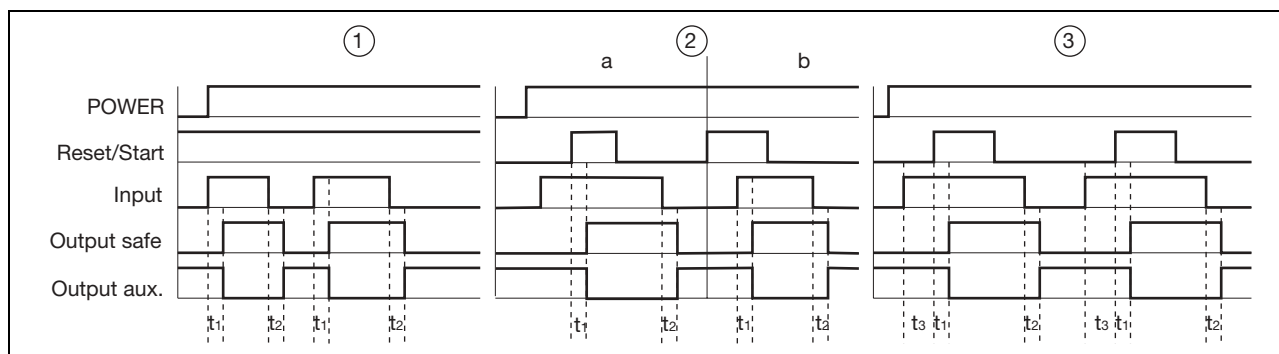


Up to Category 4, EN 954-1 PNOZ X4

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34
- } Input: Input circuits S11-S12, S21-S22, S52
- } Output safe: Safety outputs 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } i : Automatic reset
- } c : Manual reset
- } £ : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$
- } R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ X4

Preparing for operation

} Supply voltage

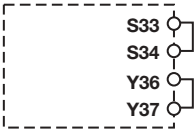
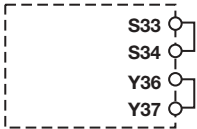
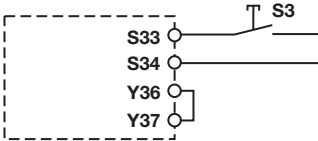
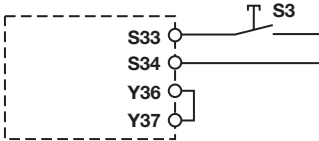
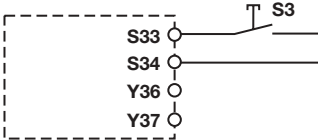
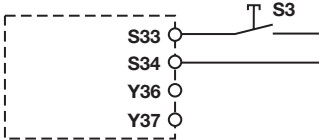
Supply voltage	AC	DC

} Input circuit

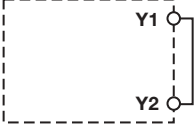
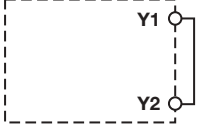
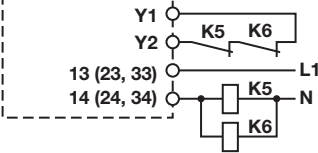
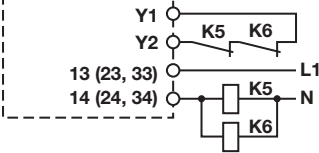
Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Light barrier with detection of shorts across contacts via ESPE		

Up to Category 4, EN 954-1 PNOZ X4

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

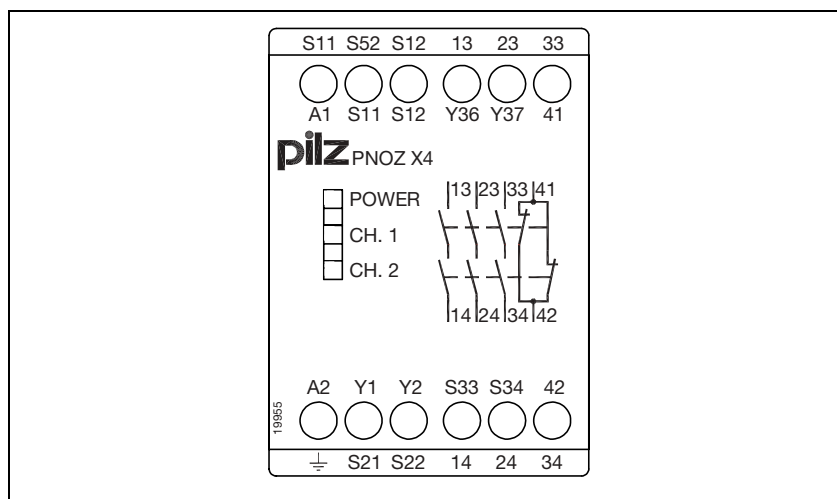
Feedback loop	Automatic reset	Manual/monitored reset
Link		
Contacts from external contactors		

} Key

S1/S2	Two-hand button
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X4

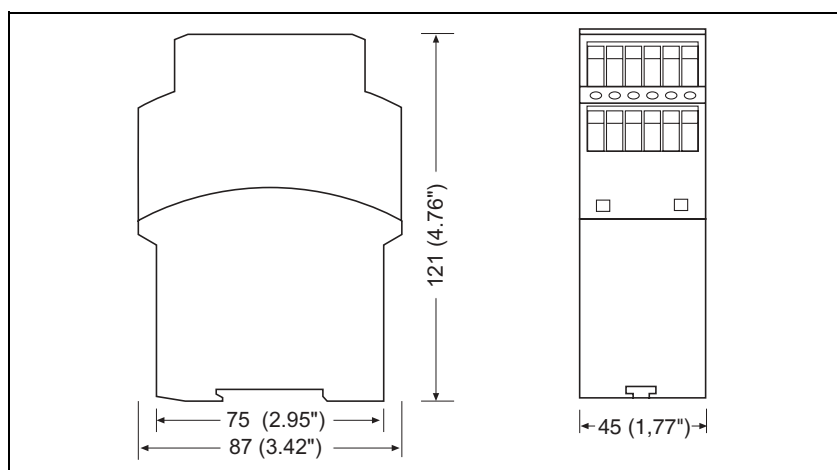
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

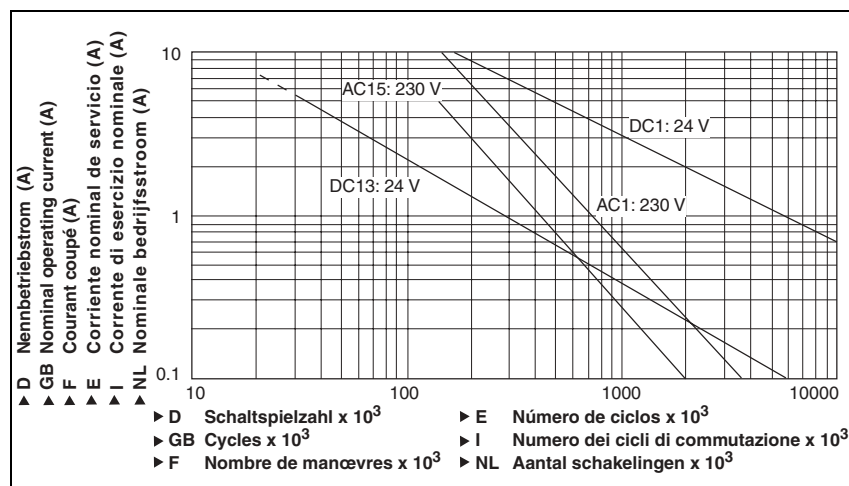


Up to Category 4, EN 954-1 PNOZ X4

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage	24 V, 110 V, 115 V, 120 V, 230 V, 240 V
Supply voltage U_B AC	24 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B AC	5.0 VA Order no.: 774731, 774734, 774735, 774736, 774738, 774739
Power consumption at U_B DC	2.5 W Order no.: 774730
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	40.0 mA
reset circuit DC: 24.0 V	70.0 mA Order no.: 774730 90.0 mA Order no.: 774731, 774734, 774735, 774736, 774738, 774739
feedback loop DC: 24.0 V	70.0 mA Order no.: 774730 90.0 mA Order no.: 774731, 774734, 774735, 774736, 774738, 774739
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 2000 VA
Safety contacts: DC1 at 24 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 200 W
Auxiliary contacts: AC1 at 240 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 2000 VA
Auxiliary contacts: DC1 at 24 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I_{max} : 5.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 7.0 A
Auxiliary contacts: AC15 at 230 V	I_{max} : 5.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 7.0 A
Contact material	AgSnO2 + 0.2 µm Au

Up to Category 4, EN 954-1 PNOZ X4

Electrical data

External contact fuse protection to **EN 60947-5-1**

Blow-out fuse, quick

Safety contacts: **10 A**

Auxiliary contacts: **10 A**

Blow-out fuse, slow

Safety contacts: **6 A**

Auxiliary contacts: **6 A**

Circuit breaker 24 VAC/DC, characteristic B/C

Safety contacts: **6 A**

Auxiliary contacts: **6 A**

Max. overall cable resistance R_{lmax}
input circuits, reset circuits

single-channel at U_B DC

20 Ohm Order no.: 774730

single-channel at U_B AC

150 Ohm Order no.: 774731, 774734, 774735, 774736, 774738, 774739

dual-channel without detect. of shorts across contacts at U_B DC

20 Ohm Order no.: 774730

dual-channel without detect. of shorts across contacts at U_B AC

150 Ohm Order no.: 774731, 774734, 774735, 774736, 774738, 774739

dual-channel with detect. of shorts across contacts at U_B DC

15 Ohm Order no.: 774730

dual-channel with detect. of shorts across contacts at U_B AC

100 Ohm Order no.: 774731, 774734, 774735, 774736, 774738, 774739

Times

Switch-on delay

with automatic reset typ.

210 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739

270 ms Order no.: 774730

with automatic reset max.

350 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739

600 ms Order no.: 774730

with automatic reset after power on typ.

240 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739

270 ms Order no.: 774730

with automatic reset after power on max.

390 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739

600 ms Order no.: 774730

with manual reset typ.

55 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739

70 ms Order no.: 774730

with manual reset max.

350 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739

600 ms Order no.: 774730

with monitored reset typ.

30 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739

40 ms Order no.: 774730

with monitored reset max.

50 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739

70 ms Order no.: 774730

Delay-on de-energisation

with E-STOP typ.

15 ms

with E-STOP max.

30 ms

with power failure typ.

50 ms Order no.: 774730

55 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739

with power failure max.

70 ms Order no.: 774730

80 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739

Recovery time at max. switching frequency 1/s

after E-STOP

50 ms

after power failure

100 ms

Up to Category 4, EN 954-1 PNOZ X4

Times	
Waiting period with a monitored reset	150 ms Order no.: 774731, 774734, 774735, 774736, 774738, 774739 250 ms Order no.: 774730
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm², 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm², 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm², 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm
Dimensions	
Height	87.0 mm
Width	45.0 mm
Depth	121.0 mm
Weight	270 g Order no.: 774730 370 g Order no.: 774731, 774734, 774735, 774736, 774738, 774739

The standards current on **09/00** apply.

Max. continuous current		
Number of contacts	I _{max} (A) at U _B DC	I _{max} (A) at U _B AC
1	8.00 A Order no.: 774730, 774732	8.00 A Order no.: 774731, 774734, 774735, 774736, 774738, 774739
2	8.00 A Order no.: 774730, 774732	7.50 A Order no.: 774731, 774734, 774735, 774736, 774738, 774739
3	7.00 A Order no.: 774730, 774732	6.50 A Order no.: 774731, 774734, 774735, 774736, 774738, 774739

Up to Category 4, EN 954-1 PNOZ X4

Order reference

Type	Features	Terminals	Order no.
PNOZ X4	24 VAC	Screw terminals	774 731
PNOZ X4	110 VAC	Screw terminals	774 734
PNOZ X4	115 VAC	Screw terminals	774 735
PNOZ X4	120 VAC	Screw terminals	774 736
PNOZ X4	230 VAC	Screw terminals	774 738
PNOZ X4	240 VAC	Screw terminals	774 739
PNOZ X4	24 VDC	Screw terminals	774 730

Up to Category 3, EN 954-1 PNOZ X5



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ X5
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } See order reference for unit types

- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

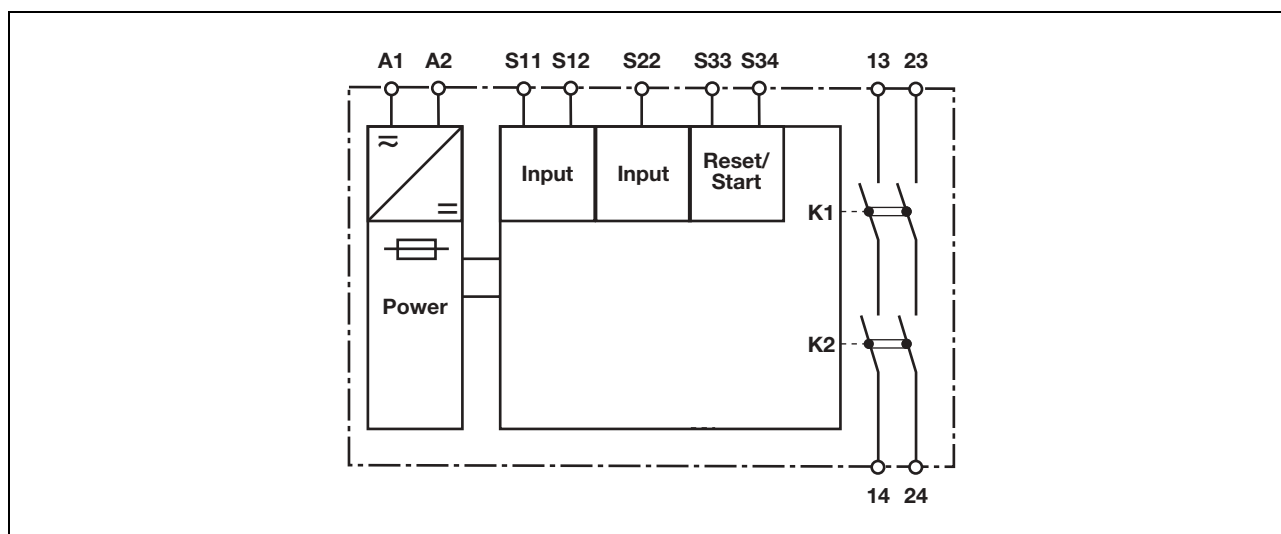
- } E-STOP pushbuttons
- } Safety gates

Safety features

The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.

Block diagram

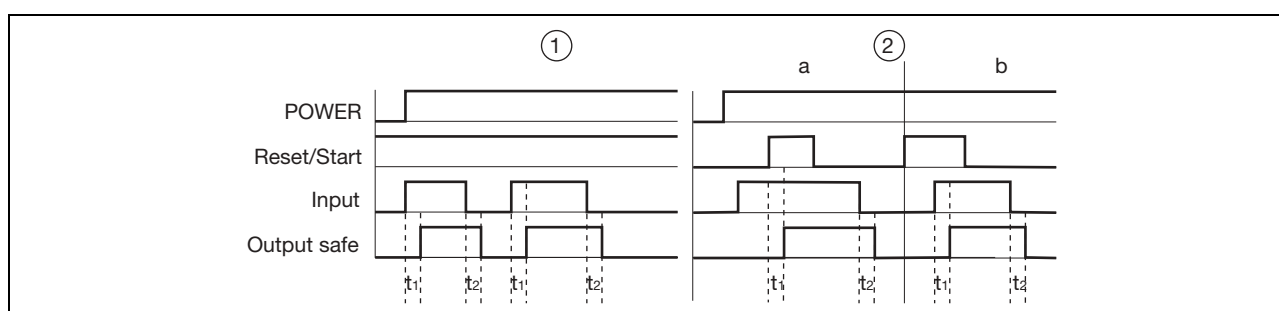


Up to Category 3, EN 954-1 PNOZ X5

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset S33-S34
- } Input: Input circuits S11, S12, S22
- } Output safe: Safety contacts 13-14, 23-24
- } i : Automatic reset
- } ☉ : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 3, EN 954-1 PNOZ X5

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
Safety gate without detection of shorts across contacts		

} Reset circuit

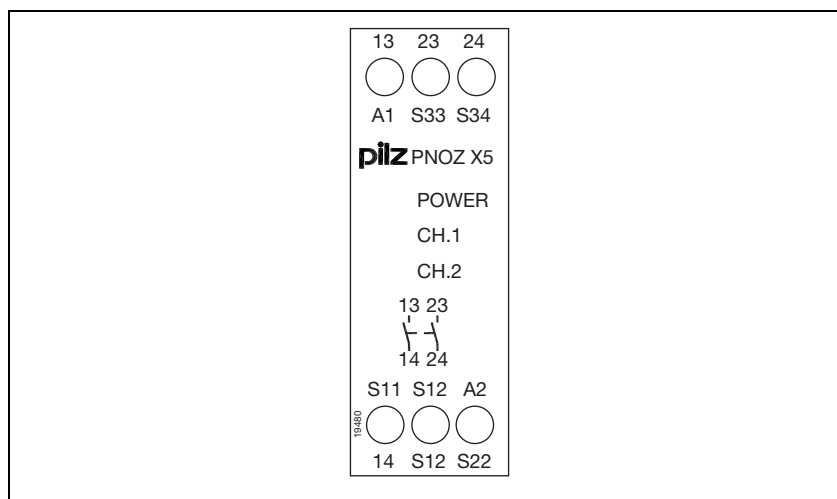
Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 3, EN 954-1 PNOZ X5

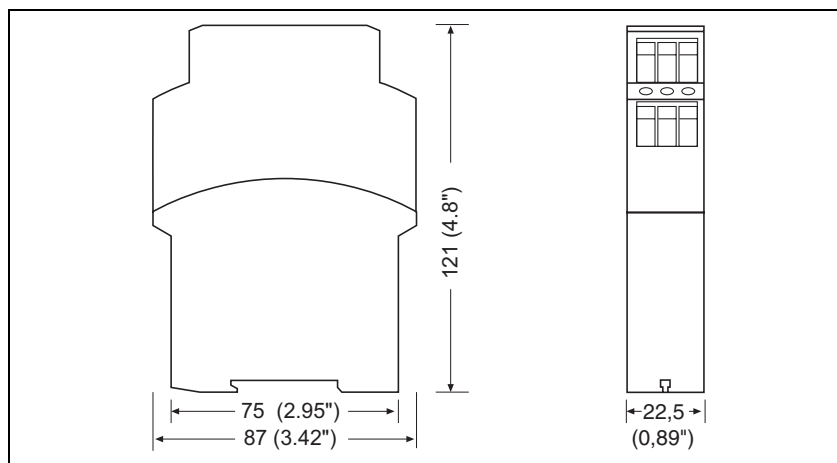
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

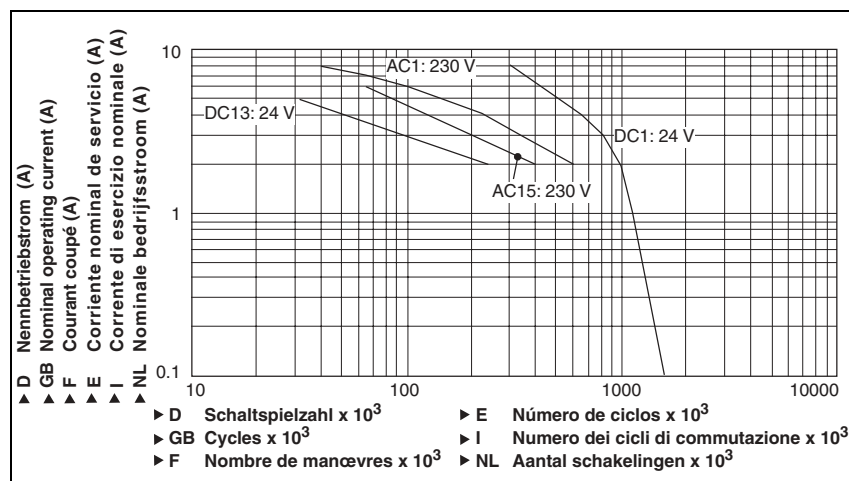


Up to Category 3, EN 954-1 PNOZ X5

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage U_B AC	24 V
Supply voltage U_B DC	12 V, 24 V
Voltage tolerance	-15% / +10% Order No.: 774325 -20% / +20% Order No.: 774326
Power consumption at U_B AC	4.0 VA Order no.: 774325
Power consumption at U_B DC	2.0 W Order no.: 774325 2.5 W Order no.: 774326
Frequency range AC	10 - 55 Hz
Residual ripple DC	20 % Order no.: 774326 160 % Order no.: 774325
Voltage and current at input circuit: 24 VDC	55 mA Order no.: 774325 70 mA Order no.: 774326
reset circuit: 24 VDC	55 mA Order no.: 774325 90 mA Order no.: 774326
feedback loop: 24 VDC	55 mA Order no.: 774325 90 mA Order no.: 774326
Output contacts in accordance with EN 954-1, Category 3	Safety contacts (N/O): 2

Up to Category 3, EN 954-1 PNOZ X5

Electrical data

Utilisation category in accordance with **EN 60947-4-1**

AC1: **240 V**

I_{min} : **0.01 A**, I_{max} : **6 A**

P_{max} : **1500 VA**

DC1: **24 V**

I_{min} : **0.01 A**, I_{max} : **4 A**

P_{max} : **100 W**

Utilisation category in accordance with **EN 60947-5-1**

AC15: **230 V**

I_{max} : **5 A**

DC13 (6 cycles/min): **24 V**

I_{max} : **4 A**

Contact material

AgSnO₂ + 0.2 μ m Au

External contact fuse protection (**EN 60947-5-1**)

Blow-out fuse, quick

6 A

Blow-out fuse, slow

4 A

Circuit breaker

4 A, 24 VAC/DC, characteristic B/C

Max. overall cable resistance R_{lmax} input circuits,
reset circuits

Single-channel at U_B DC

50 Ohm Order no.: 774325

20 Ohm Order no.: 774326

Single-channel at U_B AC

150 Ohm Order no.: 774325

Dual-channel without detect. of shorts across contacts at U_B DC

100 Ohm Order no.: 774325

35 Ohm Order no.: 774326

Dual-channel without detect. of shorts across contacts at U_B AC

250 Ohm Order no.: 774325

Times

Switch-on delay

with automatic reset typ.

115 ms Order no.: 774325

124 ms Order no.: 774326

with automatic reset max.

180 ms Order no.: 774325

230 ms Order no.: 774326

with automatic reset after power on typ.

120 ms Order no.: 774325

124 ms Order no.: 774326

with automatic reset after power on max.

190 ms Order no.: 774325

230 ms Order no.: 774326

with manual reset typ.

40 ms Order no.: 774325

80 ms Order no.: 774326

with manual reset max.

180 ms Order no.: 774325

230 ms Order no.: 774326

Delay-on de-energisation

with E-STOP typ.

12 ms Order no.: 774325

18 ms Order no.: 774326

with E-STOP max.

20 ms Order no.: 774325

30 ms Order no.: 774326

with power failure typ.

110 ms Order no.: 774325

20 ms Order no.: 774326

with power failure max.

160 ms Order no.: 774325

30 ms Order no.: 774326

Recovery time at max. switching frequency 1/s
after E-STOP

50 ms Order no.: 774325

40 ms Order no.: 774326

after power failure

200 ms Order no.: 774325

50 ms Order no.: 774326

Simultaneity, channel 1 and 2

←

Supply interruption before de-energisation

20 ms Order no.: 774325

10 ms Order no.: 774326

Environmental data

EMC

EN 60947-5-1, EN 61000-6-2

Vibration in accordance with **EN 60068-2-6**

Frequency

10 - 55 Hz

Amplitude

0.35 mm

Climatic suitability

EN 60068-2-78

Up to Category 3, EN 954-1 PNOZ X5

Environmental data	
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP 40
Terminals	IP 20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	PPO UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	
With screw terminals	87 mm x 22.5 mm x 121 mm
Weight	190 g

The standards current on **09/04** apply.

Order reference			
Type	Features	Terminals	Order no.
PNOZ X5	24 VAC/DC	Screw terminals	774 325
PNOZ X5	12 VDC	Screw terminals	774 326

Up to Category 3, EN 954-1 PNOZ X6



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Suitable to be driven via a semiconductor output
- } See order reference for unit types
- } Simultaneity monitoring, selectable

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

Approvals

	PNOZ X6	
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	É	
	É	

Unit description

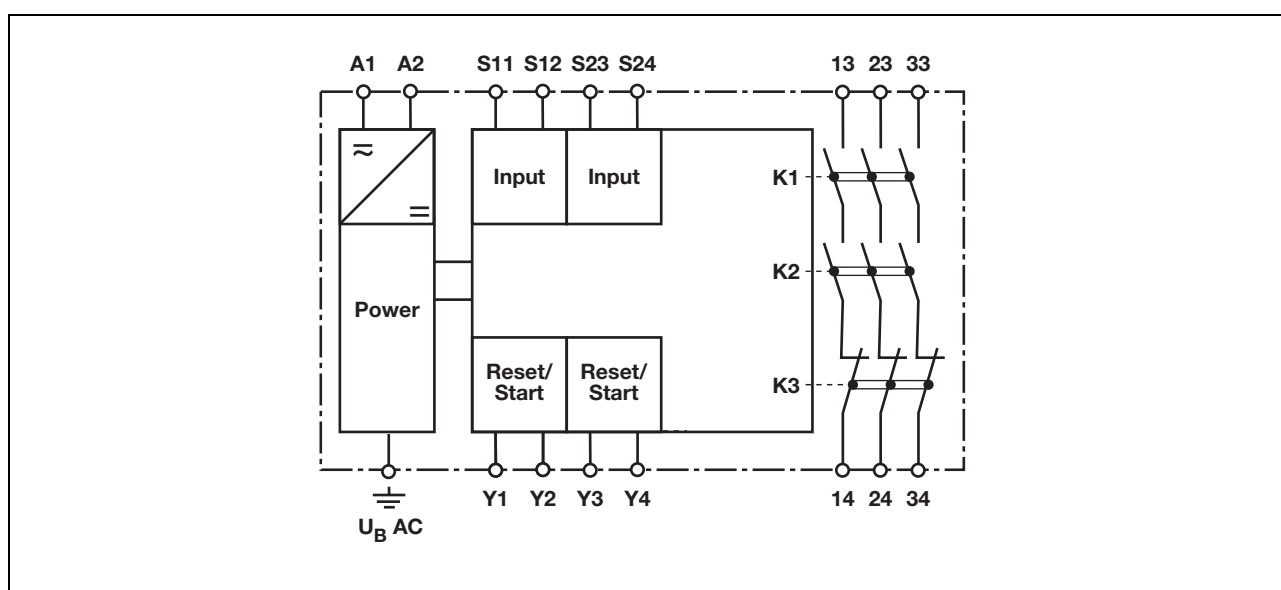
The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

Safety features

The relay conforms to the following safety criteria:

Block diagram

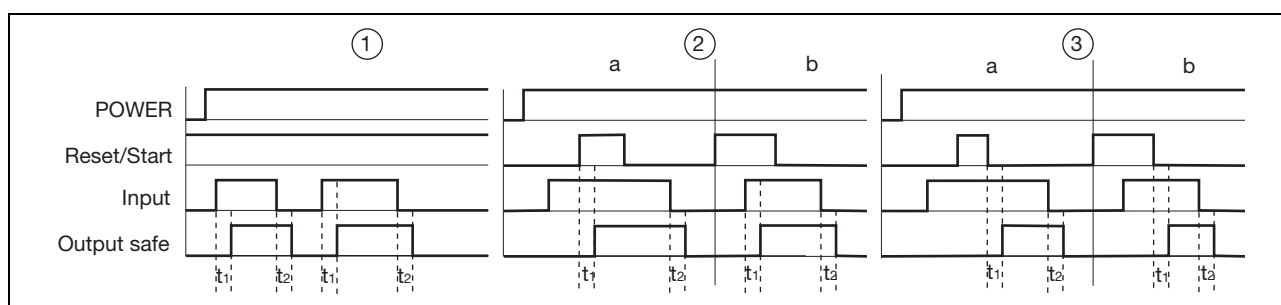


Up to Category 3, EN 954-1 PNOZ X6

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once
 - the input circuit is closed and then the reset circuit is closed and opened again.
 - the reset circuit is closed and then opened again once the input circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit Y1-Y2, Y3-Y4
- } Input: Input circuits S11-S12, S23-S24
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } i : Automatic reset
- } c : Manual reset
- } E : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 3, EN 954-1 PNOZ X6

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

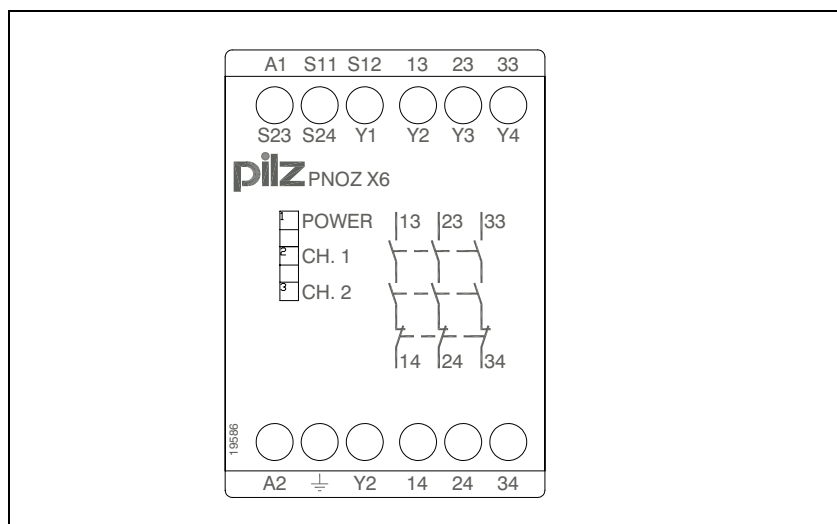
Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
Safety gate without detection of shorts across contacts		

} Reset circuit

Reset circuit	E-STOP wiring, safety gate	Safety gate (dual-channel)
Automatic reset		
Manual reset		
Monitored reset		

Up to Category 3, EN 954-1 PNOZ X6

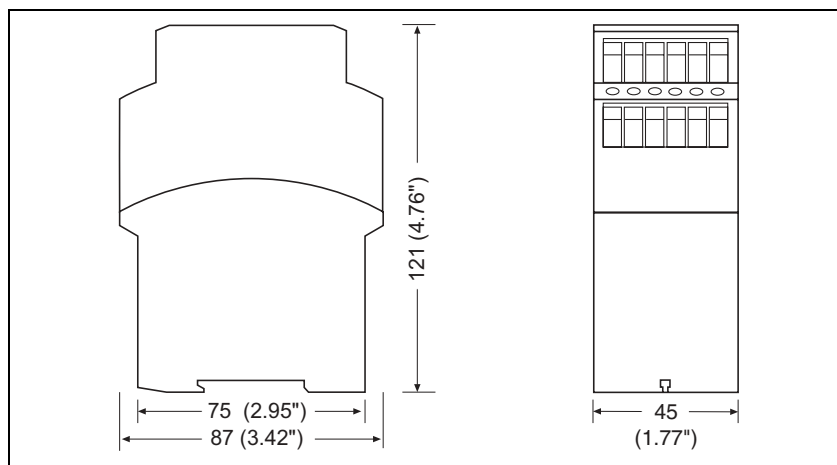
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

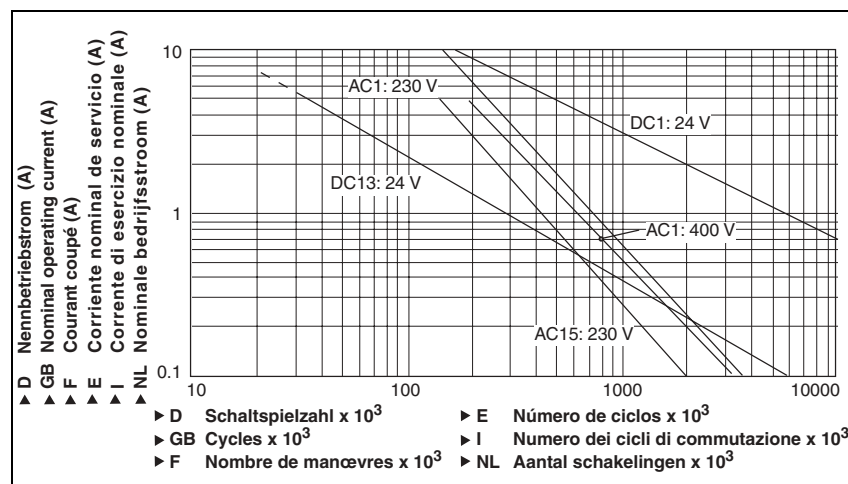


Up to Category 3, EN 954-1 PNOZ X6

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage U_B AC	24 V, 42 V, 110 - 120 V, 230 - 240 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B AC	6.5 VA Order no.: 774721, 774725, 774726 3.0 VA Order no.: 774729
Power consumption at U_B DC	2.0 W Order no.: 774729
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at input circuit: 24 VDC	50.0 mA 100.0 mA Order no.: 774721, 774725, 774726
reset circuit: 24 VDC	55.0 mA Order no.: 774729 100.0 mA Order no.: 774721, 774725, 774726
feedback loop: 24 VDC	55.0 mA Order no.: 774729
Output contacts in accordance with EN 954-1, Category 3	Safety contacts (N/O): 3
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A, I_{max} : 8.00 A P_{max} : 2000 VA
AC1: 400 V	I_{min} : 0.01 A, I_{max} : 5.00 A P_{max} : 2000 VA
DC1: 24 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : 5.0 A
DC13 (6 cycles/min): 24 V	I_{max} : 7.0 A
Contact material	AgSnO ₂ + 0.2 μ m Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel	100 Ohm
Dual-channel without detection of shorts across contacts	200 Ohm

Up to Category 3, EN 954-1 PNOZ X6

2.3

Times	
Switch-on delay with automatic reset typ.	270 ms Order no.: 774721, 774725, 774726 250 ms Order no.: 774729
with automatic reset max.	370 ms Order no.: 774721, 774725, 774726 350 ms Order no.: 774729
with automatic reset after power on typ.	260 ms
with automatic reset after power on max.	350 ms
Delay-on de-energisation with E-STOP typ.	15 ms
with E-STOP max.	30 ms
with power failure typ.	150 ms Order no.: 774721, 774725, 774726 110 ms Order no.: 774729
with power failure max.	200 ms Order no.: 774721, 774725, 774726 160 ms Order no.: 774729
Recovery time at max. switching frequency 1/s after E-STOP	50 ms
after power failure	250 ms Order no.: 774721, 774725, 774726 200 ms Order no.: 774729
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	200 ms / ←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 61000-6-2, EN 60947-5-1
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 600068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 – 55 °C
Storage temperature	-40 – 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	
With screw terminals	87.0 mm x 45.0 mm x 121.0 mm
Weight	390 g Order no.: 774721, 774725, 774726 295 g Order no.: 774729

The standards current on **09/04** apply.

Max. continuous current		
Number of contacts	I _{max} (A) at U _B DC	I _{max} (A) at U _B AC
1	8.00 A Order no.: 774 729	8.00 A
2	8.00 A Order no.: 774 729	7.30 A
3	8.00 A Order no.: 774 729	6.00 A

Up to Category 3, EN 954-1 PNOZ X6

Order reference

Type	Features	Terminals	Order no.
PNOZ X6	42 VAC	Screw terminals	774 721
PNOZ X6	110 - 120 VAC	Screw terminals	774 725
PNOZ X6	230 - 240 VAC	Screw terminals	774 726
PNOZ X6	24 VAC/DC	Screw terminals	774 729

Up to Category 2, EN 954-1
PNOZ X7



Safety relay for monitoring E-STOP pushbuttons.

Approvals

	PNOZ X7
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	É
	É

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } See order reference for unit types

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons

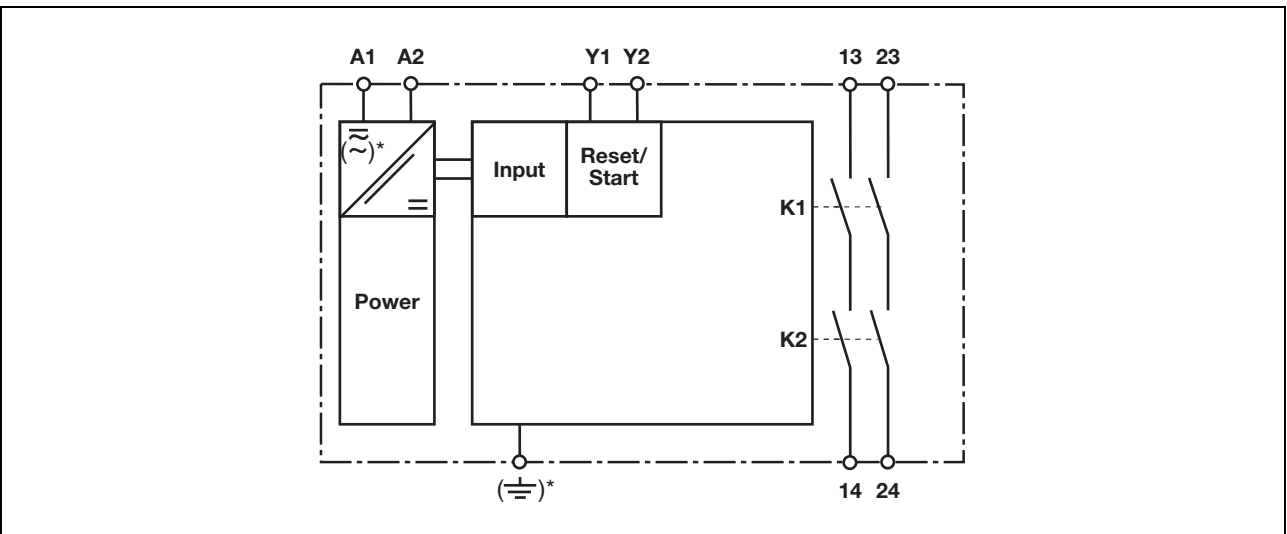
The safety relay is not suitable for non-contact barriers because

- } a dynamic start is not possible
- } the unit can be started during the delay-on de-energisation time.

Safety features

The relay conforms to the following safety criteria:

Block diagram



*Only when $U_B = 42 - 240 \text{ VAC}$

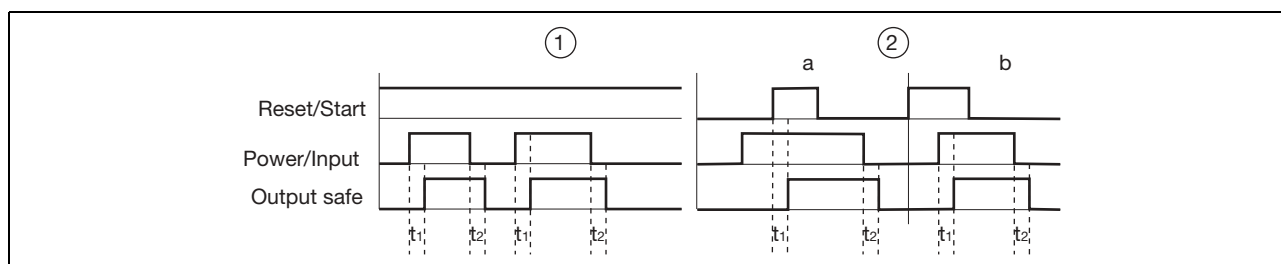
Galvanic isolation only when $U_B = 42 - 240 \text{ VAC}$

Up to Category 2, EN 954-1 PNOZ X7

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit Y1-Y2
- } Input: Input circuits A1
- } Output safe: Safety contacts 13-14, 23-24
- } i : Automatic reset
- } C : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs $l_{\max}$ in the input circuit:

$$l_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

$R_{l\max}$ = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.

- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

PNOZ X7 AC: The cable runs depend on the cable capacitance.

- } Loop circuit, 1 phase: max. $l_r = 1 \text{ km}$
- } Stub circuit: Cable capacitance C_L and therefore the cable runs l_s are dependent on the supply voltage U_B

Cable capacitance C_L depends on the supply voltage U_B

U_B [V]	42	48	110	115	120	230	240
C_L [nF]	37.5	37.5	37.5	37.5	37.5	7.5	7.5
	Loop circuit			Stub circuit			
Cable runs							

Up to Category 2, EN 954-1 PNOZ X7

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP Without detection of shorts across contacts		
Safety gate without detection of shorts across contacts		

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		

} Feedback loop

Feedback loop	Automatic reset	Manual reset
Contacts from external contactors		

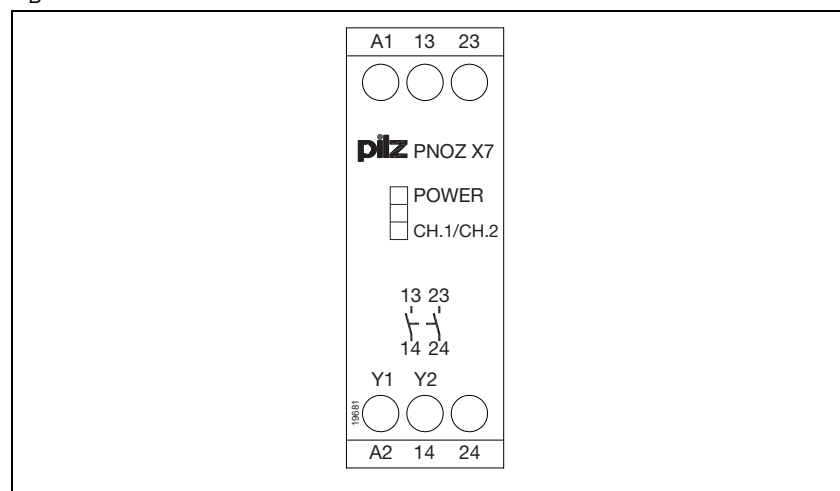
Up to Category 2, EN 954-1 PNOZ X7

} Key

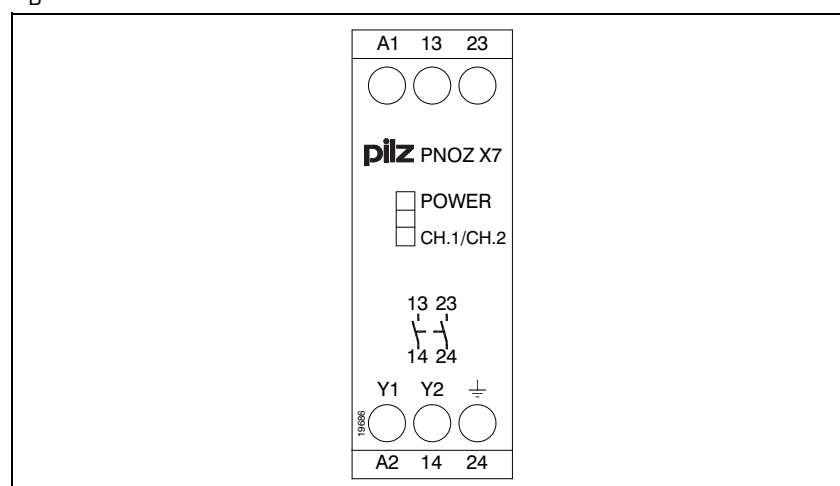
S1	E-STOP pushbutton
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Terminal configuration

$U_B = 24 \text{ VAC/DC}$



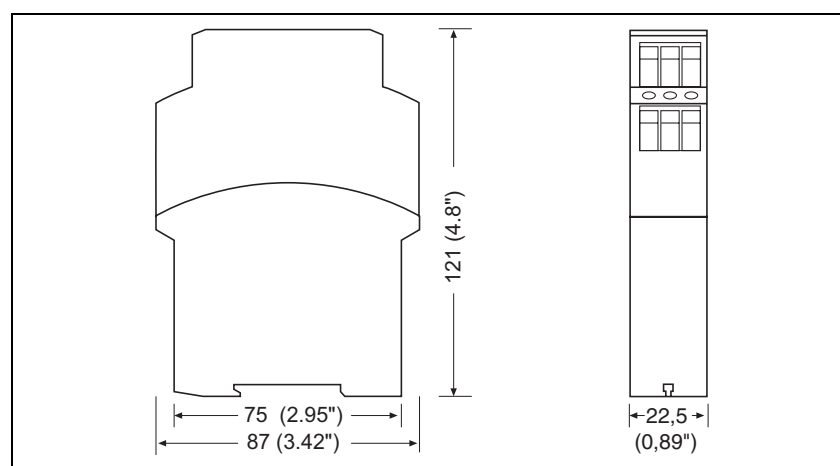
$U_B \text{ AC}$



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

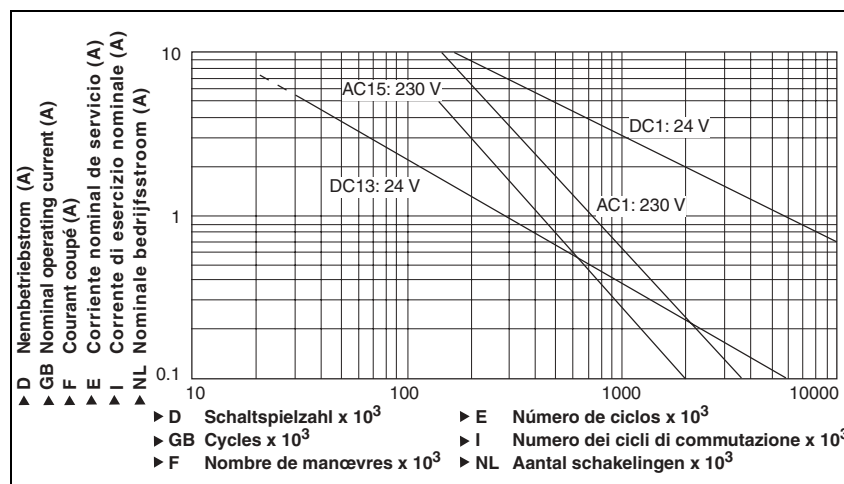


Up to Category 2, EN 954-1 PNOZ X7

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	42 V, 48 V, 110 V, 115 V, 120 V, 230 V, 240 V
Supply voltage U _B AC	24 V
Supply voltage U _B AC/DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U _B AC	2.0 VA Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 3.0 VA Order no.: 774059
Power consumption at U _B DC	1.5 W Order no.: 774059
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at	
input circuit DC: 24.0 V	50.0 mA
input circuit DC: 42.0 V	49.0 mA
input circuit DC: 48.0 V	45.0 mA
input circuit DC: 110.0 V	14.0 mA
input circuit DC: 115.0 V	17.0 mA
input circuit DC: 120.0 V	16.0 mA
input circuit DC: 230.0 V	8.0 mA
input circuit DC: 240.0 V	7.0 mA
reset circuit DC: 24.0 V	40.0 mA Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 210.0 mA Order no.: 774059
feedback loop DC: 24.0 V	40.0 mA Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 210.0 mA Order no.: 774059
Output contacts in accordance with EN 954-1 Category 2	Safety contacts (N/O): 2

Up to Category 2, EN 954-1 PNOZ X7

Electrical data	
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I_{min} : 0.01 A , I_{max} : 4.00 A Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 6.00 A Order no.: 774059 P_{max} : 1,000 VA Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 1,500 VA Order no.: 774059
Safety contacts: DC1 at 24 V	I_{min} : 0.01 A , I_{max} : 4.0 A Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 6.0 A Order no.: 774059 P_{max} : 100 W Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 150 W Order no.: 774059
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I_{max} : 4.0 A Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 5.0 A Order no.: 774059
Safety contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 4.0 A Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 6.0 A Order no.: 774059
Contact material	AgSnO2 + 0.2 µm Au
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	4 A Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 6 A Order no.: 774059
Blow-out fuse, slow	
Safety contacts:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	4 A
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
single-channel at U_B DC	15 Ohm Order no.: 774059
single-channel at U_B AC	15 Ohm Order no.: 774059
Times	
Switch-on delay	
with automatic reset typ.	230 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 50 ms Order no.: 774059
with automatic reset max.	150 ms Order no.: 774059 700 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058
with automatic reset after power on typ.	230 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 50 ms Order no.: 774059
with automatic reset after power on max.	150 ms Order no.: 774059 700 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058
with manual reset typ.	140 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 35 ms Order no.: 774059
with manual reset max.	150 ms Order no.: 774059 700 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058

Up to Category 2, EN 954-1 PNOZ X7

2.3

Times	
Delay-on de-energisation with E-STOP typ.	45 ms Order no.: 774059 70 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058
with E-STOP max.	100 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 70 ms Order no.: 774059
with power failure typ.	45 ms Order no.: 774059 70 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058
with power failure max.	100 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 70 ms Order no.: 774059
Recovery time at max. switching frequency 1/s after E-STOP	120 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 50 ms Order no.: 774059
after power failure	120 ms Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058 150 ms Order no.: 774059
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm
Dimensions	
Height	87.0 mm
Width	22.5 mm
Depth	121.0 mm
Weight	190 g Order no.: 774059 225 g Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058

The standards current on **09/04** apply.

Up to Category 2, EN 954-1 PNOZ X7

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B AC
1	4.00 A Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058
2	3.00 A Order no.: 774049, 774053, 774054, 774055, 774056, 774057, 774058

Order reference

Type	Features	Terminals	Order no.
PNOZ X7	42 VAC	Screw terminals	774 058
PNOZ X7	48 VAC	Screw terminals	774 049
PNOZ X7	110 VAC	Screw terminals	774 053
PNOZ X7	115 VAC	Screw terminals	774 054
PNOZ X7	120 VAC	Screw terminals	774 055
PNOZ X7	230 VAC	Screw terminals	774 056
PNOZ X7	240 VAC	Screw terminals	774 057
PNOZ X7	24 VAC/DC	Screw terminals	774 059

Up to Category 4, EN 954-1 PNOZ X9



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Approvals

	PNOZ X9
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Unit features

- } Positive-guided relay outputs:
 - 7 safety contacts (N/O), instantaneous
 - 2 auxiliary contacts (N/C), instantaneous
- } 2 semiconductor outputs
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
 - Input circuits
- } Semiconductor output signals:
 - Supply voltage is present
 - Switch status channel 1/2
- } See order reference for unit types

- } Safety gates
- } Light barriers

Safety features

The relay conforms to the following safety criteria:

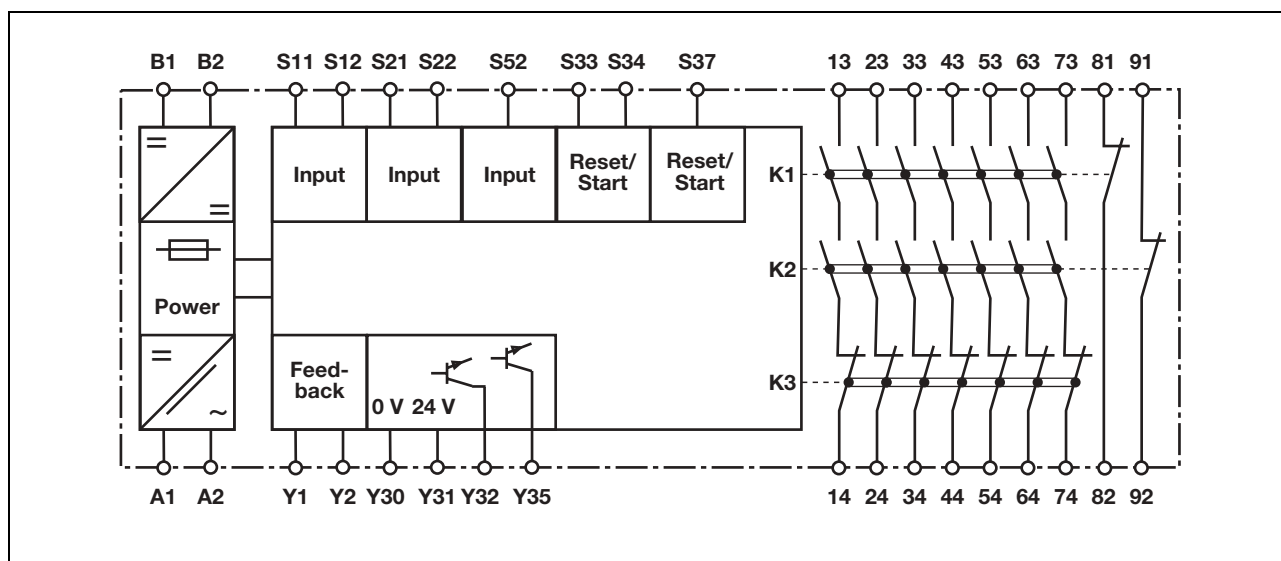
- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons

Block diagram

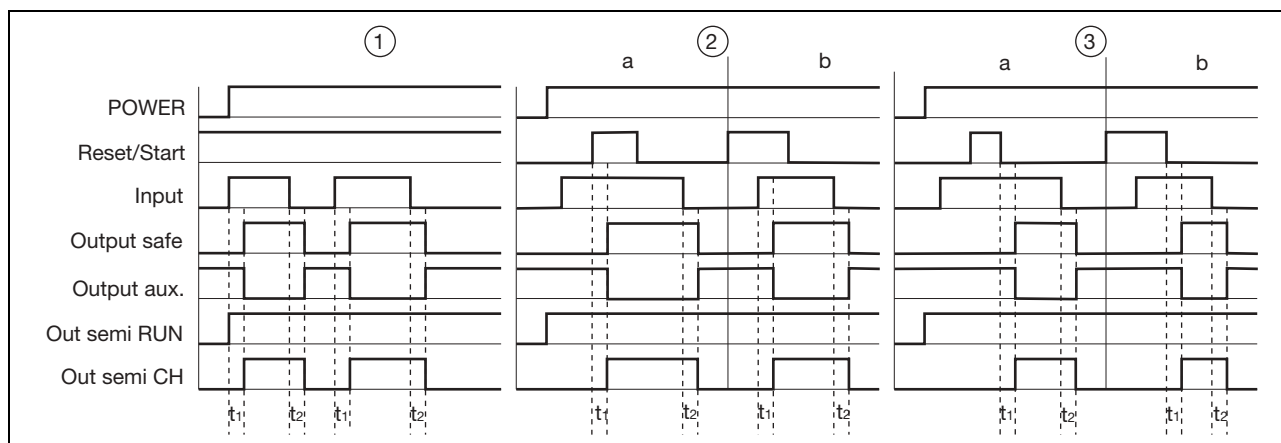


Up to Category 4, EN 954-1 PNOZ X9

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once
 - the input circuit is closed and then the reset circuit is closed and opened again.
 - the reset circuit is closed and then opened again once the input circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34
- } Input: Input circuits S11-S12, S21-S22, S52
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74
- } Output aux: Auxiliary contacts 81-82, 91-92
- } Out semi RUN: Semiconductor output supply voltage Y35
- } Out semi CH: Semiconductor output switch status Y32
- } i : Automatic reset
- } c : Manual reset
- } £ : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t1: Switch-on delay
- } t2: Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74 are safety contacts, outputs 81-82, 91-92 are auxiliary contacts (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cabling runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

- R_{lmax} = max. overall cable resistance (see technical details)
- R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ X9

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ X9

} Reset circuit

Reset circuit	E-STOP/safety gate wiring (single and dual-channel, without shorts across contacts)	E-STOP/safety gate wiring (dual-channel, with shorts across contacts)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

Feedback loop	
Contacts from external contactors	

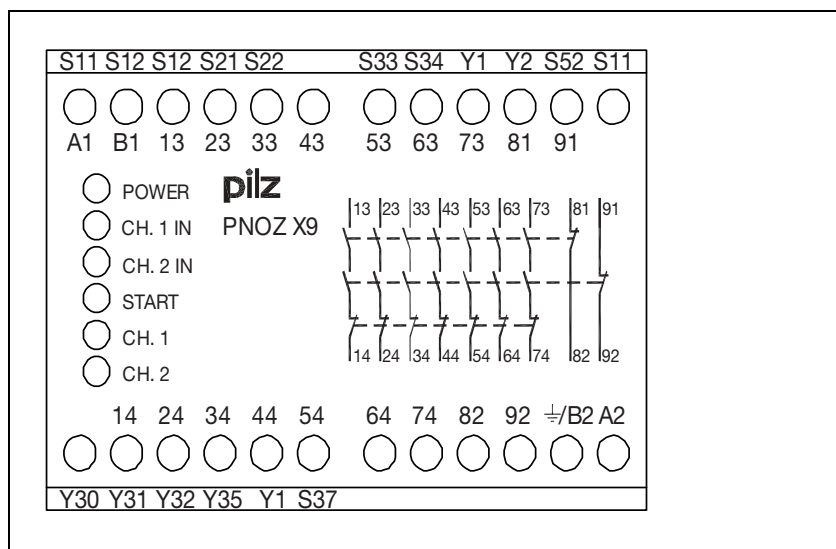
} Semiconductor output

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X9

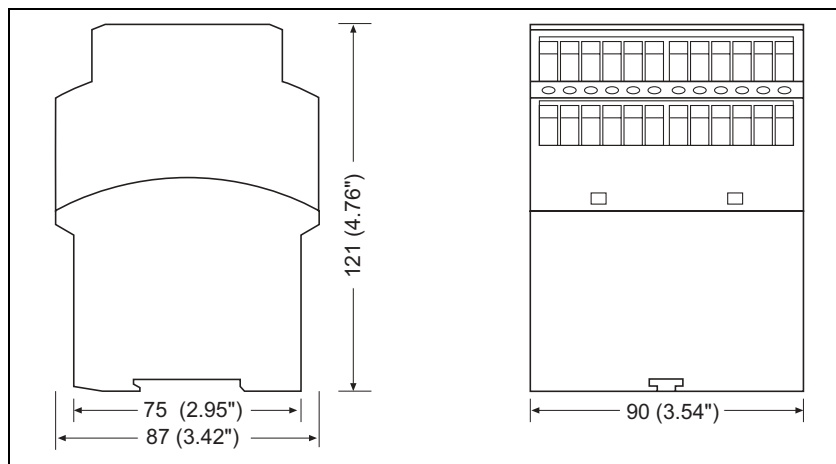
Terminal configuration



Installation

- The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- Use the notch on the rear of the unit to attach it to a DIN rail.
- Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

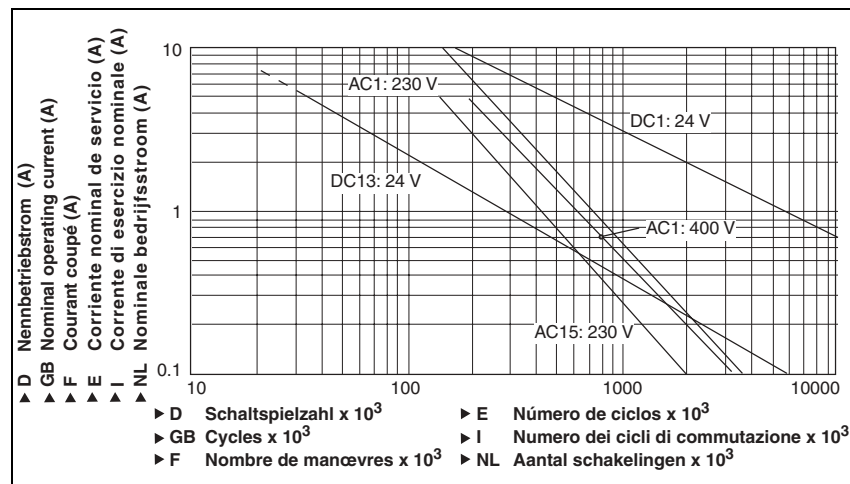


Up to Category 4, EN 954-1 PNOZ X9

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage U_B AC **24 V, 42 V, 100 - 120 V, 200 - 230 V**

Supply voltage U_B DC **24 V**

Voltage tolerance **-15% / +10%**

Power consumption at U_B AC **11.0 VA**

Power consumption at U_B DC **5.5 W**

Frequency range AC **50 - 60 Hz**

Residual ripple DC **160 %**

Voltage and current at input circuit: **24 VDC**

reset circuit: **24 V DC**

feedback loop: **24 V DC**

Output contacts in accordance with **EN 954-1, Category 4**

Safety contacts (N/O): **7**

Auxiliary contacts (N/C): **2**

Utilisation category in accordance with **EN 60947-4-1**

AC1: **240 V**

I_{min} : **0.01 A**, I_{max} : **8.00 A**

P_{max} : **2,000 VA**

Safety contacts: AC1: **400 V**

I_{min} : **0.01 A**, I_{max} : **5.00 A**

P_{max} : **2,000 VA**

DC1: **24 V**

I_{min} : **0.01 A**, I_{max} : **8.0 A**

P_{max} : **200 W**

Utilisation category in accordance with **EN 60947-5-1**

AC15: **230 V**

I_{max} : **5.0 A**

DC13 (6 cycles/min): **24 V**

I_{max} : **7.0 A**

Contact material **AgSnO₂ + 0.2 σ m Au**

External contact fuse protection (**EN 60947-5-1**)

Blow-out fuse, quick **10 A**

Blow-out fuse, slow **6 A**

Circuit breaker **6 A, 24 VAC/DC, characteristic B/C**

Semiconductor outputs (short circuit proof) **24 V DC, 20 mA**

External supply voltage **24 VDC**

Voltage tolerance **-20 % / +20 %**

Up to Category 4, EN 954-1 PNOZ X9

Max. overall cable resistance R_{lmax} input circuits,
reset circuits

Single-channel at U_B DC	45 Ohm
Single-channel at U_B AC	45 Ohm
Dual-channel without detect. of shorts across contacts at U_B DC	90 Ohm
Dual-channel without detect. of shorts across contacts at U_B AC	90 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm
Dual-channel with detect. of shorts across contacts at U_B AC	15 Ohm

Times

Switch-on delay	
with automatic reset typ.	200 ms
with automatic reset max.	250 ms
with automatic reset after power on typ.	220 ms
with automatic reset after power on max.	300 ms
with manual reset typ.	200 ms
with manual reset max.	250 ms
with monitored reset typ.	150 ms
with monitored reset max.	220 ms

Delay-on de-energisation	
with E-STOP typ.	20 ms
with E-STOP max.	30 ms
with power failure typ.	170 ms
with power failure max.	250 ms

Recovery time at max. switching frequency 1/s after E-STOP	50 ms
after power failure	300 ms

Simultaneity, channel 1 and 2	150 ms

Supply interruption before de-energisation	35 ms

Environmental data

EMC	EN 60947-5-1, EN 61000-6-2

Vibration in accordance with **EN 60068-2-6**

Frequency	10 - 55 Hz
Amplitude	0.35 mm

Climatic suitability	EN 60068-2-78

Airgap creepage	EN 60947-1

Ambient temperature	-10 - 55 °C

Storage temperature	-40 - 85 °C

Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20

Mechanical data

Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0

Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ²

2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ²

Torque setting with screw terminals	0.60 Nm

Dimensions (H x W x D)	
With screw terminals	87.0 mm x 90.0 mm x 121.0 mm

Weight	750 g

The standards current on **06/04** apply.

Up to Category 4, EN 954-1 PNOZ X9

Max. continuous current

Number of contacts	1.00	2.00	3.00	4.00	5.00	6.00	7.00
Imax on DC units (in A)	8.00	8.00	8.00	7.00	6.00	5.50	5.00
Imax on AC units (in A)	8.00	5.60	4.60	4.00	3.50	3.20	3.00

Order reference

Type	Features		Terminals	Order no.
PNOZ X9	24 VAC/DC		Screw terminals	774 609
PNOZ X9	42 VAC	24 VDC	Screw terminals	774 601
PNOZ X9	110 - 120 VAC	24 VDC	Screw terminals	774 605
PNOZ X9	220 - 230 VAC	24 VDC	Screw terminals	774 606

Up to Category 4, EN 954-1 PNOZ X10.1



Safety relay for monitoring E-STOP pushbuttons, safety gates and light barriers.

Unit features

- } Positive-guided relay outputs:
 - 6 safety contacts (N/O), instantaneous
 - 4 auxiliary contacts (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Light barriers
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
 - Input circuits
- } See order reference for unit types

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

Approvals

	PNOZ X10.1
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Unit description

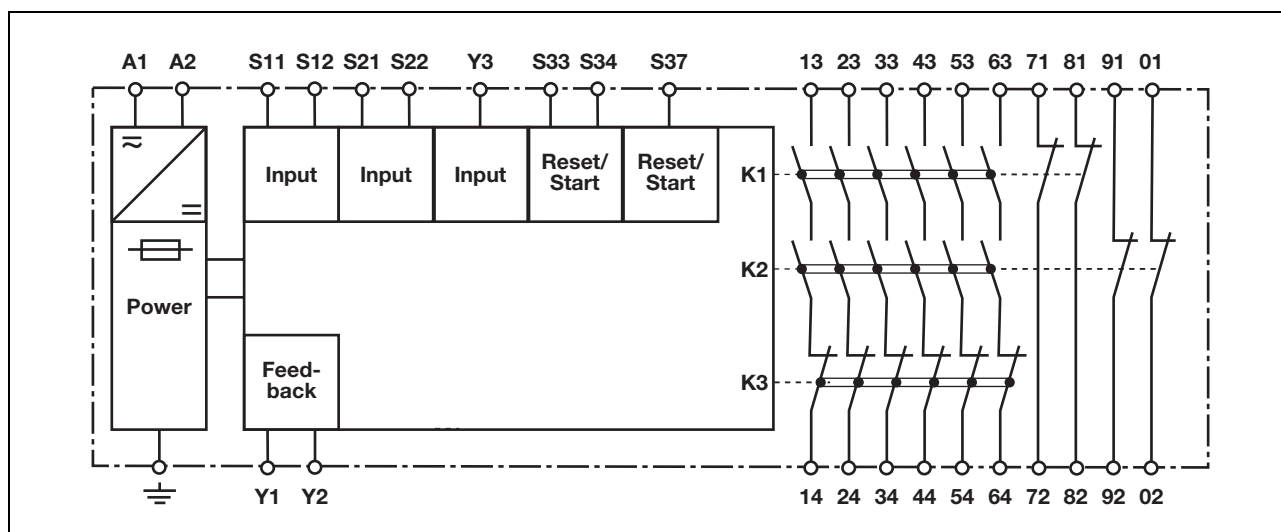
The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates
- } Light barriers

Safety features

The relay conforms to the following safety criteria:

Block diagram

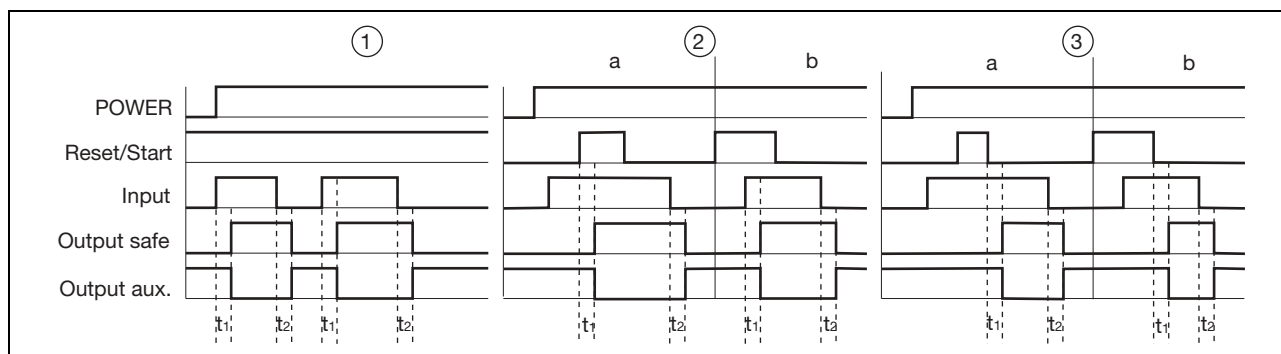


Up to Category 4, EN 954-1 PNOZ X10.1

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once
 - the input circuit is closed and then the reset circuit is closed and opened again.
 - the reset circuit is closed and then opened again once the input circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33(S12)-S34
- } Input: Input circuits S12-Y3, S21-S22
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64
- } Output aux: Auxiliary contacts 71-72, 81-82, 91-92, 01-02
- } i : Automatic reset
- } c : Manual reset
- } E : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54, 63-64 are safety contacts, outputs 71-72, 81-82, 91-92, 01-02 are auxiliary contacts (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cabling runs $I_{\max}$ in the input circuit:

$$I_{\max} = \frac{R_{I\max}}{R_i / \text{km}}$$

$R_{I\max}$ = max. overall cable resistance (see technical details)

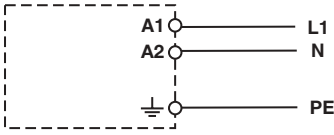
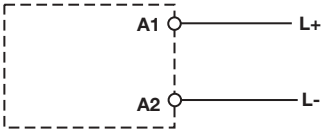
R_i /km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

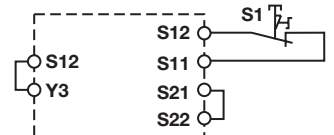
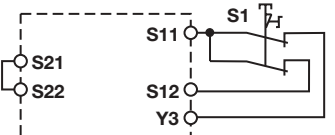
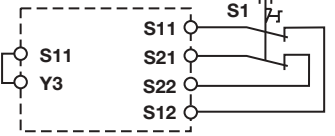
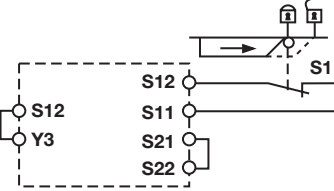
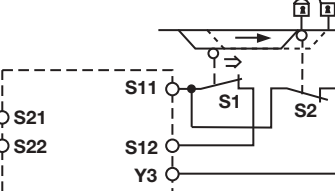
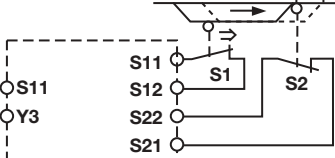
Up to Category 4, EN 954-1
PNOZ X10.1

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ X10.1

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

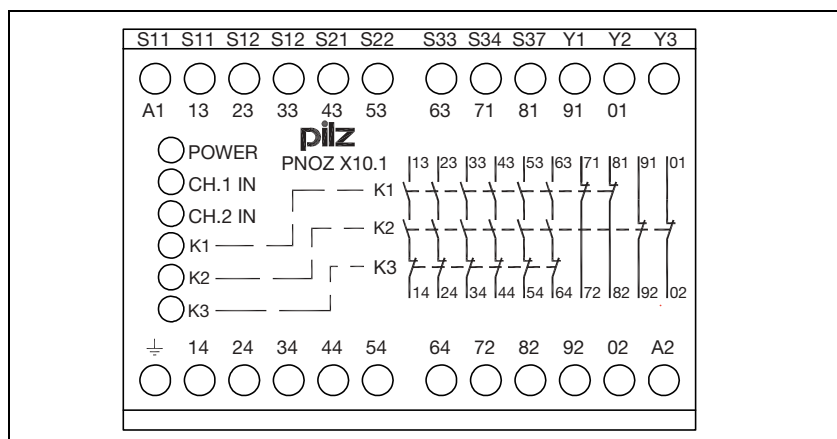
Feedback loop	Automatic reset	Monitored/manual reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X10.1

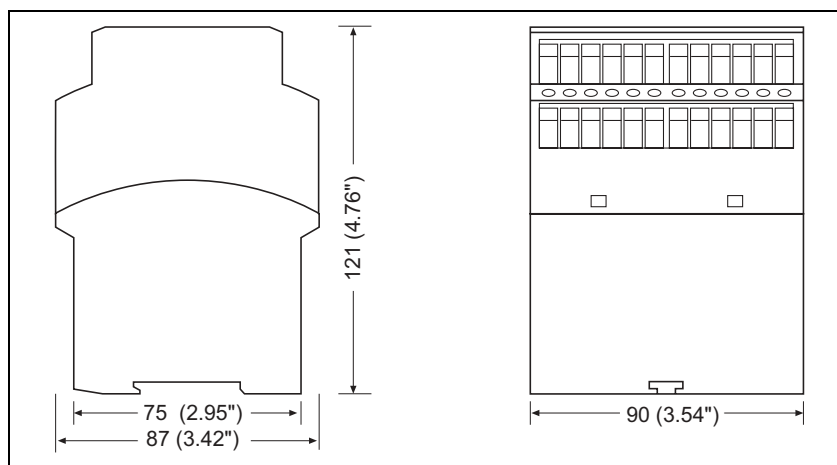
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

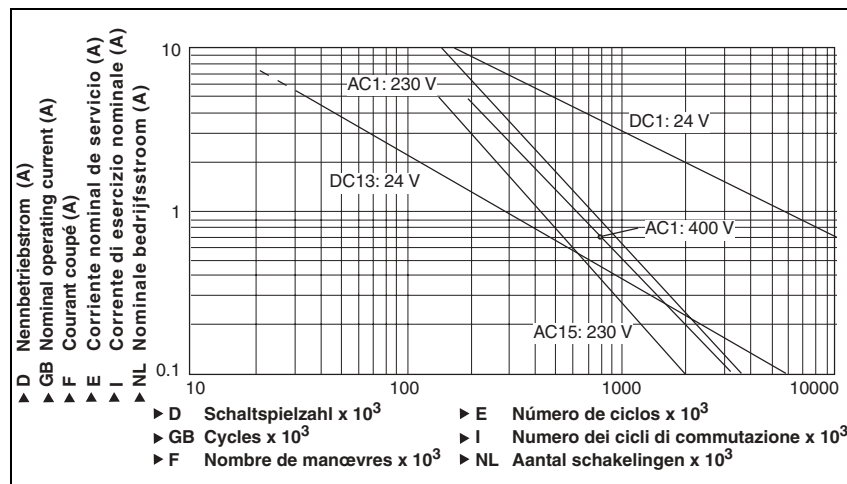


Up to Category 4, EN 954-1 PNOZ X10.1

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage U_B AC	24 V, 42 V, 110 - 120 V, 230 - 240 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B AC	10.0 VA Order no.: 774740, 774741, 774745, 774746
Power consumption at U_B DC	5.5 W Order no.: 774749
Frequency range AC	50 - 60 Hz Order no.: 774740, 774741, 774745, 774746
Residual ripple DC	160 % Order no.: 774749
Voltage and current at input circuit: 24.0 VDC	50 mA
reset circuit: 24.0 VDC	100.0 mA
feedback loop: 24.0 VDC	100.0 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 6 Auxiliary contacts (N/C): 4
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 2,000 VA
AC1: 400 V	I_{min} : 0.01 A, I_{max} : 5.0 A P_{max} : 2,000 VA
DC1: 24 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : 5.0 A
DC13 (6 cycles/min): 24 V	I_{max} : 7.0 A
Contact material	AgSnO ₂ + 0.2 σ m Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
single-channel at U_B DC	45 Ohm Order no.: 774749
single-channel at U_B AC	45 Ohm Order no.: 774740, 774741, 774745, 774746
dual-channel without detect. of shorts across contacts at U_B DC	90 Ohm Order no.: 774749
dual-channel without detect. of shorts across contacts at U_B AC	90 Ohm Order no.: 774740, 774741, 774745, 774746
dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm Order no.: 774749
dual-channel with detect. of shorts across contacts at U_B AC	15 Ohm Order no.: 774740, 774741, 774745, 774746

Up to Category 4, EN 954-1 PNOZ X10.1

2.3

Times	
Switch-on delay with automatic reset typ.	180 ms Order no.: 774740, 774741, 774745, 774746 190 ms Order no.: 774749
with automatic reset max.	250 ms
with automatic reset after power on typ.	230 ms Order no.: 774740, 774741, 774745, 774746 200 ms Order no.: 774749
with automatic reset after power on max.	320 ms Order no.: 774740, 774741, 774745, 774746 300 ms Order no.: 774749
with manual reset typ.	200 ms
with manual reset max.	250 ms
with monitored reset typ.	150 ms Order no.: 774740, 774741, 774745, 774746 165 ms Order no.: 774749
with monitored reset max.	200 ms Order no.: 774740, 774741, 774745, 774746 220 ms Order no.: 774749
Delay-on de-energisation with E-STOP typ.	20 ms
with E-STOP max.	30 ms
with power failure typ.	300 ms
with power failure max.	400 ms
Recovery time at max. switching frequency 1/s after E-STOP	50 ms
after power failure	450 ms
Min. start pulse duration with a monitored reset	50 ms
Simultaneity, channel 1 and 2	150 ms
Supply interruption before de-energisation	150 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	
with screw terminals	87 mm x 90 mm x 121 mm
Weight	550 g Order no.: 774749 730 g Order no.: 774740, 774741, 774745, 774746

The standards current on **06/04** apply.

Up to Category 4, EN 954-1 PNOZ X10.1

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC	$I_{\max}$ (A) at U_B AC
1	8.00 A Order no.: 774749	8.00 A Order no.: 774740, 774741, 774745, 774746
2	8.00 A Order no.: 774749	7.00 A Order no.: 774740, 774741, 774745, 774746
3	7.00 A Order no.: 774749	5.60 A Order no.: 774740, 774741, 774745, 774746
4	6.10 A Order no.: 774749	4.90 A Order no.: 774740, 774741, 774745, 774746
5	5.40 A Order no.: 774749	4.40 A Order no.: 774740, 774741, 774745, 774746
6	5.00 A Order no.: 774749	4.00 A Order no.: 774740, 774741, 774745, 774746

Order reference

Type	Features	Terminals	Order no.
PNOZ X10.1	24 VAC	Screw terminals	774 740
PNOZ X10.1	42 VAC	Screw terminals	774 741
PNOZ X10.1	110 - 120 VAC	Screw terminals	774 745
PNOZ X10.1	230 - 240 VAC	Screw terminals	774 746
PNOZ X10.1	24 VDC	Screw terminals	774 749

Up to Category 4, EN 954-1 PNOZ 11



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Unit features

- } Positive-guided relay outputs:
 - 7 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
 - Input circuits
- } Semiconductor output signals:
 - Switch status channel 1/2
 - Supply voltage is present
- } See order reference for unit types

Safety features

- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
 - } The transformer is short circuit-proof.

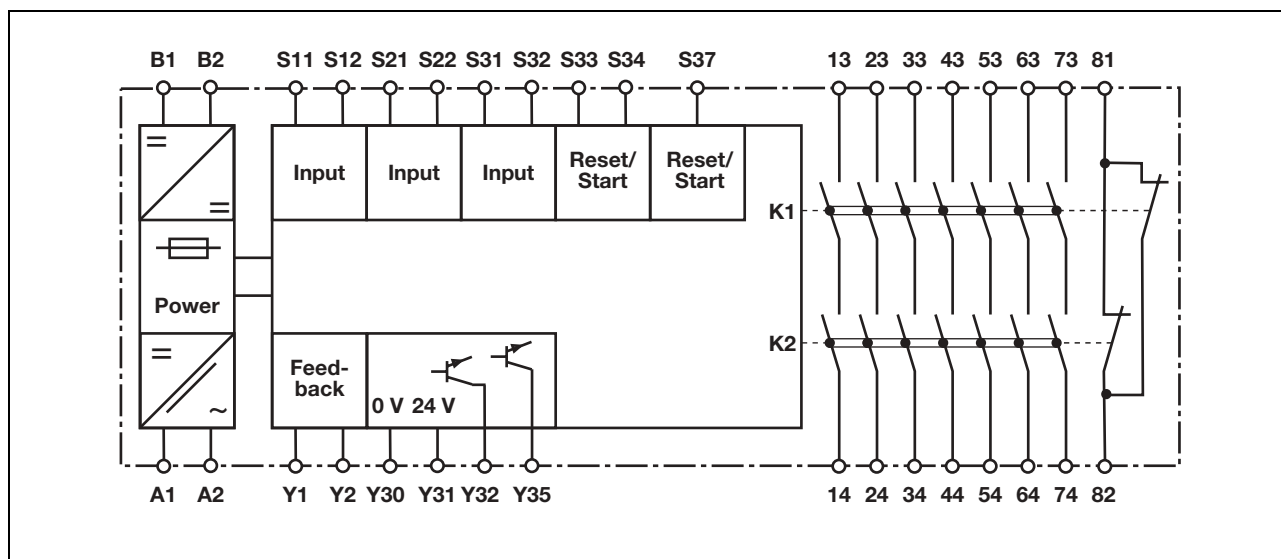
Approvals

	PNOZ 11
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Unit description

- The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with
- } E-STOP pushbuttons
 - } Safety gates

Block diagram

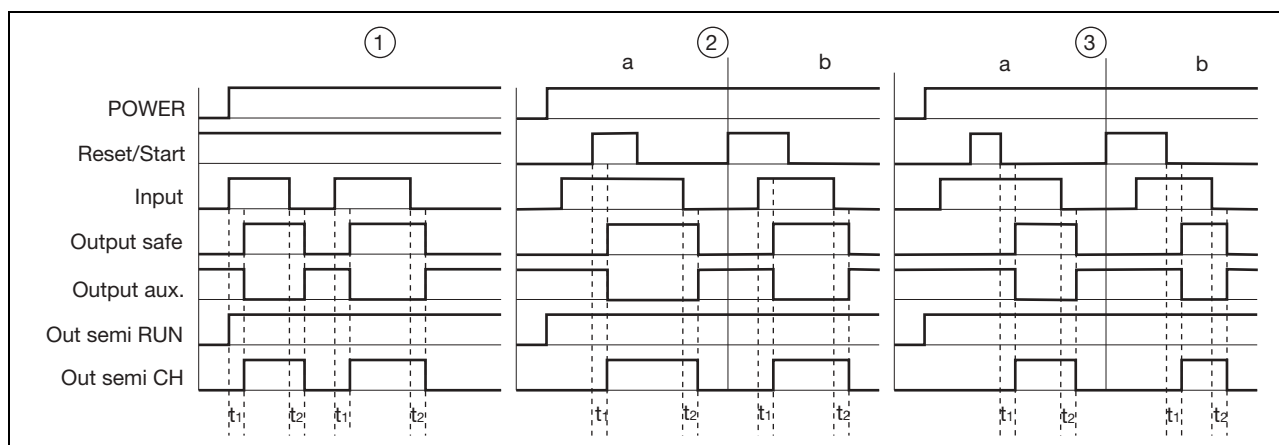


Up to Category 4, EN 954-1 PNOZ 11

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
- short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
- shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once
 - the input circuit is closed and then the reset circuit is closed and opened again.
 - the reset circuit is closed and then opened again once the input circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34, S34-S37
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74
- } Output aux: Auxiliary contacts 81-82
- } Out semi RUN: Semiconductor output supply voltage Y35
- } Out semi CH: Semiconductor output switch status Y32
- } i : Automatic reset
- } c : Manual reset
- } E : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74 are safety contacts, output 81-82 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{I_{max}}}{R_i / km}$$

$R_{I_{max}}$ = max. overall cable resistance (see technical details)

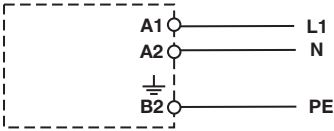
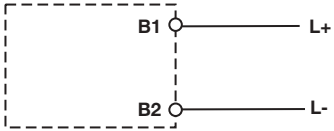
R_i / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

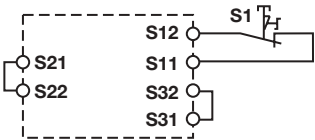
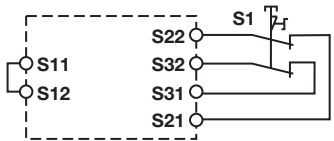
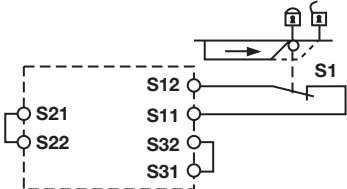
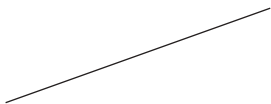
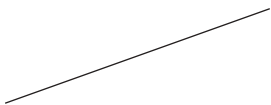
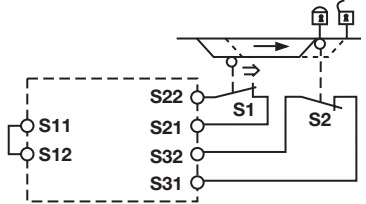
Up to Category 4, EN 954-1
PNOZ 11

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1 PNOZ 11

} Reset circuit

Reset circuit	E-STOP wiring, safety gate	Safety gate (dual-channel)
Automatic reset		
Manual reset		
Monitored reset		

} Feedback loop

Feedback loop	Automatic reset	Manual/monitored reset:
Link		
Contacts from external contactors		

} Semiconductor output

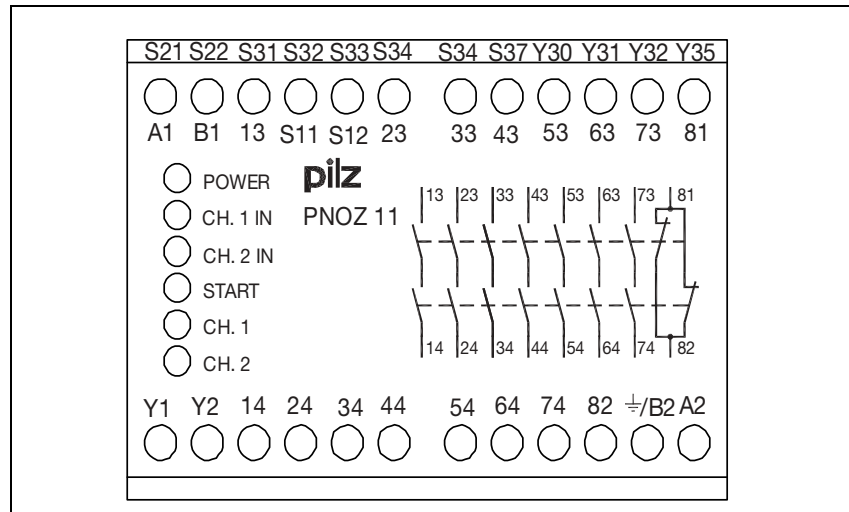
Up to Category 4, EN 954-1 PNOZ 11

} Key

S1	E-STOP pushbutton
S1/S2	Two-hand button
S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ 11

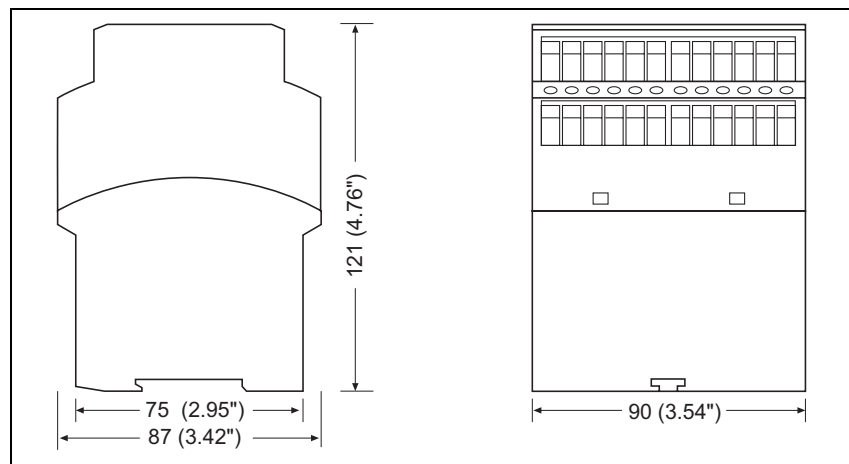
Terminal configuration



Installation

- The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- Use the notch on the rear of the unit to attach it to a DIN rail.
- Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

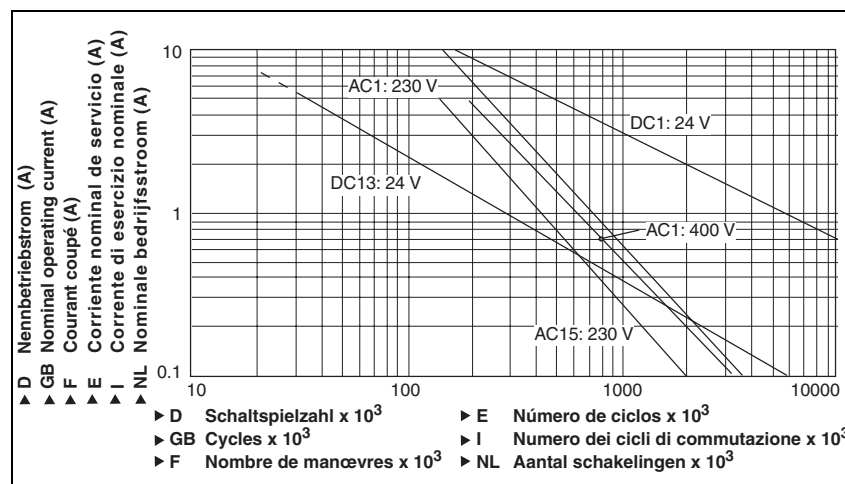


Up to Category 4, EN 954-1 PNOZ 11

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U_B AC	24 V, 42 V, 48 V, 110 - 120 V, 230 - 240 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B AC	9.0 VA
Power consumption at U_B DC	3.5 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	160 %
Voltage and current at	
input circuit DC: 24.0 V	50.0 mA
reset circuit DC: 24.0 V	45.0 mA
feedback loop DC: 24.0 V	45.0 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 7 Auxiliary contacts (N/C): 1

Utilisation category in accordance with **EN 60947-4-1**

Safety contacts: AC1 at 240 V	I_{min} : 0.01 A, I_{max} : 8.00 A P_{max} : 2,000 VA
Safety contacts: AC1 at 400 V	I_{min} : 0.01 A, I_{max} : 5.00 A P_{max} : 2,000 VA
Safety contacts: DC1 at 24 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 200 W
Auxiliary contacts: AC1 at 240 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 2,000 VA
Auxiliary contacts: DC1 at 24 V	I_{min} : 0.01 A, I_{max} : 8.0 A P_{max} : 200 W

Utilisation category in accordance with **EN 60947-5-1**

Safety contacts: AC15 at 230 V	I_{max} : 5.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 7.0 A
Auxiliary contacts: AC15 at 230 V	I_{max} : 5.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 7.0 A

Up to Category 4, EN 954-1 PNOZ 11

Electrical data	
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	10 A
Auxiliary contacts:	10 A
Blow-out fuse, slow	
Safety contacts:	6 A
Auxiliary contacts:	6 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	6 A
Auxiliary contacts:	6 A
Semiconductor outputs (short circuit proof)	24.0 V DC, 20 mA
External supply voltage	24.0 V DC
Voltage tolerance	
	-20 %/+20 %
Max. overall cable resistance R_{lmax}	
input circuits, reset circuits	
single-channel at U_B DC	50 Ohm
single-channel at U_B AC	100 Ohm
dual-channel with detect. of shorts across contacts at U_B DC	15 Ohm
dual-channel with detect. of shorts across contacts at U_B AC	20 Ohm
Times	
Switch-on delay	
with automatic reset max.	450 ms
with automatic reset after power on max.	480 ms
with manual reset typ.	335 ms
with manual reset max.	450 ms
with monitored reset max.	450 ms
Delay-on de-energisation	
with E-STOP typ.	17 ms
with E-STOP max.	30 ms
with power failure typ.	40 ms
with power failure max.	60 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	100 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	10 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0

Up to Category 4, EN 954-1 PNOZ 11

Mechanical data

Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm
Dimensions	
Height	87.0 mm
Width	90.0 mm
Depth	121.0 mm
Weight	640 g

The standards current on **09/01** apply.

Max. continuous current

Number of contacts	I_{max} (A) at U_B DC	I_{max} (A) at U_B AC
1	8 A	8 A
2	8 A	8 A
3	8 A	6.80 A
4	6.90 A	5.90 A
5	6.20 A	5.30 A
6	5.60 A	4.80 A
7	5.20 A	4.50 A

Order reference

Type	Features		Terminals	Order no.
PNOZ 11	24 VAC	24 VDC	Screw terminals	774 080
PNOZ 11	42 VAC	24 VDC	Screw terminals	774 081
PNOZ 11	48 VAC	24 VDC	Screw terminals	774 082
PNOZ 11	110 - 120 VAC	24 VDC	Screw terminals	774 085
PNOZ 11	230 - 240 VAC	24 VDC	Screw terminals	774 086

Up to Category 4, EN 954-1 PNOZ X13



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Unit features

- } Positive-guided relay outputs:
 - 5 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Approvals

	PNOZ X13
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Unit description

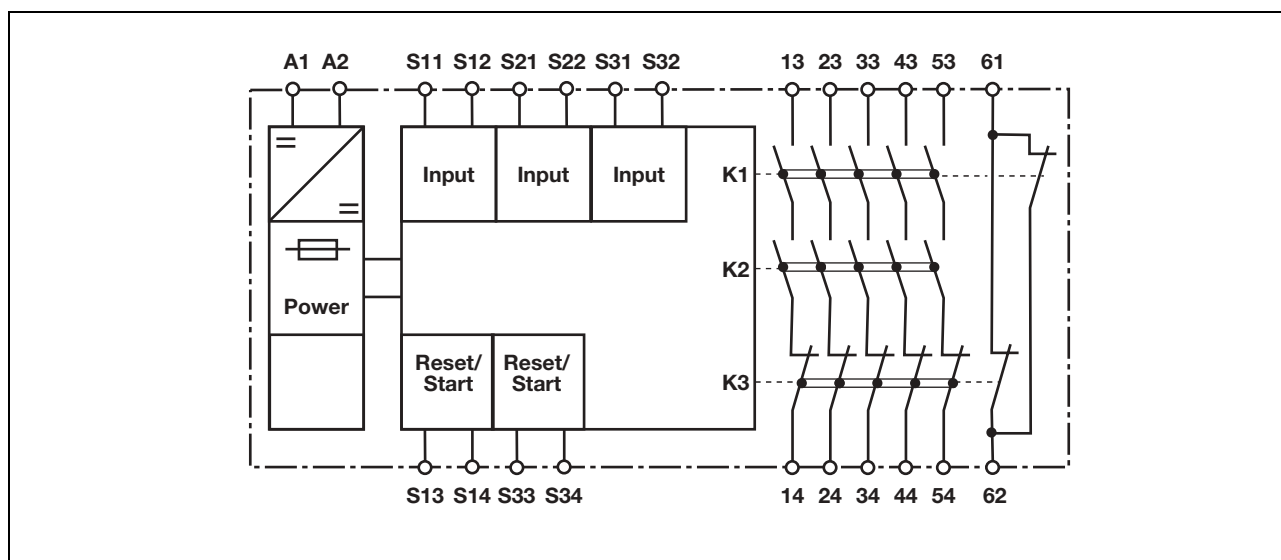
The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

Safety features

The relay conforms to the following safety criteria:

Block diagram

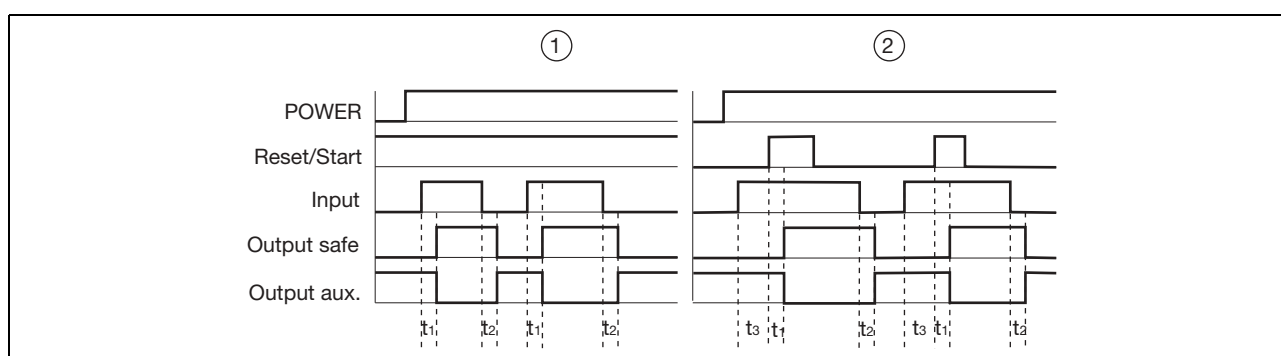


Up to Category 4, EN 954-1 PNOZ X13

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S13-S14, S33-S34
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts, instantaneous 13-14, 23-24, 33-34, 43-44, 53-54
- } Output aux: Auxiliary contacts 61-62
- } $\bar{\cdot}$: Automatic reset
- } ϕ : Monitored reset
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Waiting period

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54 are safety contacts, output 61-62 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{I_{max}}}{R_l / km}$$

$R_{I_{max}}$ = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

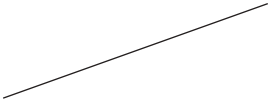
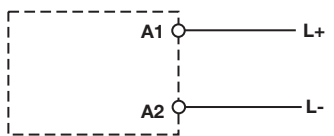
- } Use copper wire that can withstand 60/75 °C.

- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

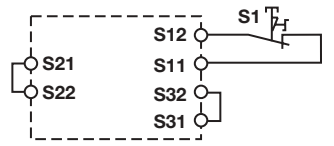
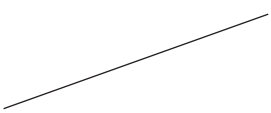
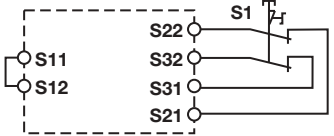
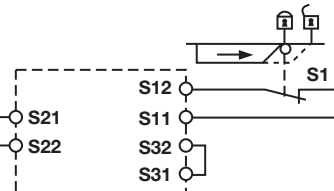
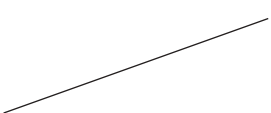
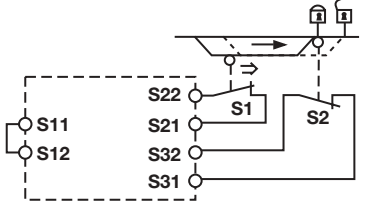
Up to Category 4, EN 954-1 PNOZ X13

Preparing for operation

} Supply voltage

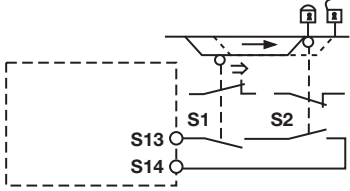
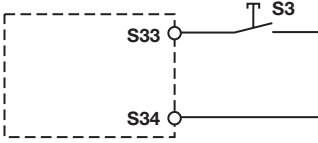
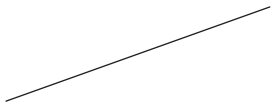
Supply voltage	AC	DC
		

} Input circuit

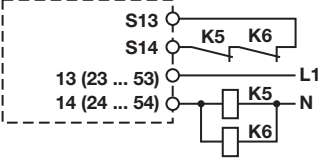
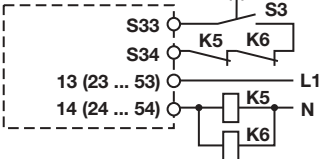
Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ X13

} Reset circuit

Reset circuit	E-STOP wiring, safety gate	Safety gate (dual-channel)
Automatic reset		
Monitored reset		

} Feedback loop

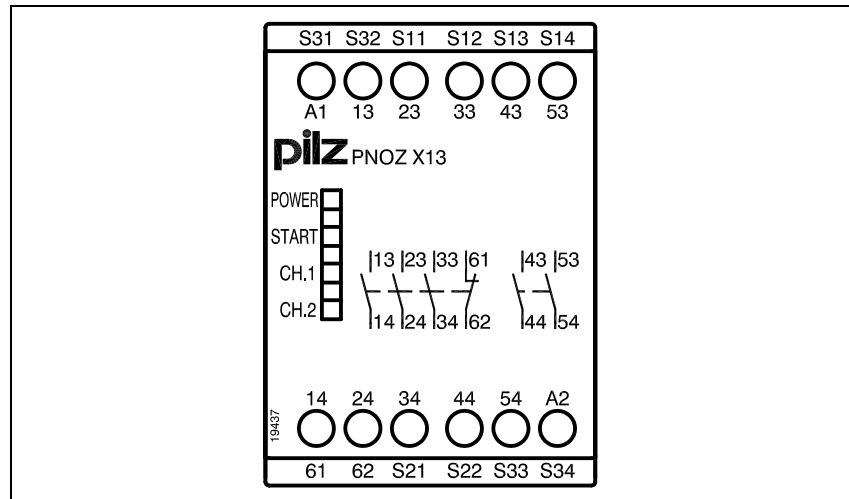
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ X13

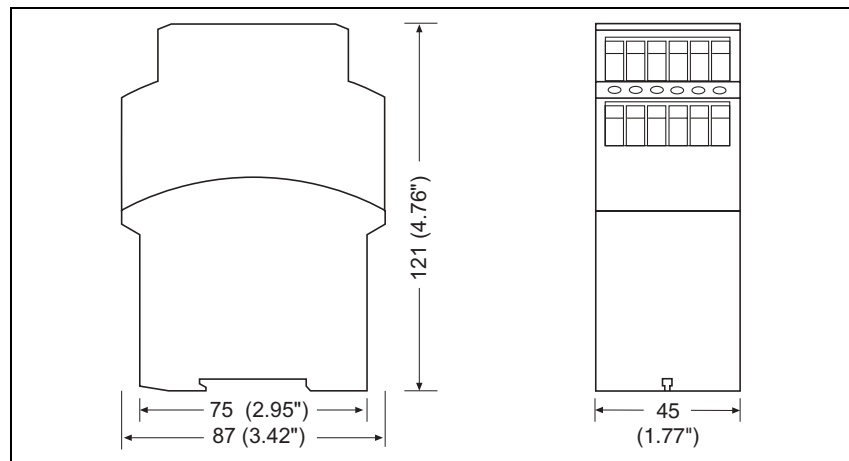
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

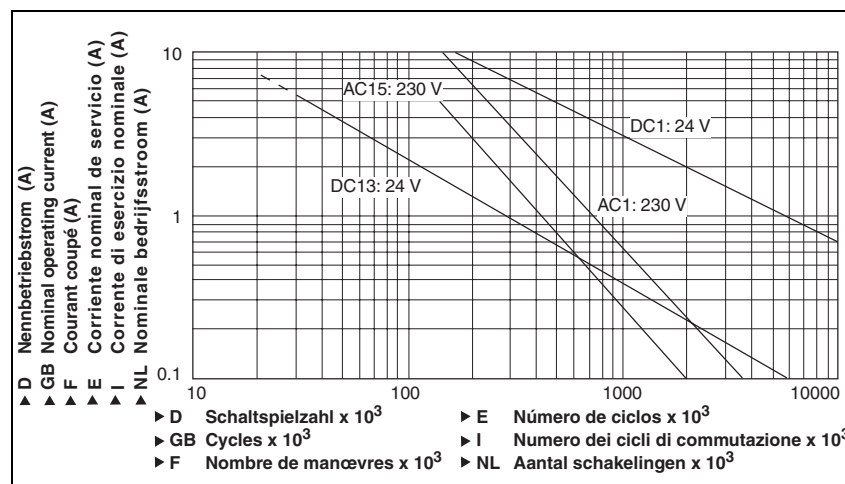


Up to Category 4, EN 954-1 PNOZ X13

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B DC	4.5 W
Residual ripple DC	160 %
Voltage and current at input circuit: 24 VDC	60 mA
reset circuit: 24 VDC	50 mA
feedback loop: 24 VDC	5 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 5 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 8 \text{ A}$ $P_{max}: 2,000 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 8 \text{ A}$ $P_{max}: 200 \text{ W}$
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V DC13 (6 cycles/min): 24 V	$I_{max}: 5 \text{ A}$ $I_{max}: 7 \text{ A}$
Contact material	AgSnO₂ + 0.2 μm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	10 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B DC	100 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	10 Ohm

Up to Category 4, EN 954-1 PNOZ X13

Times	
Switch-on delay	
with automatic reset typ.	350 ms
with automatic reset max.	600 ms
with automatic reset after power on typ.	390 ms
with automatic reset after power on max.	670 ms
with monitored reset typ.	40 ms
with monitored reset max.	70 ms
Delay-on de-energisation	
with E-STOP typ.	20 ms
with E-STOP max.	50 ms
with power failure typ.	85 ms
with power failure max.	120 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	250 ms
Waiting period with a monitored reset	300 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 600068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	
with screw terminals	87 mm x 45 mm x 121 mm
Weight	345 g

The standards current on 01/02 apply.

Max. continuous current	
Number of contacts	I _{max} (A) at U _B DC
1	8.00 A
2	7.90 A
3	6.50 A
4	5.60 A
5	5.00 A

Up to Category 4, EN 954-1 PNOZ X13

Order reference

Type	Features	Terminals	Order no.
PNOZ X13	24 VDC	Screw terminals	774 549

Up to Category 4, EN 954-1 PNOZ 16



Safety relay for monitoring emergency stop pushbuttons, safety gates, safety mats and safe edges

Approvals

	PNOZ 16	
	É	
	É	
	É	

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Safe edges
 - Safety mats
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Detection of shorts across contacts on safety mat "EXT. FAULT"
- } See order reference for unit types

Unit description

The safety relay meets the requirements of EN 60204-1, IEC 60204-1 and EN 1760-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates
- } Safety mats
- } Safe edges

The safety relay is not suitable for non-contact barriers because

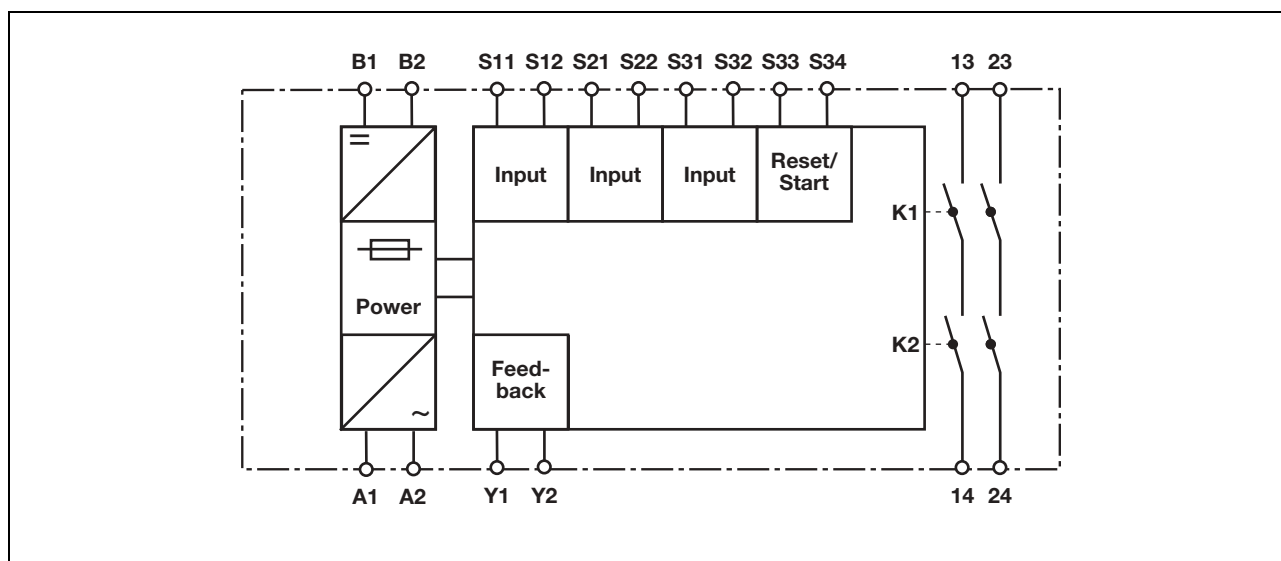
- } a dynamic start is not possible
- } the unit can be started during the delay-on de-energisation time.

Safety features

The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

Block diagram

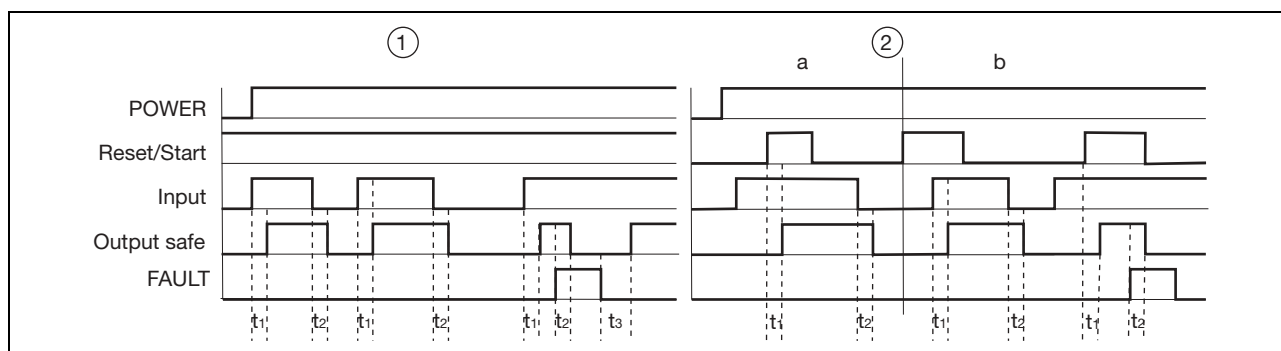


Up to Category 4, EN 954-1 PNOZ 16

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
- short circuits and shorts between contacts in the input circuit.
- } When the safety mat is actuated, a short is formed between the inputs and internal fault detection is energised. The safety contacts open and the LED EXT.FAULT is lit. If the safety mat is cleared and supply voltage is maintained, the unit is ready for operation again once the recovery time has elapsed.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts 13-14, 23-24
- } FAULT: Short between contacts in the input circuit due to actuation of safety mat
- } i : Automatic reset
- } ☐ : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation
- } t₃: Recovery time after short across contacts

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

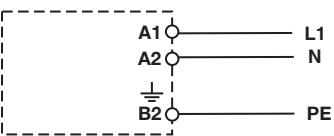
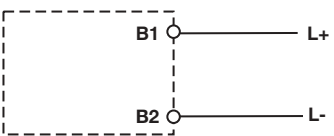
$$I_{\max} = \frac{R_{I\max}}{R_l / \text{km}}$$

R_{I_{max}} = max. overall cable resistance (see technical details)
 R_l /km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

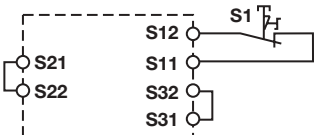
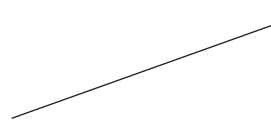
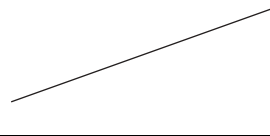
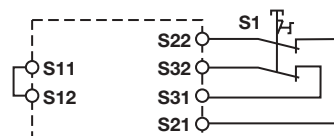
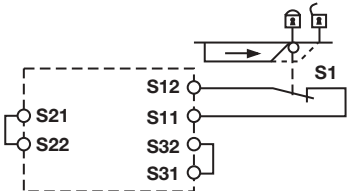
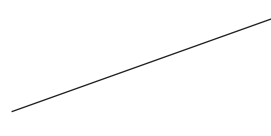
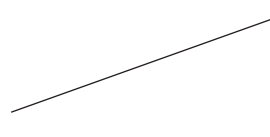
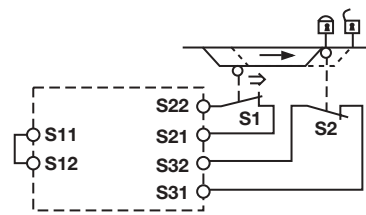
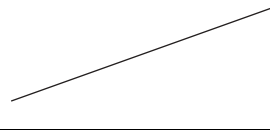
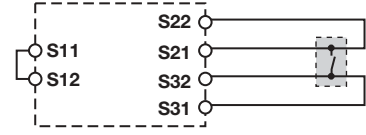
Up to Category 4, EN 954-1 PNOZ 16

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ 16

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		

} Feedback loop

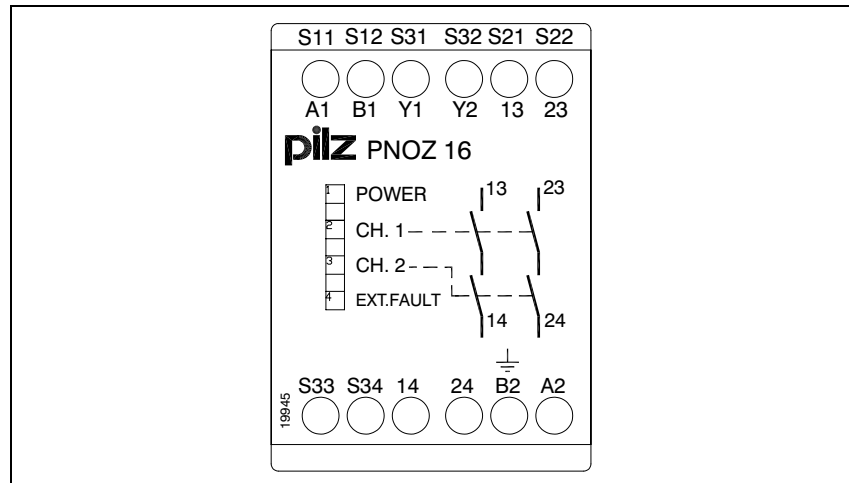
Feedback loop	Automatic reset	Manual reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ 16

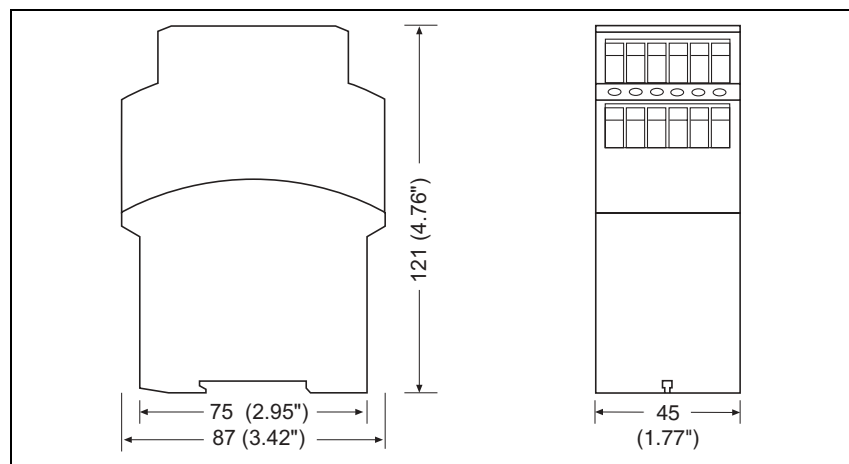
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

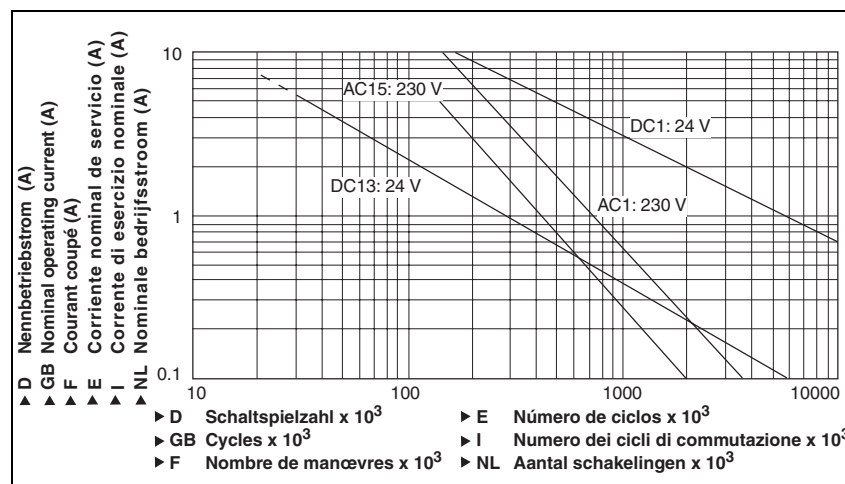


Up to Category 4, EN 954-1 PNOZ 16

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	24 V, 42 V, 48 V, 110 V, 115 V, 120 V, 230 V, 240 V
Supply voltage U _B AC	24 V
Supply voltage U _B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U _B AC	3.5 VA
Power consumption at U _B DC	2.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	20 %
Voltage and current at	
input circuit DC: 24.0 V	25.0 mA
reset circuit DC: 24.0 V	25.0 mA
feedback loop DC: 24.0 V	25.0 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 2
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 8.00 A P _{max} : 2000 VA
Safety contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 8.0 A P _{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I _{max} : 5.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 6.0 A
Contact material	AgSnO ₂ + 0.2 µm Au
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	10 A
Safety contacts:	
Blow-out fuse, slow	6 A
Safety contacts:	
Circuit breaker 24 VAC/DC, characteristic B/C	6 A
Safety contacts:	
Safety mat resistance + overall cable resistance	80 Ohm

Up to Category 4, EN 954-1 PNOZ 16

Electrical data

Max. overall cable resistance R_{lmax} input circuits, reset circuits	
single-channel at U_B DC	40 Ohm
single-channel at U_B AC	40 Ohm
dual-channel with detect. of shorts across contacts at U_B DC	80 Ohm
dual-channel with detect. of shorts across contacts at U_B AC	80 Ohm

Times

Switch-on delay	
with automatic reset typ.	230 ms
with automatic reset max.	350 ms
with automatic reset after power on typ.	310 ms
with automatic reset after power on max.	450 ms
with manual reset typ.	230 ms
with manual reset max.	350 ms
Delay-on de-energisation	
with E-STOP typ.	18 ms
with E-STOP max.	30 ms
with power failure typ.	50 ms
with power failure max.	80 ms
Recovery time at max. switching frequency 1/s after E-STOP	50 ms
after power failure	100 ms
Recovery time after short across contacts	
at U_B DC - Tol.	650 ms
at U_B DC nom.	400 ms
at U_B DC + Tol.	320 ms
at U_B AC - Tol.	400 ms
at U_B AC nom.	300 ms
at U_B AC + Tol.	280 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms

Environmental data

EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20

Mechanical data

Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm

Up to Category 4, EN 954-1 PNOZ 16

Mechanical data

Dimensions	
Height	87.0 mm
Width	45.0 mm
Depth	121.0 mm
Weight	350 g

The standards current on **02/03** apply.

Order reference

Type	Features		Terminals	Order no.
PNOZ 16	24 VAC/DC		Screw terminals	774 060
PNOZ 16	42 VAC	24 VDC	Screw terminals	774 061
PNOZ 16	48 VAC	24 VDC	Screw terminals	774 062
PNOZ 16	110 VAC	24 VDC	Screw terminals	774 063
PNOZ 16	115 VAC	24 VDC	Screw terminals	774 064
PNOZ 16	120 VAC	24 VDC	Screw terminals	774 065
PNOZ 16	230 VAC	24 VDC	Screw terminals	774 066
PNOZ 16	240 VAC	24 VDC	Screw terminals	774 067

Up to Category 4, EN 954-1 PNOZ 16S



Safety relay for monitoring emergency stop pushbuttons, safety gates, safety mats and safe edges

Approvals

	PNOZ 16S
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- } 2 semiconductor outputs
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
 - Safe edges
 - Safety mats
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Detection of shorts across contacts on safety mat "EXT. FAULT"
- } Semiconductor outputs signal:
 - Switch status channel 1/2
 - Supply voltage is present
 - Detection of shorts across contacts on safety mat "EXT. FAULT"

- } E-STOP pushbuttons
- } Safety gates
- } Safety mats
- } Safe edges

The safety relay is not suitable for non-contact barriers because

- } a dynamic start is not possible
- } the unit can be started during the delay-on de-energisation time.

Safety features

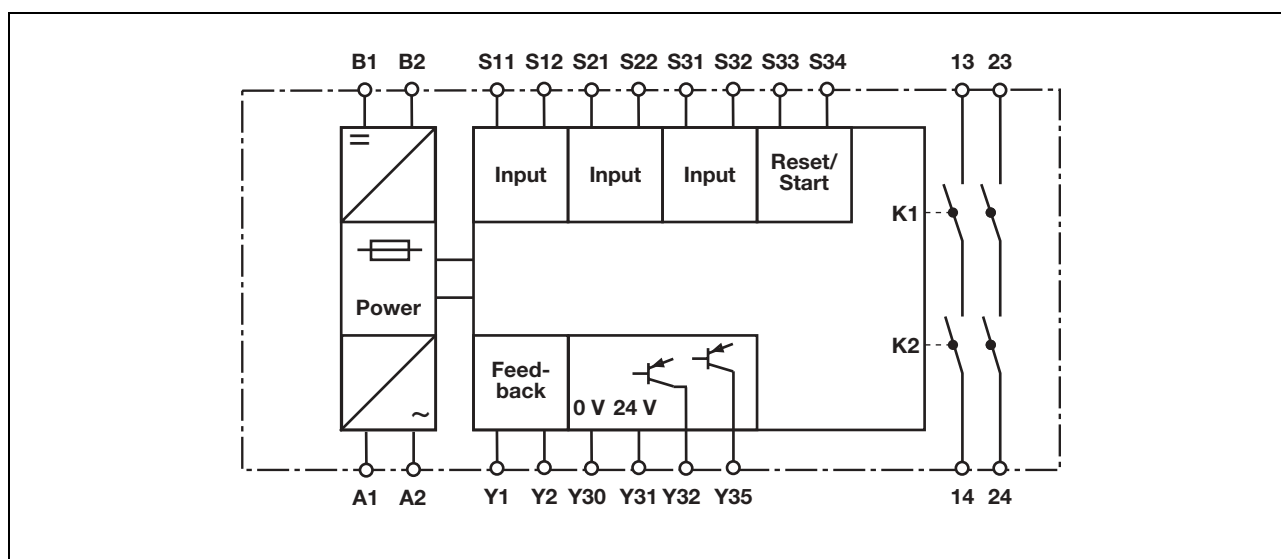
The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

Unit description

The safety relay meets the requirements of EN 60204-1, IEC 60204-1 and EN 1760-1 and may be used in applications with

Block diagram

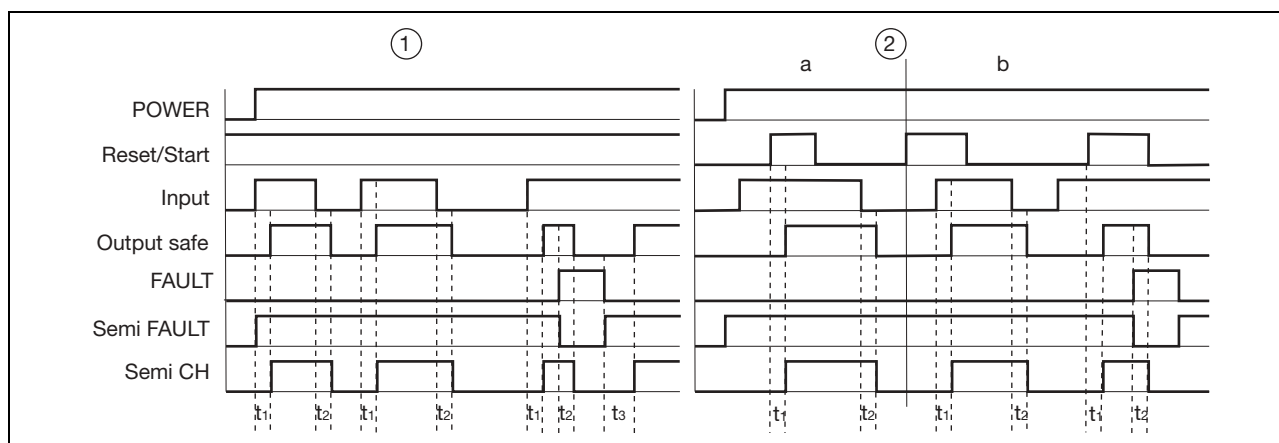


Up to Category 4, EN 954-1 PNOZ 16S

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
- short circuits and shorts between contacts in the input circuit.
- } When the safety mat is actuated, a short is formed between the inputs and internal fault detection is energised. The safety contacts open and the LED EXT.FAULT is lit. If the safety mat is cleared and supply voltage is maintained, the unit is ready for operation again once the recovery time has elapsed.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S33-S34
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts 13-14, 23-24
- } Out semi FAULT: Semiconductor output supply voltage Y35
- } Out semi CH: Semiconductor output switch status Y32
- } FAULT: Short between contacts in the input circuit due to actuation of safety mat
- } i : Automatic reset
- } c : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation
- } t₃: Recovery time after short across contacts

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ 16S

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		
Safety mat, safe edge with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ 16S

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Manual reset		

} Feedback loop

Feedback loop	Automatic reset	Manual reset
Contacts from external contactors		

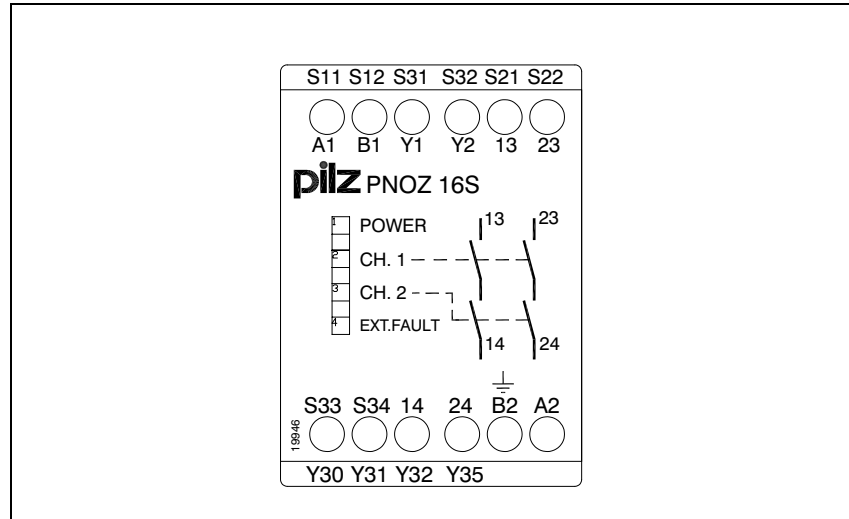
} Semiconductor output

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ 16S

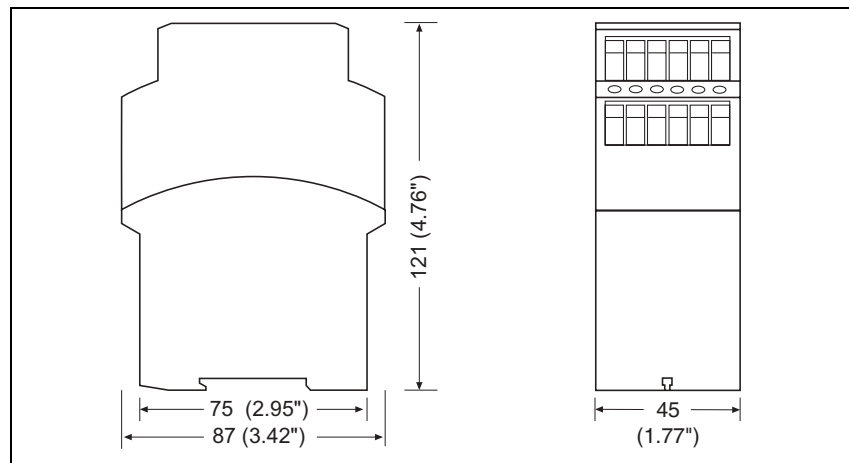
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

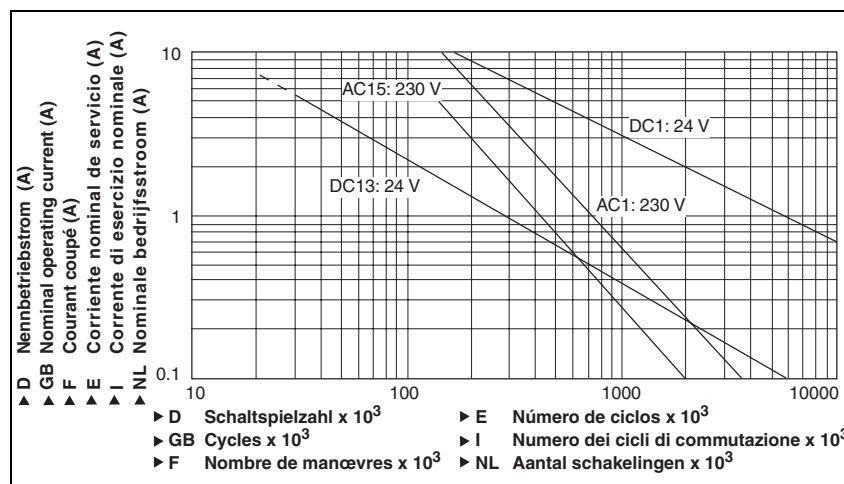


Up to Category 4, EN 954-1 PNOZ 16S

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	24 V, 42 V, 48 V, 110 V, 115 V, 120 V, 230 V, 240 V
Supply voltage U _B AC	24 V
Supply voltage U _B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U _B AC	3.5 VA
Power consumption at U _B DC	2.0 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	20 %
Voltage and current at	
input circuit DC: 24.0 V	25.0 mA
reset circuit DC: 24.0 V	25.0 mA
feedback loop DC: 24.0 V	25.0 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 2
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I _{min} : 0.01 A, I _{max} : 8.00 A P _{max} : 2,000 VA
Safety contacts: DC1 at 24 V	I _{min} : 0.01 A, I _{max} : 8.0 A P _{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I _{max} : 5.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 6.0 A
Contact material	AgSnO ₂ + 0.2 µm Au
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	10 A
Safety contacts:	
Blow-out fuse, slow	6 A
Safety contacts:	
Circuit breaker 24 VAC/DC, characteristic B/C	6 A
Safety contacts:	
Semiconductor outputs (short circuit proof)	24.0 V DC, 20 mA
External supply voltage	24.0 V DC
Voltage tolerance	-15% / +10%
Safety mat resistance + overall cable resistance	80 Ohm

Up to Category 4, EN 954-1 PNOZ 16S

Electrical data

Max. overall cable resistance R_{lmax} input circuits, reset circuits	
single-channel at U_B DC	40 Ohm
single-channel at U_B AC	40 Ohm
dual-channel with detect. of shorts across contacts at U_B DC	80 Ohm
dual-channel with detect. of shorts across contacts at U_B AC	80 Ohm

Times

Switch-on delay	
with automatic reset typ.	230 ms
with automatic reset max.	350 ms
with automatic reset after power on typ.	310 ms
with automatic reset after power on max.	450 ms
with manual reset typ.	230 ms
with manual reset max.	350 ms
Delay-on de-energisation	
with E-STOP typ.	18 ms
with E-STOP max.	30 ms
with power failure typ.	50 ms
with power failure max.	80 ms
Recovery time at max. switching frequency 1/s after E-STOP	50 ms
after power failure	100 ms
Recovery time after short across contacts	
at U_B DC - Tol.	650 ms
at U_B DC nom.	400 ms
at U_B DC + Tol.	320 ms
at U_B AC - Tol.	400 ms
at U_B AC nom.	300 ms
at U_B AC + Tol.	280 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms

Environmental data

EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20

Mechanical data

Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm

Up to Category 4, EN 954-1 PNOZ 16S

Mechanical data

Dimensions	
Height	87.0 mm
Width	45.0 mm
Depth	121.0 mm
Weight	350 g

The standards current on **02/03** apply.

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC	$I_{\max}$ (A) at U_B AC
1	8 A	8 A
2	6 A	6 A

Order reference

Type	Features		Terminals	Order no.
PNOZ 16S	24 VAC/DC		Screw terminals	774 070
PNOZ 16S	42 VAC	24 VDC	Screw terminals	774 071
PNOZ 16S	48 VAC	24 VDC	Screw terminals	774 072
PNOZ 16S	110 VAC	24 VDC	Screw terminals	774 073
PNOZ 16S	115 VAC	24 VDC	Screw terminals	774 074
PNOZ 16S	120 VAC	24 VDC	Screw terminals	774 075
PNOZ 16S	230 VAC	24 VDC	Screw terminals	774 076
PNOZ 16S	240 VAC	24 VDC	Screw terminals	774 077

Up to Category 4, EN 954-1
PNOZ Ex



Safety relay for monitoring E-STOP pushbuttons and safety gates in potentially explosive atmospheres

Approvals

	PNOZ Ex
	É
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Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 instantaneous auxiliary contact (N/O) in the intrinsically safe area
 - 1 instantaneous auxiliary contact (N/O) for fusing in the intrinsically safe area
 - 1 instantaneous auxiliary contact (N/C) in the non-intrinsically safe area
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } Ex area II (1)GD [EEx ia] IIB/IIC
- } See order reference for unit types

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

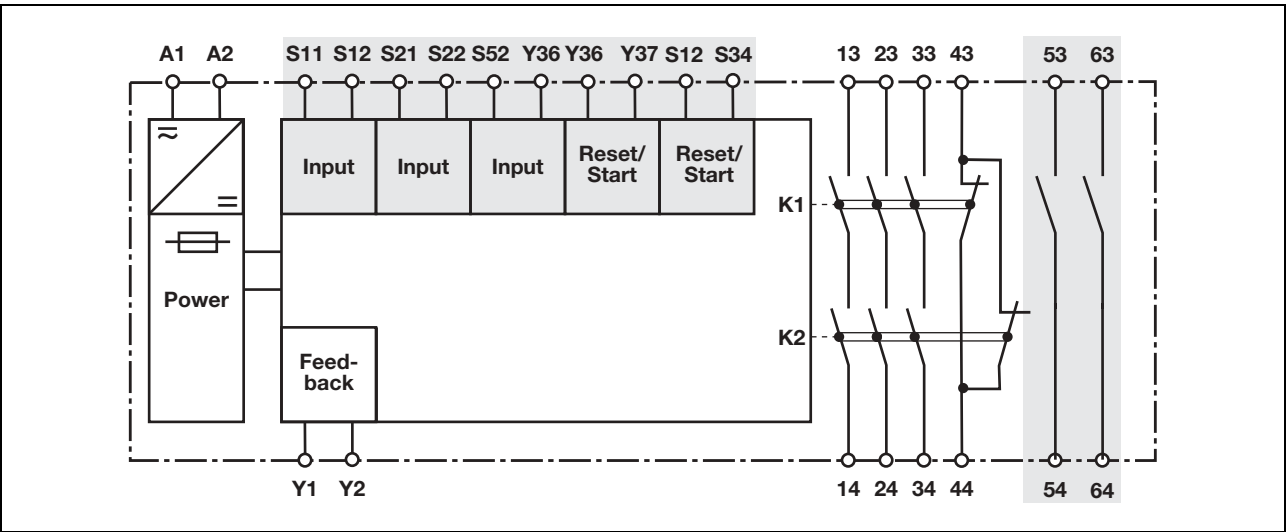
The safety relay provides an intrinsically safe output circuit and volt-free contacts for potentially explosive are-

as (standards used: EN 50014 +A1-A2 and EN 50020).
The unit is suitable for non-contact barriers (e.g. light curtains) because a dynamic start is possible.

Safety features

- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Block diagram



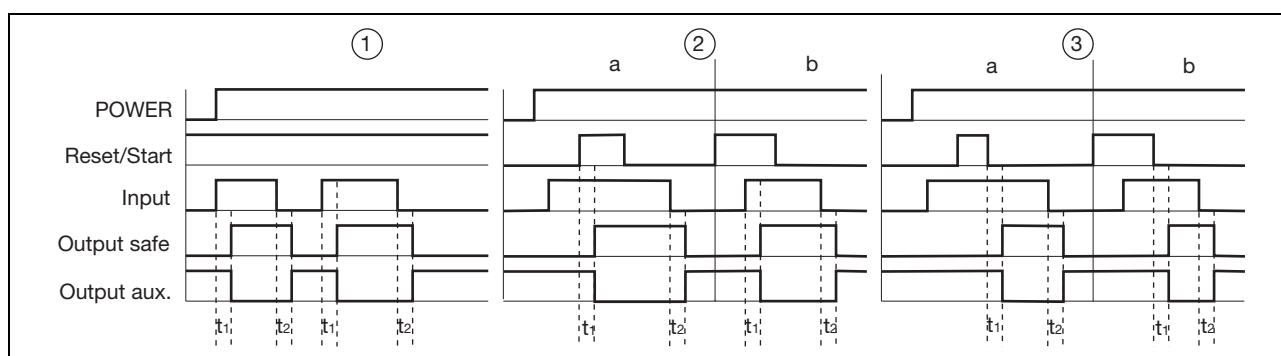
Grey area = intrinsically safe area

Up to Category 4, EN 954-1 PNOZ Ex

Function description

- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
- shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Monitored reset: Unit is active once
 - the input circuit is closed and then the reset circuit is closed
- and opened again.
- the reset circuit is closed and then opened again once the input circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S12-S34, Y36-Y37, Y1-Y2
- } Input: Input circuits S11-S12, S21-S21, S52, Y36
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42, 53-54, 63-64
- } $\downarrow$: Automatic reset
- } C : Manual reset
- } E : Monitored reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, outputs 41-42, 53-54, 63-64 are auxiliary contacts (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cabling runs $I_{\max}$ in the input circuit:

$$I_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

$R_{l\max}$ = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ Ex

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP with detection of shorts across con- tacts		
Safety gate with detection of shorts across con- tacts		

} Reset circuit

Reset circuit	Reset from the non-intrinsically safe area	Reset from the intrinsically safe area
Automatic reset		
Manual reset		
Monitored reset		

Up to Category 4, EN 954-1
PNOZ Ex

} Feedback loop

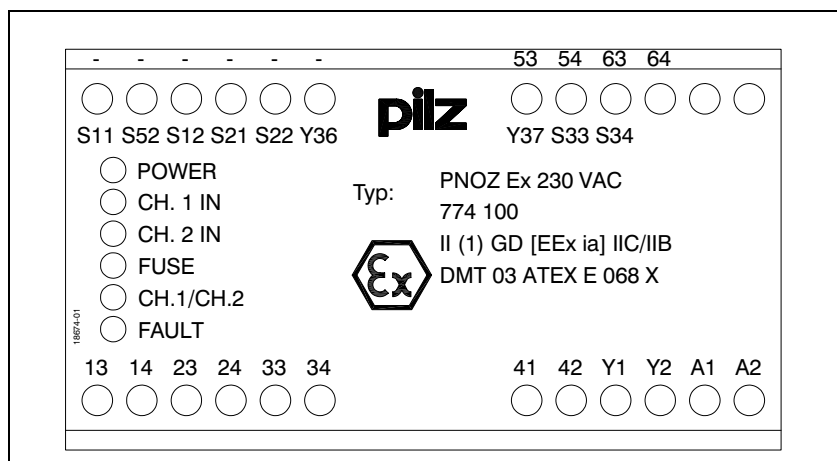
Feedback loop	Reset from the non-intrinsically safe area	Reset from the intrinsically safe area
Contacts from external contactors (manual reset)		
Contacts from external contactors (monitored reset)		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ Ex

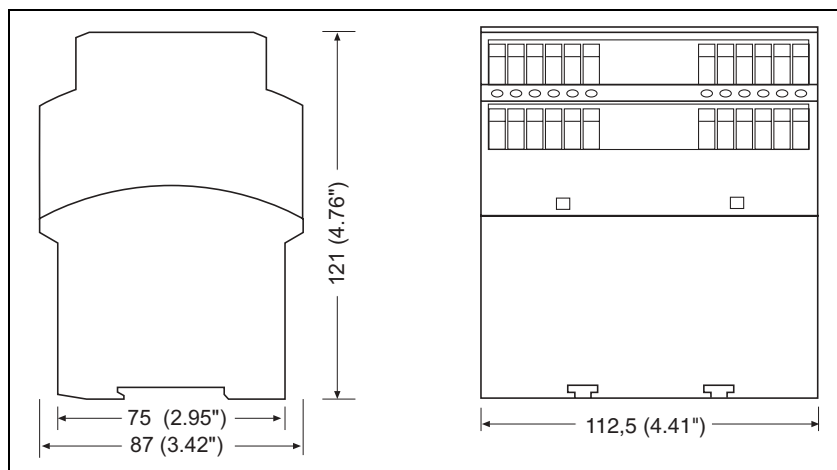
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).
- } Always install the unit outside the potentially explosive area. Only the intrinsically safe output circuit (terminals S11, S12, S21, S22, S34, S52, Y36, Y37 and GND) and the volt-free contacts (terminals 53, 54 and 63, 64) may be brought into the potentially explosive area.
- } Air gaps between uninsulated parts of intrinsically safe circuits and earthed metal parts must be a minimum of 3 mm; air gaps between uninsulated parts of intrinsically safe circuits and uninsulated parts of non-intrinsically safe circuits must at least conform with the values required in Table 4, Amendment 4 of EN 50020

Dimensions

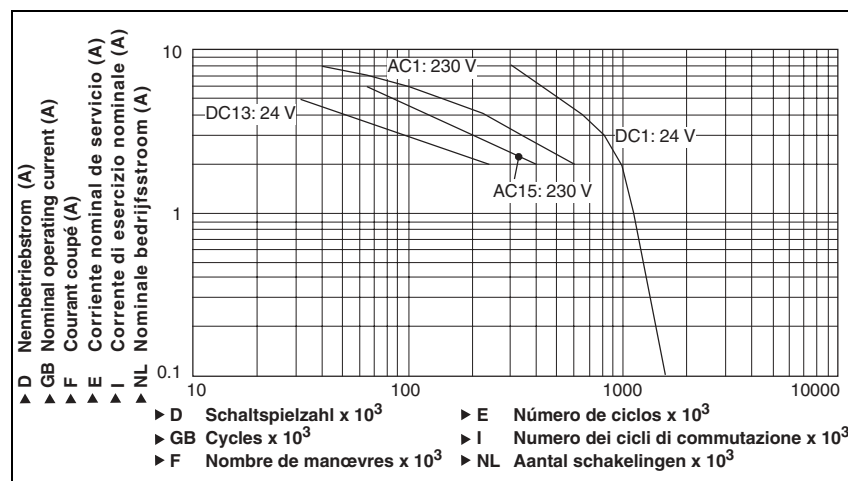


Up to Category 4, EN 954-1 PNOZ Ex

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U _B AC	115 V, 120 V, 230 V
Voltage tolerance	-15 %/+10 %
Power consumption at U _B AC	8.0 VA
Frequency range AC	50 - 60 Hz
Voltage and current at input circuit DC: 6.0 V	25.0 mA
reset circuit DC: 6.0 V	15.0 mA
feedback loop DC: 24.0 V	20.0 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 3 Auxiliary contacts, intrinsically safe (N/O): 2 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 4.00 A P _{max} : 1000 VA
Safety contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 2.0 A P _{max} : 48 W
Auxiliary contacts (intrinsically safe): DC1 at 30 V	I _{min} : 0.01 A , I _{max} : 0.5 A P _{max} : 10 W
Auxiliary contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 4.0 A P _{max} : 1000 VA
Auxiliary contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 2.0 A P _{max} : 48 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I _{max} : 4.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 2.0 A
Auxiliary contacts: AC15 at 230 V	I _{max} : 4.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 2.0 A
Contact material	AgSnO2 + 0.2 µm Au

Up to Category 4, EN 954-1 PNOZ Ex

Electrical data	
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	4 A
Auxiliary contacts:	4 A
Blow-out fuse, slow	
Safety contacts:	4 A
Auxiliary contacts:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	4 A
Auxiliary contacts:	4 A
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
single-channel at U_B AC	40 Ohm
dual-channel without detect. of shorts across contacts at U_B AC	80 Ohm
dual-channel with detect. of shorts across contacts at U_B AC	15 Ohm
Max. line capacitance	
EX IIB	2 σ F
EX IIC	1 σ F
Max. line inductance	
EX IIB	200 σ H
EX IIC	100 σ H
Times	
Switch-on delay	
with automatic reset typ.	150 ms
with automatic reset max.	200 ms
with automatic reset after power on typ.	165 ms
with automatic reset after power on max.	210 ms
with manual reset typ.	145 ms
with manual reset max.	200 ms
with monitored reset typ.	115 ms
with monitored reset max.	150 ms
Delay-on de-energisation	
with E-STOP typ.	10 ms
with E-STOP max.	30 ms
with power failure typ.	110 ms
with power failure max.	150 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms
after power failure	200 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	150 ms
Supply interruption before de-energisation	35 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-20 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20

Up to Category 4, EN 954-1 PNOZ Ex

Mechanical data

Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm
Dimensions	
Height	87.0 mm
Width	112.5 mm
Depth	121.0 mm
Weight	720 g

The standards current on **05/04** apply.

Order reference

Type	Features	Terminals	Order no.
PNOZ Ex	230 VAC	Screw terminals	774 100
PNOZ Ex	115 VAC	Screw terminals	774 104
PNOZ Ex	120 VAC	Screw terminals	774 105

Up to Category 4, EN 954-1 PNOZ XV2



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ XV2
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Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
 - 2 safety contacts (N/O), delay-on de-energisation
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
- } Delay-on de-energisation, fixed or selectable
- } Delay time can be cancelled via reset button
- } See order reference for unit types

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

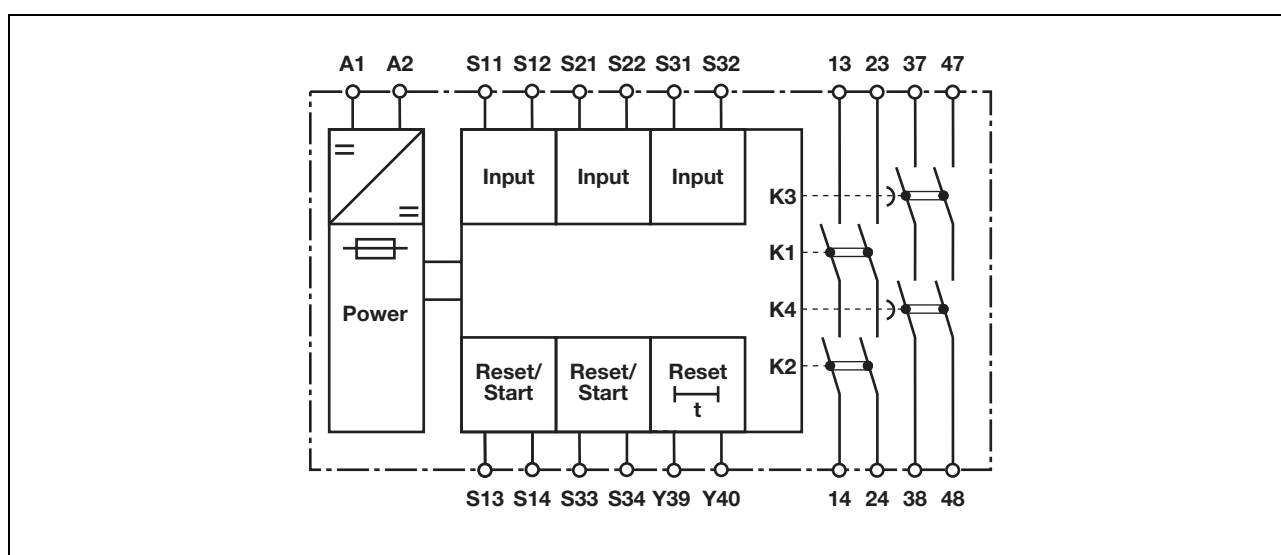
The max. category the safety contacts can achieve in accordance with EN 954-1 is stated in the technical details.

Safety features

The relay conforms to the following safety criteria:

- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Block diagram

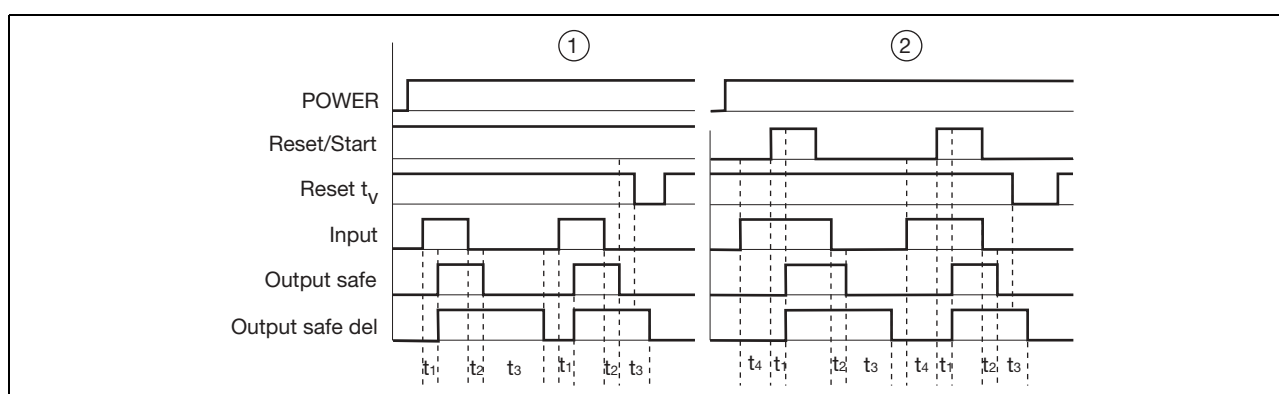


Up to Category 4, EN 954-1 PNOZ XV2

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S13-S14, S33-S34
- } Reset t_v : Y39-Y40
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts, instantaneous 13-14, 23-24
- } Output safe del: Safety contacts, delayed 37-38, 47-48
- } i : Automatic reset
- } C : Monitored reset
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Delay time
- } t_4 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24 are instantaneous safety contacts, outputs 37-38, 47-48 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs $l_{\max}$ in the input circuit:

$$l_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

$R_{l\max}$ = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

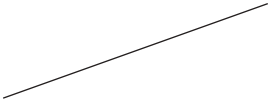
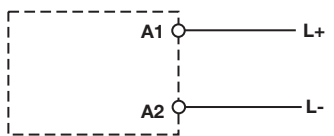
- } Use copper wire that can withstand 60/75 °C.

- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

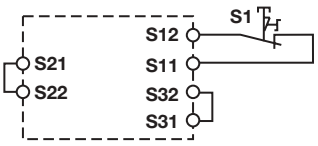
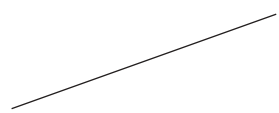
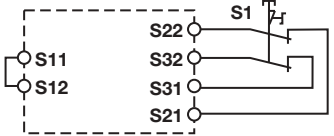
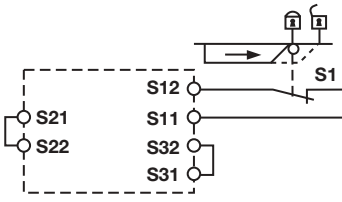
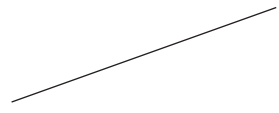
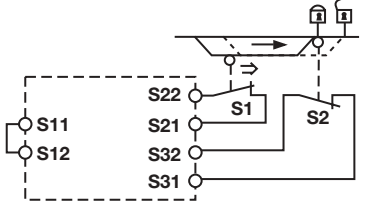
Up to Category 4, EN 954-1 PNOZ XV2

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ XV2

} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Monitored reset		

} Reset

Reset	Link	N/C contact for resetting the delay time
Link or N/C contact		

} Feedback loop

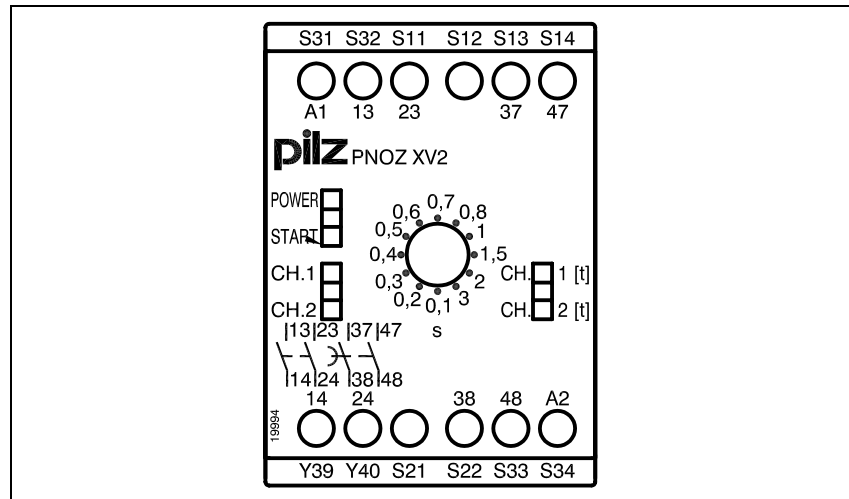
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ XV2

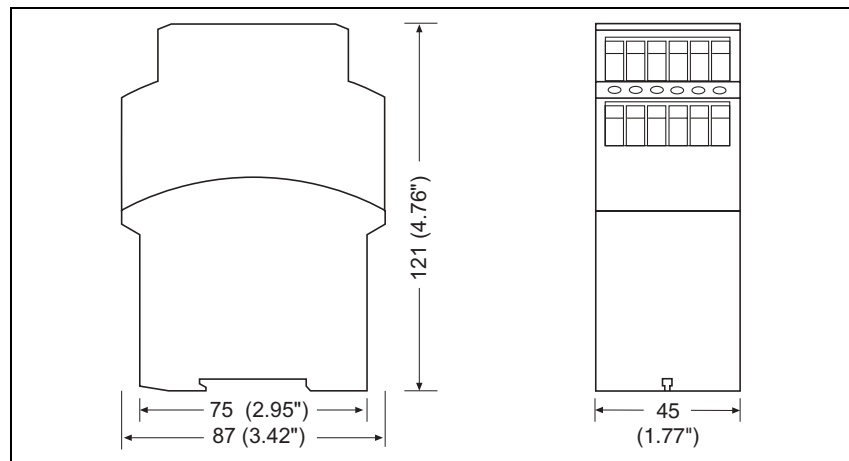
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

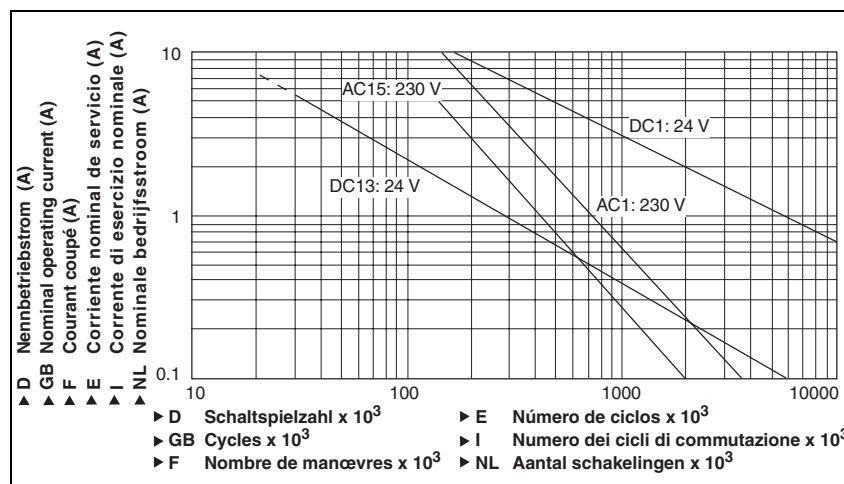


Up to Category 4, EN 954-1 PNOZ XV2

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15% / +10%
Power consumption	4.5 W
Residual ripple DC	160 %
Voltage and current at input circuit: 24.0 V DC	35.0 mA
reset circuit: 24.0 V DC	40.0 mA
feedback loop: 24.0 V DC	5.0 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 2 ST
Output contacts in accordance with EN 954-1	Safety contacts (N/O), delayed: 2 ST
Category 1 Order no. 774500, 774508	When delay time >30 s
Category 3	When delay time <30 s
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 2,000 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 8.0 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	I_{max} : 5.0 A
DC13 (6 cycles/min): 24 V	I_{max} : 7.0 A
Contact material	AgSnO₂ + 0.2 σm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A , 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel	100 Ohm
Dual-channel with detection of shorts across contacts	10 Ohm

Up to Category 4, EN 954-1 PNOZ XV2

Times	
Switch-on delay	
with automatic reset typ.	350 ms
with automatic reset max.	650 ms
with automatic reset after power on typ.	385 ms
with automatic reset after power on max.	700 ms
with monitored reset typ.	45 ms
with monitored reset max.	70 ms
Delay-on de-energisation	
with E-STOP typ.	15 ms
with E-STOP max.	30 ms
with power failure typ.	85 ms
with power failure max.	200 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms + t _v
after power failure	250 ms
Delay time t _v	
selectable	0.10 s, 0.20 s, 0.30 s, 0.40 s, 0.50 s, 0.60 s, 0.70 s, 0.80 s, 1.00 s, 1.50 s, 2.00 s, 3.00 s Order no.: 774502
	0.00 s, 0.50 s, 1.00 s, 2.00 s, 4.00 s, 6.00 s, 8.00 s, 10.00 s, 15.00 s, 20.00 s, 25.00 s, 30.00 s Order no.: 774500
	0.00 s, 5.00 s, 10.00 s, 20.00 s, 40.00 s, 60.00 s, 80.00 s, 100.00 s, 150.00 s, 200.00 s, 250.00 s, 300.00 s Order no.: 774508
fixed	0.5 s Order no.: 774504, 3.0 s Order no.: 774505, 10 s Order no.: 774506
Repetition accuracy	2 %
Time accuracy	-15% / +15% +50 ms
Waiting period with a monitored reset	300 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	87 mm x 45 mm x 121 mm
Weight	350 g Order no.: 774502, 774500, 774508
	340 g Order no.: 774504, 774505, 774506

The standards current on 11/03 apply.

Up to Category 4, EN 954-1 PNOZ XV2

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC
1	8.00 A
2	6.80 A
3	5.50 A
4	4.80 A

Order reference

Type	Features	Terminals	Order no.	
PNOZ XV2	24 VDC	0.5 s fixed	Screw terminals	774 504
PNOZ XV2	24 VDC	3.0 s fixed	Screw terminals	774 505
PNOZ XV2	24 VDC	10.0 s fixed	Screw terminals	774 506
PNOZ XV2	24 VDC	3 s selectable	Screw terminals	774 502
PNOZ XV2	24 VDC	30 s selectable	Screw terminals	774 500
PNOZ XV2	24 VDC	300 s selectable	Screw terminals	774 508

Up to Category 4, EN 954-1 PNOZ XV3



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ XV3
	É
	É
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Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 2 safety contacts (N/O), delay-on de-energisation
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } Delay-on de-energisation, fixed or selectable
- } Delay time can be cancelled via reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
 - Reset circuit
- } See order reference for unit types

Safety features

- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
 - } The transformer is short circuit-proof. An electronic fuse is used on a DC supply.

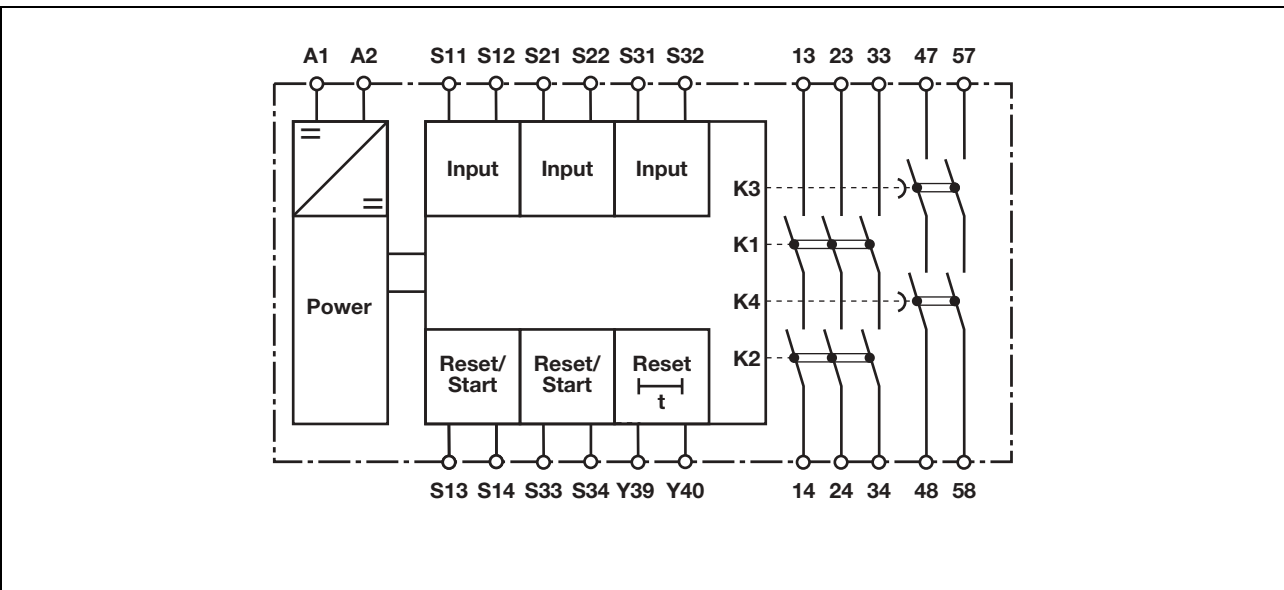
Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

The max. category the safety contacts can achieve in accordance with EN 954-1 is stated in the technical details.

Block diagram

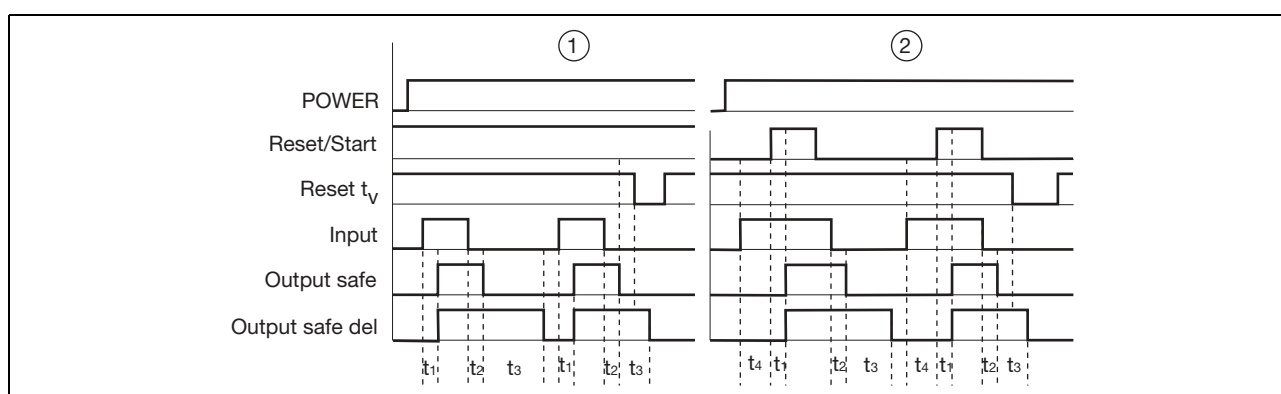


Up to Category 4, EN 954-1 PNOZ XV3

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits in the input circuit and, with a monitored reset, in the reset circuit too,
 - shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Monitored reset: Unit is active once the input circuit is closed and once the reset circuit is closed after the waiting period has elapsed (see technical details).
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S13-S14, S33-S34
- } Reset t_v : Y39-Y40
- } Input: Input circuits S11-S12, S21-S22, S31-S32
- } Output safe: Safety contacts, instantaneous 13-14, 23-24, 33-34
- } Output safe del: Safety contacts, delayed 47-48, 57-58
- } $\bar{i}$: Automatic reset
- } $\bar{c}$: Monitored reset
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation
- } t_3 : Delay time
- } t_4 : Waiting period

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34 are instantaneous safety contacts, outputs 47-48, 57-58 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs l_{max} in the input circuit:

$$l_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.

- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Up to Category 4, EN 954-1 PNOZ XV3

Preparing for operation

} Supply voltage

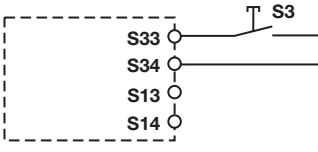
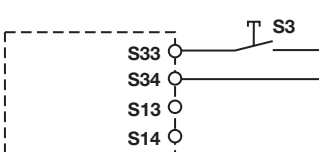
Supply voltage	AC	DC

} Input circuit

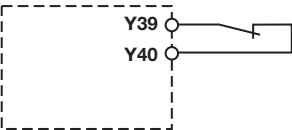
Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1 PNOZ XV3

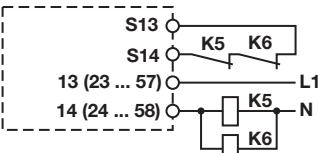
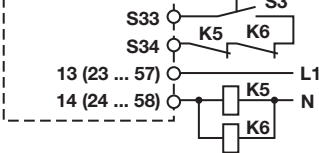
} Reset circuit

Reset circuit	E-STOP wiring (single-channel) Safety gate (single-channel)	E-STOP wiring (dual-channel) Safety gate (dual-channel)
Automatic reset		
Monitored reset		

} Reset

Reset	Link	N/C contact for resetting the delay time
Link or N/C contact		

} Feedback loop

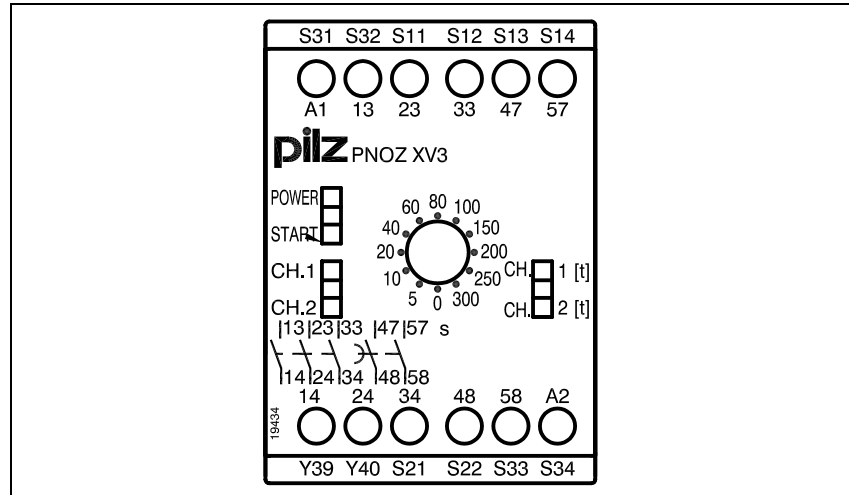
Feedback loop	Automatic reset	Monitored reset
Contacts from external contactors		

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ XV3

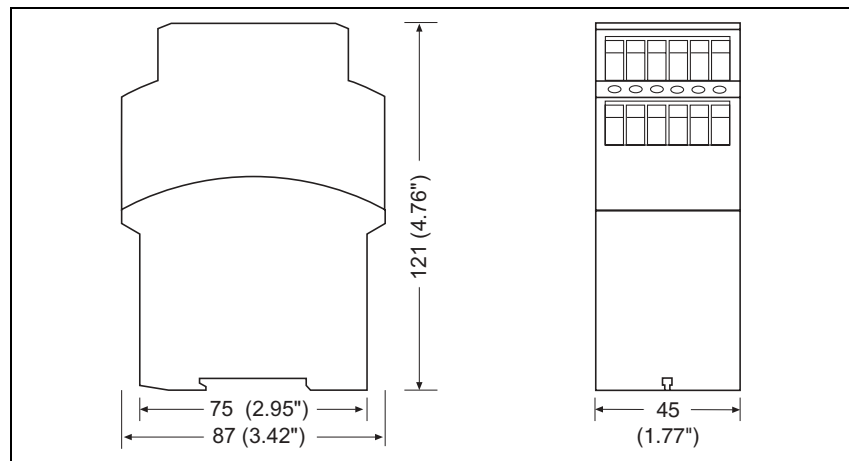
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

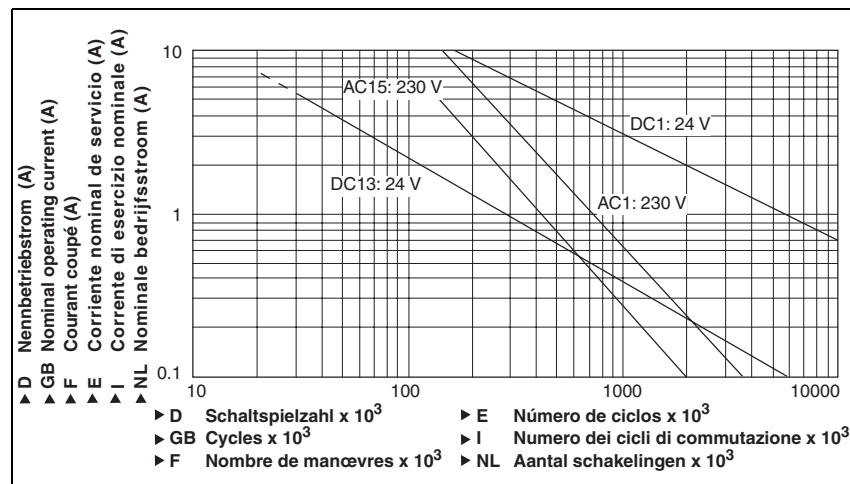


Up to Category 4, EN 954-1 PNOZ XV3

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Breaking capacity of the safety contacts



Technical details

Electrical data

Supply voltage U _B AC	24 V
Supply voltage U _B DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U _B AC	7.0 VA Order no.: 774541
Power consumption at U _B DC	4.5 W Order no.: 774540, 774542, 774544, 774545, 774547, 774548
Frequency range AC	50 – 60 Hz Order no.: 774541
Residual ripple DC	160 % Order no.: 774540, 774542, 774544, 774545, 774547, 774548
Voltage and current at input circuit: 24 V DC	35 mA
reset circuit: 24 V DC	50.0 mA
feedback loop: 24 V DC	5.0 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 3 ST
Output contacts in accordance with EN 954-1	Safety contacts (N/O), delayed: 2 ST
Category 1 Order no. 774540, 774541, 774548	When delay time >30 s
Category 3	When delay time <30 s

Up to Category 4, EN 954-1 PNOZ XV3

Electrical data	
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 8 \text{ A}$ $P_{max}: 2,000 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 8 \text{ A}$ $P_{max}: 200 \text{ W}$
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	$I_{max}: 5 \text{ A}$
DC13 (6 cycles/min): 24 V	$I_{max}: 7 \text{ A}$
Contact material	AgSnO₂ + 0.2 μm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} input circuits, reset circuits	
Single-channel at U_B DC	100 Ohm Order no.: 774540, 774542, 774544, 774545, 774547, 774548
Single-channel at U_B AC	100 Ohm Order no.: 774541
Dual-channel with detect. of shorts across contacts at U_B DC	10 Ohm Order no.: 774540, 774542, 774544, 774545, 774547, 774548
Dual-channel with detect. of shorts across contacts at U_B AC	10 Ohm Order no.: 774541
Times	
Switch-on delay	
with automatic reset typ.	350 ms
with automatic reset max.	650 ms
with automatic reset after power on typ.	385 ms
with automatic reset after power on max.	700 ms
with monitored reset typ.	35 ms
with monitored reset max.	60 ms
Delay-on de-energisation	
with E-STOP typ.	15 ms
with E-STOP max.	30 ms
with power failure typ.	85 ms
with power failure max.	200 ms
Recovery time at max. switching frequency 1/s after E-STOP	50 ms + t_v
after power failure	250 ms
Delay time t_v	
Selectable	0.10 s, 0.20 s, 0.30 s, 0.40 s, 0.50 s, 0.60 s, 0.70 s, 0.80 s, 1.00 s, 1.50 s, 2.00 s, 3.00 s Order no.: 774542 0.00 s, 0.50 s, 1.00 s, 2.00 s, 4.00 s, 6.00 s, 8.00 s, 10.00 s, 15.00 s, 20.00 s, 25.00 s, 30.00 s Order no.: 774540 0.00 s, 5.00 s, 10.00 s, 20.00 s, 40.00 s, 60.00 s, 80.00 s, 100.00 s, 150.00 s, 200.00 s, 250.00 s, 300.00 s Order no.: 774541, 774548
Fixed	0.5 s Order no.: 774544, 3.0 s Order no.: 77454, 10.0 s Order no.: 774547
Repetition accuracy	2 %
Time accuracy	-15% / +15% +50 ms
Waiting period with a monitored reset	300 ms
Min. start pulse duration with a monitored reset	30 ms
Simultaneity, channel 1 and 2	←
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 – 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78

Up to Category 4, EN 954-1 PNOZ XV3

2.3

Environmental data	
Airgap creepage	VDE 0110-1
Ambient temperature	-10 – 55 °C
Storage temperature	-40 – 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL94 VO
Front	ABS UL94 VO
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	87.0 mm x 45.0mm x 121.0 mm
Weight	360 g Order no.: 774544, 774545, 774547
	370 g Order no.: 774540, 774541, 774542, 774548

The standards current on 11/03 apply.

Max. continuous current		
Number of contacts	I _{max} (A) at U _B DC	I _{max} (A) at U _B AC
1	8.0 A Order no.: 774 540, 774 542, 774 544, 774 545, 774 547, 774 548	7.0 A Order no.: 774 541
2	6.8 A Order no.: 774 540, 774 542, 774 544, 774 545, 774 547, 774 548	5.0 A Order no.: 774 541
3	5.5 A Order no.: 774 540, 774 542, 774 544, 774 545, 774 547, 774 548	4.0 A Order no.: 774 541
4	4.8 A Order no.: 774 540, 774 542, 774 544, 774 545, 774 547, 774 548	3.5 A Order no.: 774 541
5	4.3 A Order no.: 774 540, 774 542, 774 544, 774 545, 774 547, 774 548	3.0 A Order no.: 774 541

Order reference					
Type	Features			Terminals	Order no.
PNOZ XV3		24 VDC	0.5 s fixed	Screw terminals	774 544
PNOZ XV3		24 VDC	3 s fixed	Screw terminals	774 545
PNOZ XV3		24 VDC	10 s fixed	Screw terminals	774 547
PNOZ XV3		24 VDC	3 s selectable	Screw terminals	774 542
PNOZ XV3		24 VDC	30 s selectable	Screw terminals	774 540
PNOZ XV3		24 VDC	300 s selectable	Screw terminals	774 548
PNOZ XV3	24 VAC		300 s selectable	Screw terminals	774 541

Please note: Order no. 774 541 is without UL approval.

Up to Category 4, EN 954-1 PNOZ 2VQ



Safety relay for monitoring E-STOP pushbuttons and safety gates.

Approvals

	PNOZ 2VQ
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Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 2 safety contacts (N/O), delay-on de-energisation
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - E-STOP pushbutton
 - Safety gate limit switch
 - Reset button
- } Delay-on de-energisation can be set separately for both safety contacts with delay-on de-energisation
- } Delay time can be cancelled via reset button
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage

The max. category the safety contacts can achieve in accordance with EN 954-1 is stated in the technical details.

Safety features

The relay conforms to the following safety criteria:

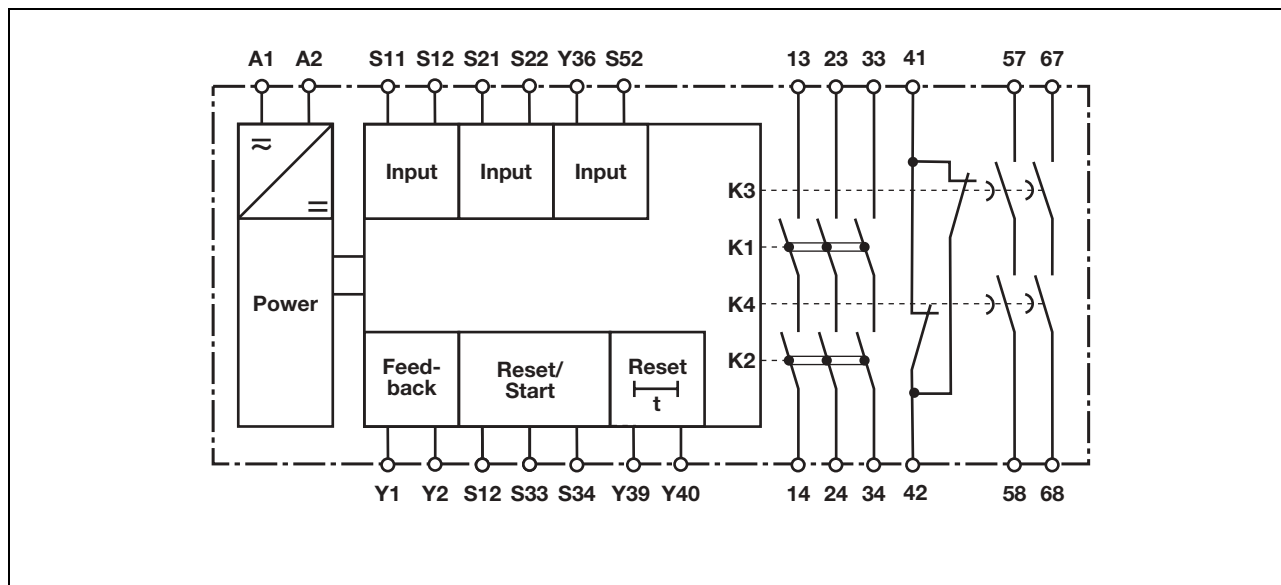
- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- } The unit has an electronic fuse.

Unit description

The safety relay meets the requirements of EN 60204-1 and IEC 60204-1 and may be used in applications with

- } E-STOP pushbuttons
- } Safety gates

Block diagram

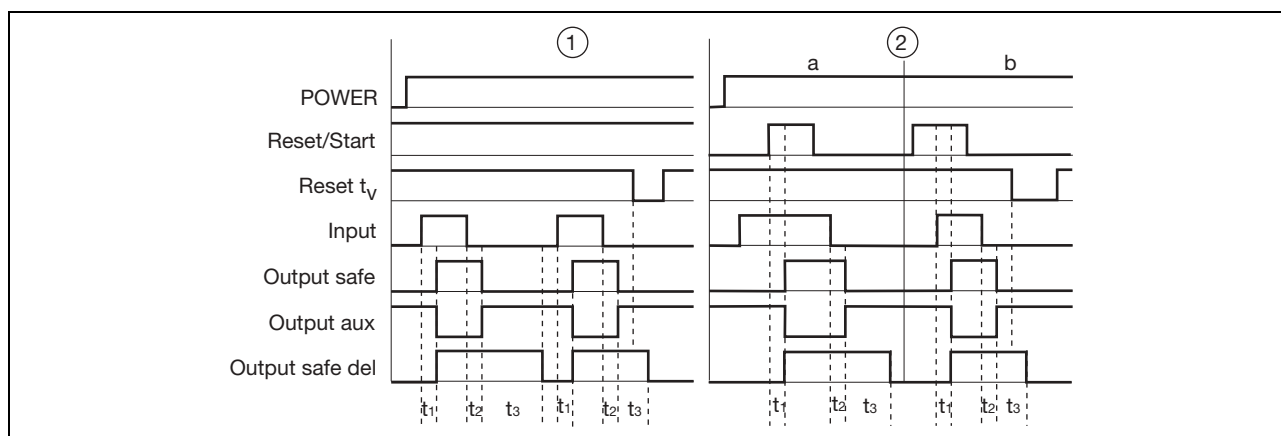


Up to Category 4, EN 954-1 PNOZ 2VQ

Function description

- } Single-channel operation: no redundancy in the input circuit, earth faults in the reset and input circuit are detected.
- } Dual-channel operation without detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
- short circuits in the input circuit and, with a monitored reset, in the reset circuit too.
- } Dual-channel operation with detection of shorts across contacts: redundant input circuit, detects
 - earth faults in the reset and input circuit,
 - short circuits and shorts between contacts in the input circuit.
- } Automatic start: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } Power: Supply voltage
- } Reset/start: Reset circuit S12, S33, S34
- } Reset t_v : Y39-Y40
- } Input: Input circuits S11-S12, S21-S22, Y36-S52
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } Output safe del: Safety contacts, delayed 57-58, 67-68
- } Output aux: Auxiliary contacts 41-42
- } i : Automatic reset
- } c : Manual reset
- } a: Input circuit closes before reset circuit
- } b: Reset circuit closes before input circuit
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation inst. contacts
- } t_3 : Delay time

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are instantaneous safety contacts, outputs 57-58, 67-68 are delay-on de-energisation safety contacts, output 41-42 is an instantaneous auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs l_{max} in the input circuit:

$$l_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

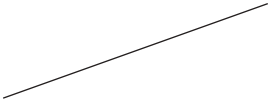
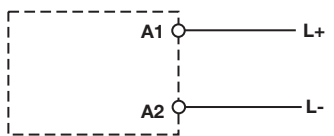
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

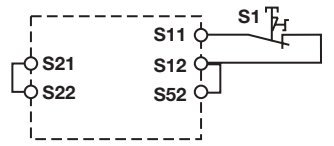
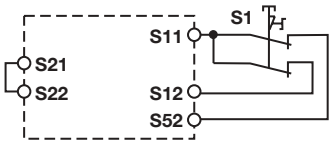
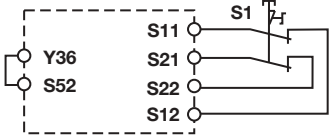
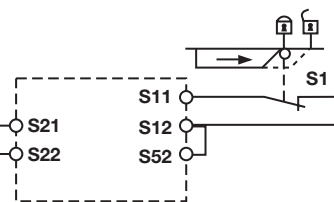
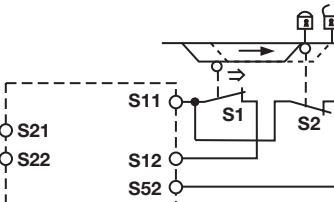
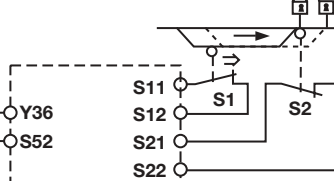
Up to Category 4, EN 954-1 PNOZ 2VQ

Preparing for operation

} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
E-STOP without detection of shorts across contacts		
E-STOP with detection of shorts across contacts		
Safety gate without detection of shorts across contacts		
Safety gate with detection of shorts across contacts		

Up to Category 4, EN 954-1
PNOZ 2VQ

} Reset circuit

Reset circuit	E-STOP/safety gate wiring (single-channel and dual-channel without shorts across contacts)	E-STOP/safety gate wiring (dual-channel with shorts across contacts)
Automatic reset		
Manual reset		

} Feedback loop

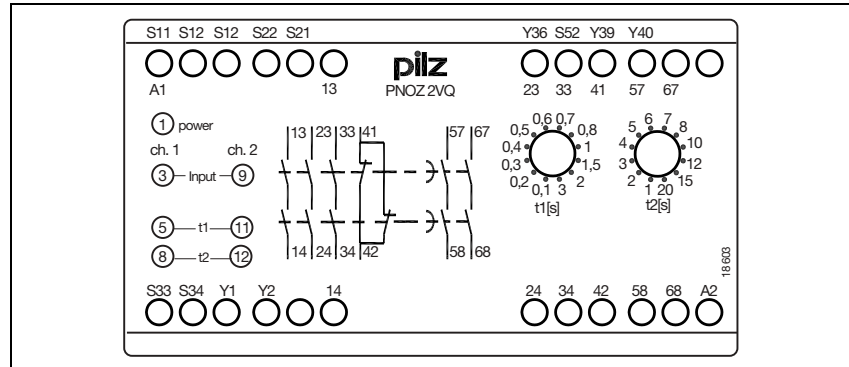
Feedback loop	
Contacts from external contactors	

} Key

S1/S2	E-STOP pushbutton/ safety gate switch
S3	Reset button
	Switch operated
	Gate open
	Gate closed

Up to Category 4, EN 954-1 PNOZ 2VQ

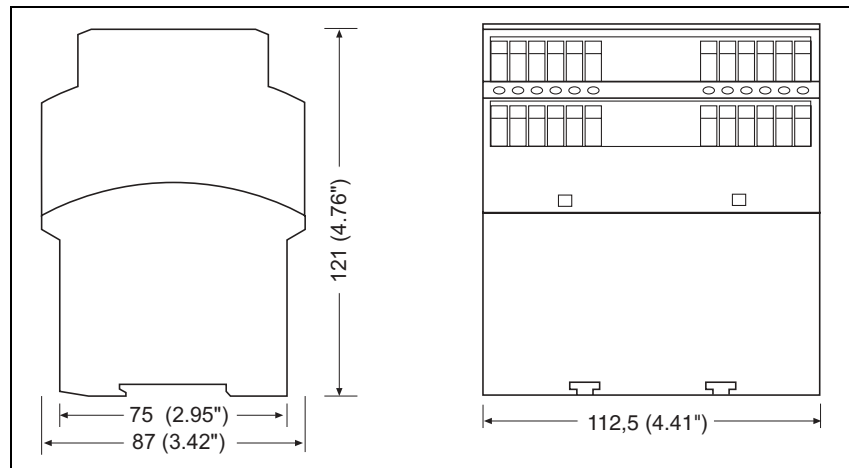
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions



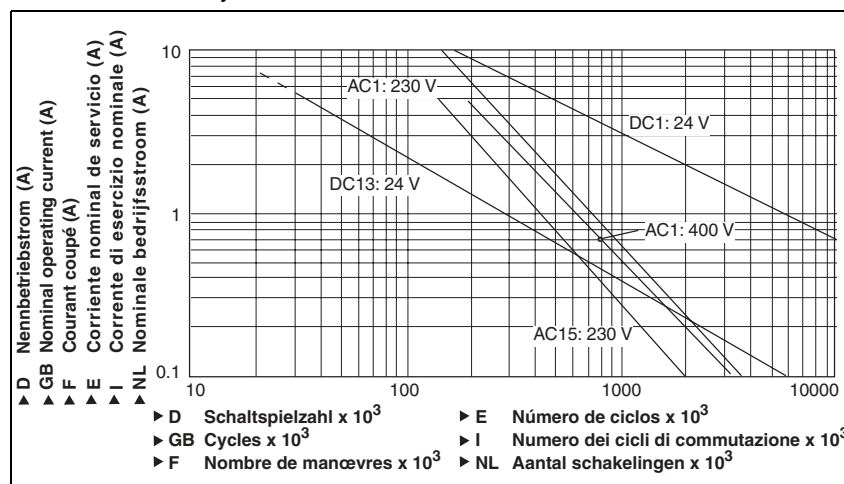
Up to Category 4, EN 954-1 PNOZ 2VQ

Notice

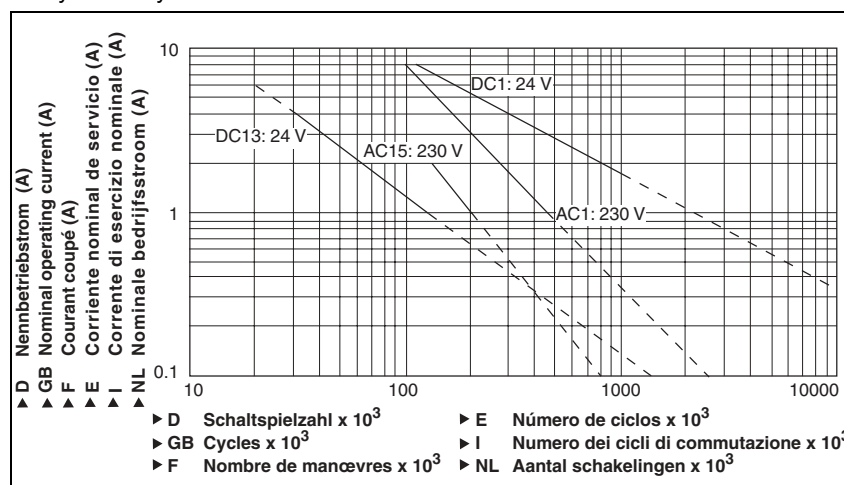
This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph

Instantaneous safety contacts:



Delayed safety contacts:



Technical details

Electrical data

Supply voltage	
Supply voltage U_B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U_B DC	6.5 W
Residual ripple DC	160 %
Voltage and current at input circuit DC: 24.0 V	35.0 mA
reset circuit DC: 24.0 V	100.0 mA
feedback loop DC: 24.0 V	100.0 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 3
Output contacts in accordance with EN 954-1 Category 3	Safety contacts (N/O), delayed: 2
	Delay time <30 s
	Auxiliary contacts (N/C): 1

Up to Category 4, EN 954-1 PNOZ 2VQ

Electrical data

Utilisation category in accordance with **EN 60947-4-1**

Safety contacts: AC1 at 240 V	$I_{min}: 0.01\text{ A}$, $I_{max}: 8.00\text{ A}$ $P_{max}: 2,000\text{ VA}$
Safety contacts: AC1 at 400 V	$I_{min}: 0.01\text{ A}$, $I_{max}: 5.00\text{ A}$ $P_{max}: 2,000\text{ VA}$
Safety contacts: DC1 at 24 V	$I_{min}: 0.01\text{ A}$, $I_{max}: 8.0\text{ A}$ $P_{max}: 200\text{ W}$
Safety contacts, delayed: AC1 at 240 V	$I_{min}: 0.01\text{ A}$, $I_{max}: 4.0\text{ A}$ $P_{max}: 1,000\text{ VA}$
Safety contacts, delayed: DC1 at 24 V	$I_{min}: 0.01\text{ A}$, $I_{max}: 4.0\text{ A}$ $P_{max}: 100\text{ W}$
Auxiliary contacts: AC1 at 240 V	$I_{min}: 0.01\text{ A}$, $I_{max}: 8.0\text{ A}$ $P_{max}: 2,000\text{ VA}$
Auxiliary contacts: DC1 at 24 V	$I_{min}: 0.01\text{ A}$, $I_{max}: 8.0\text{ A}$ $P_{max}: 200\text{ W}$

Utilisation category in accordance with **EN 60947-5-1**

Safety contacts: AC15 at 230 V	$I_{max}: 5.0\text{ A}$
Safety contacts: DC13 at 24 V (6 cycles/min)	$I_{max}: 7.0\text{ A}$
Safety contacts, delayed: AC15 at 230 V	$I_{max}: 4.0\text{ A}$
Safety contacts, delayed: DC13 at 24 V (6 cycles/min)	$I_{max}: 4.0\text{ A}$
Auxiliary contacts: AC15 at 230 V	$I_{max}: 5.0\text{ A}$
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	$I_{max}: 7.0\text{ A}$

Contact material **AgSnO2 + 0.2 µm Au**

External contact fuse protection to **EN 60947-5-1**

Blow-out fuse, quick	
Safety contacts:	10 A
Safety contacts, delayed:	6 A
Auxiliary contacts:	10 A
Blow-out fuse, slow	
Safety contacts:	6 A
Safety contacts, delayed:	4 A
Auxiliary contacts:	6 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	6 A
Safety contacts, delayed:	4 A
Auxiliary contacts:	6 A

Max. overall cable resistance R_{lmax}

input circuits, reset circuits	
single-channel at U_B DC	60 Ohm
dual-channel without detect. of shorts across contacts at U_B DC	120 Ohm
dual-channel with detect. of shorts across contacts at U_B DC	5 Ohm

Times

Switch-on delay	
with automatic reset typ.	200 ms
with automatic reset max.	300 ms
with automatic reset after power on typ.	200 ms
with automatic reset after power on max.	300 ms
with manual reset typ.	200 ms
with manual reset max.	300 ms
Delay-on de-energisation	
with E-STOP typ.	15 ms
with E-STOP max.	30 ms
with power failure typ.	30 ms
with power failure max.	40 ms
Recovery time at max. switching frequency 1/s	
after E-STOP	50 ms +tv
after power failure	100 ms

Up to Category 4, EN 954-1 PNOZ 2VQ

2.3

Times	
Delay time t_{V} : selectable	0.10 s; 0.20 s; 0.30 s; 0.40 s; 0.50 s; 0.60 s; 0.70 s; 0.80 s; 1.00 s; 1.50 s; 2.00 s; 3.00 s Order no.: 774013
Delay time $t_{\text{V}2}$: selectable	1.00 s, 2.00 s, 3.00 s, 4.00 s, 5.00 s, 6.00 s, 7.00 s, 8.00 s, 10.00 s, 12.00 s, 15.00 s, 20.00 s
Repetition accuracy	2 %
Time accuracy	-15 %/+15 % +50 ms
Simultaneity, channel 1 and 2	150 ms
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm
Dimensions	
Height	87.0 mm
Width	112.5 mm
Depth	121.0 mm
Weight	600 g

The standards current on 06/02 apply.

Max. continuous current	
Number of contacts	I_{max} (A) at U_{B} DC
1	8.00 A
2	6.80 A
3	5.50 A
4	5.00 A
5	4.50 A

Order reference			
Type	Features	Terminals	Order no.
PNOZ 2VQ	24 VDC	Screw terminals	774 013

Requirement class IIIA, EN 574 P1HZ X1



Two-hand control device for safety circuits

Approvals

	P1HZ X1
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- } Connection options for:
 - 2 operator elements (buttons)
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage

Unit description

The two-hand control relay meets the requirements of EN 574 Type IIIA. It forces the operator to keep his hands outside the danger zone area during the hazardous movement. It is designed for use in two-hand circuits.

Caution!

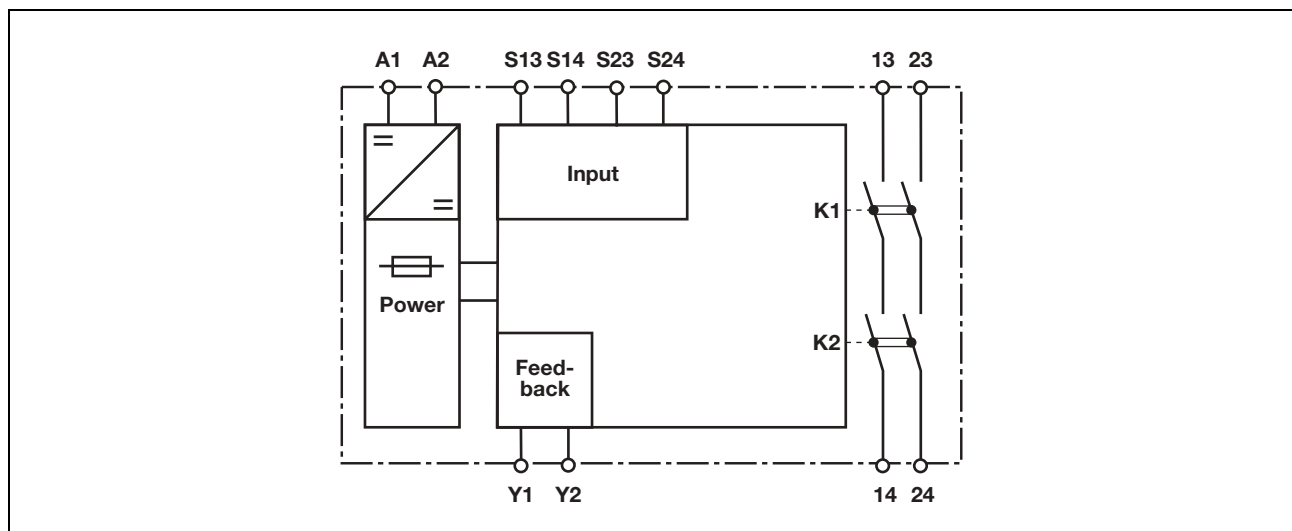
The two-hand control relay may **not** be used on **press controllers**. It is only suitable for use where the risk analysis has established a low level of risk (e.g. EN 954-1 Cat. B or 1).

Safety features

The two-hand control relay meets the following safety requirements:

- } The two-hand control relay prevents the plant from being enabled in the following cases:
 - Power supply failure
 - Component failure
 - Short circuit on an input circuit
 - Coil defect
 - Open circuit
 - Earth fault
- } In each on-off cycle, the output relays on the safety device are tested to ensure they open and close correctly

Block diagram

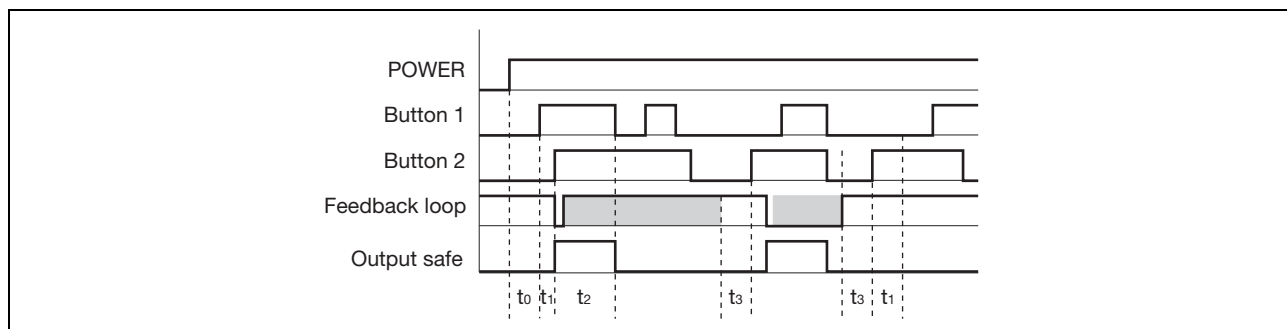


Requirement class IIIA, EN 574 P1HZ X1

Function description

- } The two-hand control relay must be activated by simultaneously pressing two buttons. If one or both of the buttons are released, the unit interrupts the control command for the hazardous movement.
- } Reactivation: The output relays will not re-energise until both operator elements have been released and then re-operated simultaneously.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.

Timing diagram



Key

- } POWER: Supply voltage
- } Button 1/Button 2: Input circuits S13-S14, S23-S24
- } Feedback loop: Feedback loop Y1-Y2
- } Output safe: Safety outputs 13-14, 23-24
- } t₀: Recovery time after power on
- } t₁: Simultaneity, channel 1 and 2
- } t₂: Operating cycle ended through button 1 or 2
- } t₃: Y1-Y2 must be closed before before the button is operated (recovery time)
- } Shaded area: Status irrelevant

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

R_{lmax} = max. overall cable resistance (see technical details)

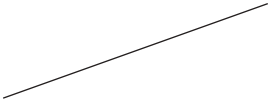
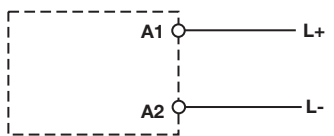
R_l /km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

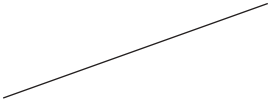
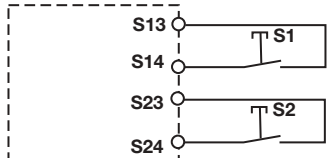
Requirement class IIIA, EN 574 P1HZ X1

Preparing for operation

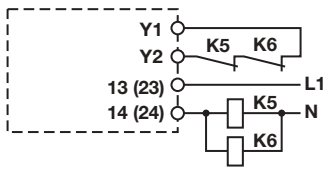
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
Two-hand button with detection of shorts across con- tacts		

} Feedback loop

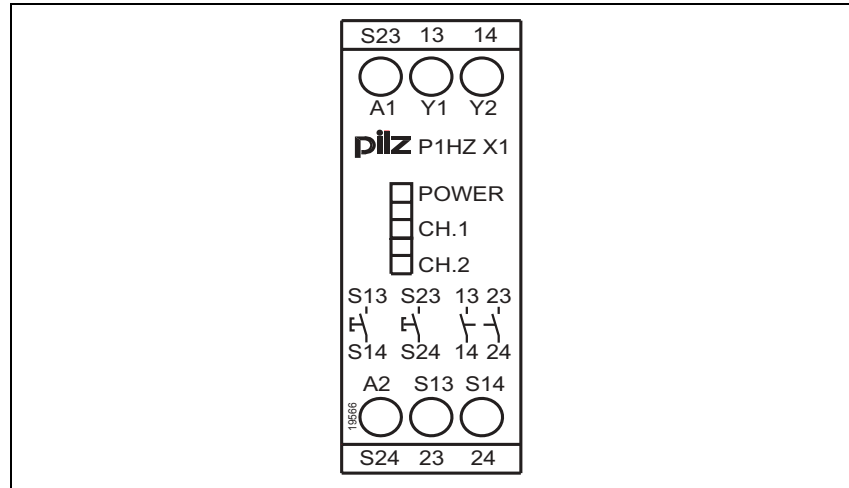
Feedback loop	
Contacts from external contactors	

} Key

S1/S2	Two-hand button

Requirement class IIIA, EN 574 P1HZ X1

Terminal configuration



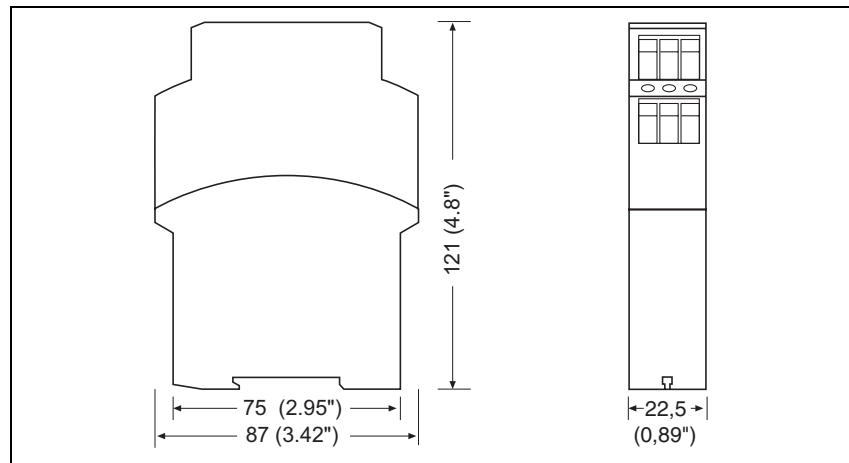
Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Notice

The distance of the button connected to the two-hand relay from the nearest danger zone must be large enough that if one of the buttons is released, the dangerous moment is interrupted before the operator can reach into the danger zone (see EN 999 "The positioning of protective equipment in respect of approach speeds of parts of the human body").

Dimensions

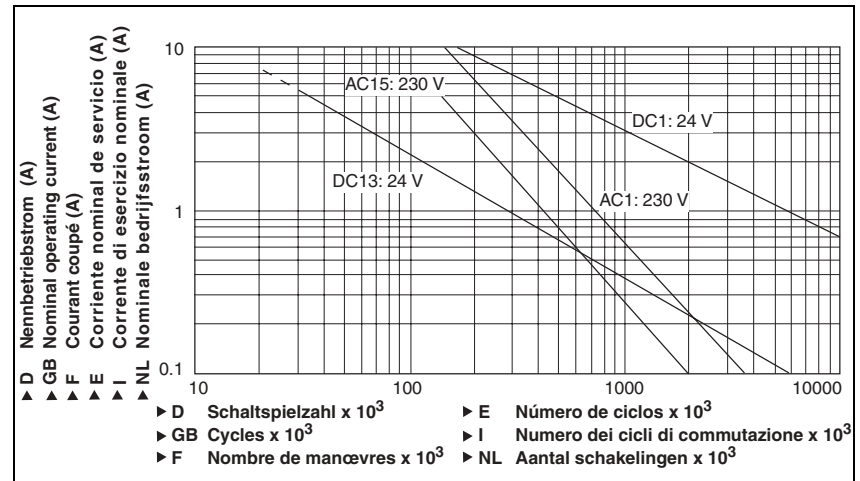


Requirement class IIIA, EN 574 P1HZ X1

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B DC	2.0 W
Residual ripple DC	10 %
Voltage and current at input circuit: 24 VDC	
N/O contact	10 mA
feedback loop: 24 VDC	40.0 mA
Output contacts in accordance with EN 954-1, Category 1	Safety contacts (N/O): 2
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 6.0 \text{ A}$ $P_{max}: 1500 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 6.0 \text{ A}$ $P_{max}: 150 \text{ W}$
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	$I_{max}: 5.0 \text{ A}$
DC13 (6 cycles/min): 24 V	$I_{max}: 2.5 \text{ A}$
Contact material	AgSnO ₂ + 0.2 σ m Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} per input circuit,	14 Ohm

Times

Delay-on de-energisation (reaction time in accordance with EN 574)	
N/O contact	15 ms
Recovery time after two-hand	150 ms
Simultaneity, channel 1 and 2	500 ms

Environmental data

EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78

Requirement class IIIA, EN 574 P1HZ X1

2.3

Environmental data	
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-25 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 – 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 – 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	
with screw terminals	87.0 mm x 22.5 mm x 121.0 mm
Weight	210 g

The standards current on **08/02** apply.

Order reference			
Type	Features	Terminals	Order no.
P1HZ X1	24 VDC	Screw terminals	774 360

Requirement class IIIC, EN 574 P2HZ X1



Two-hand control unit for press controllers and safety circuits

Approvals

	P2HZ X1
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } 2 semiconductor outputs
- } Connection options for:
 - 2 operator elements (buttons)
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } See order reference for unit types

- } Safety circuits in accordance with EN 60204-1

Safety features

The two-hand control relay meets the following safety requirements:

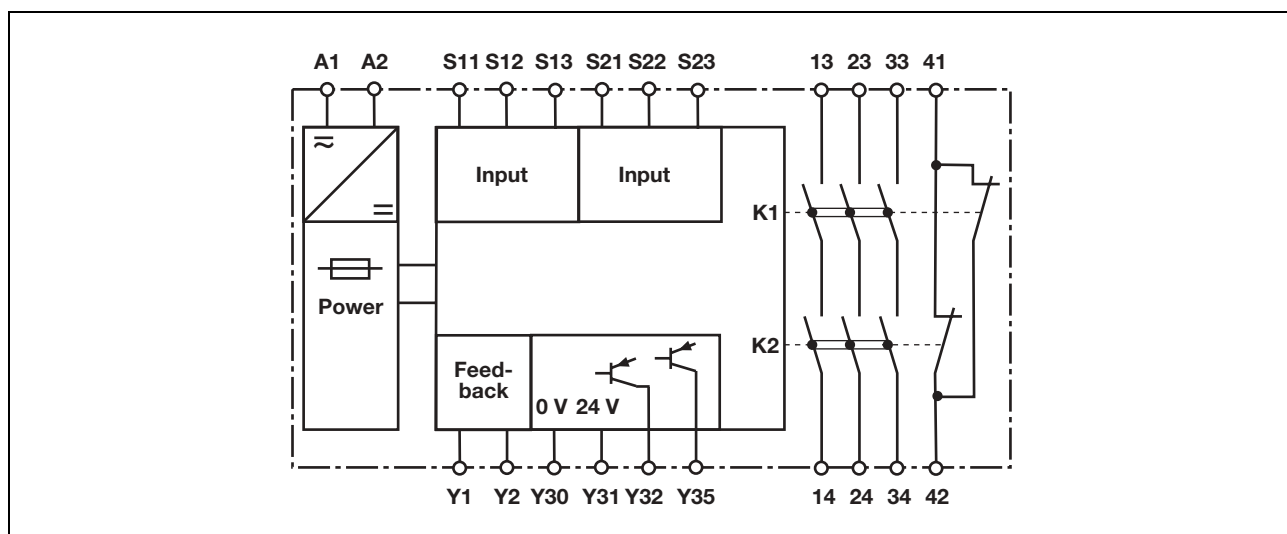
- } The circuit is redundant with built-in self-monitoring
- } The safety function remains effective in the case of a component failure
- } The circuit prevents a further press stroke in the case of:
 - Relay failure
 - Contact welding
 - Coil defect on a relay
 - Open circuit
 - Short circuit

Unit Description

The two-hand control relay meets the requirements of EN 574 Type IIIC. It forces the operator to keep his hands outside the danger zone area during the hazardous movement. The unit is suitable for use on controllers for metalworking presses as a component for simultaneous switching. It can be used in applications with

- } Mechanical presses (EN 692)
- } Hydraulic presses (EN 693)

Block diagram

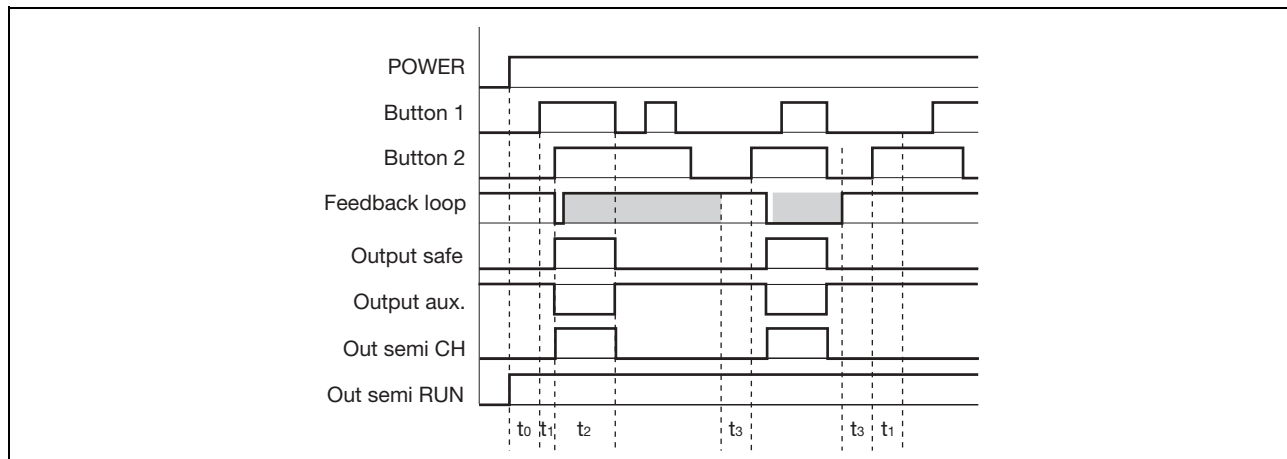


Requirement class IIIC, EN 574 P2HZ X1

Function description

- } The two-hand control relay must be activated by simultaneously pressing two buttons. If one or both of the buttons are released, the unit interrupts the control command for the hazardous movement.
- } Reactivation: The output relays will not re-energise until both operator elements have been released and then re-operated simultaneously.

Timing diagram



Key

- } POWER: Supply voltage
- } Button 1/Button 2: Input circuits S11-S12-S13, S21-S22-S23
- } Feedback loop: Feedback loop Y1-Y2
- } Output safe: Safety outputs 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } Out semi RUN: Semiconductor output for operational readiness Y35
- } Out semi CH: Semiconductor output switch status Y32
- } t_0 : Recovery time after power on
- } t_1 : Simultaneity, channel 1 and 2
- } t_2 : Operating cycle ended through button 1 or 2
- } t_3 : Y1-Y2 must be closed before before the button is operated (recovery time)
- } Shaded area: Status irrelevant

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

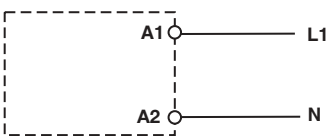
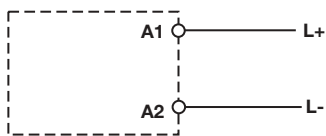
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

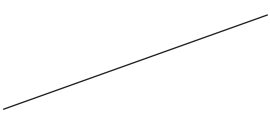
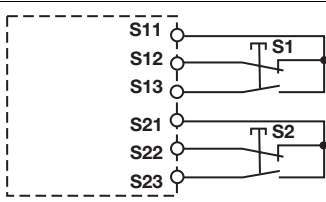
Requirement class IIIC, EN 574
P2HZ X1

Preparing for operation

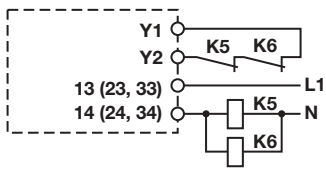
} Supply voltage

Supply voltage	AC	DC
		

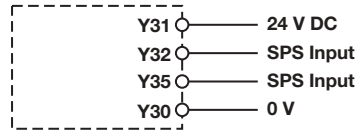
} Input circuit

Input circuit	Single-channel	Dual-channel
Two-hand button with detection of shorts across con- tacts		

} Feedback loop

Feedback loop	
Contacts from external contactors	

} Semiconductor output

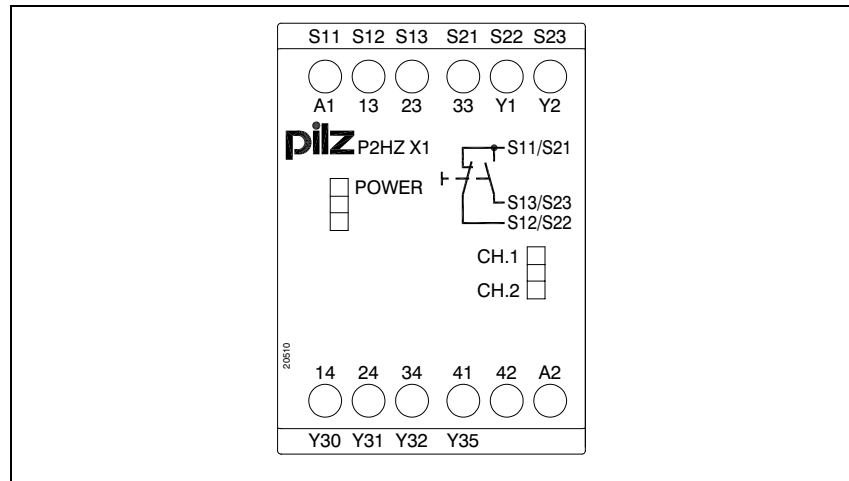


} Key

S1/S2	Two-hand button

Requirement class IIIC, EN 574 P2HZ X1

Terminal configuration



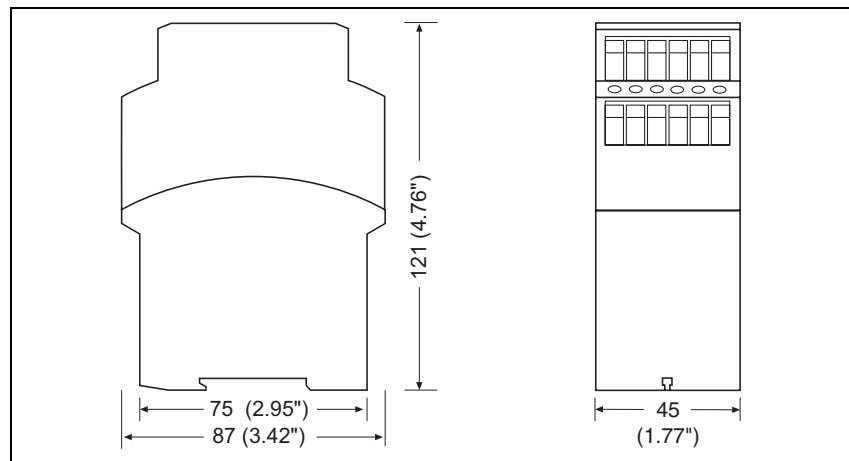
Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Notice

The distance of the button connected to the two-hand relay from the nearest danger zone must be large enough that if one of the buttons is released, the dangerous moment is interrupted before the operator can reach into the danger zone (see EN 999 "The positioning of protective equipment in respect of approach speeds of parts of the human body").

Dimensions

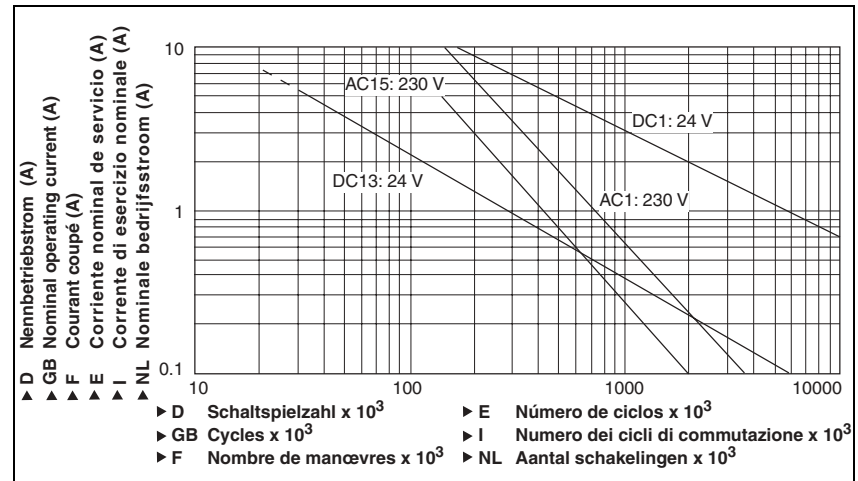


Requirement class IIIC, EN 574 P2HZ X1

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage U_B AC	24 V, 42 V, 48 V, 110 V, 115 V, 120 V, 230 V, 240 V
Supply voltage U_B DC	24 V, 26 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B AC	6.0 VA
Power consumption at U_B DC	2.5 W
Frequency range AC	50 - 60 Hz
Residual ripple DC	10 %

Voltage and current at input circuit: **24 VDC**

N/O contact	30 mA
N/C contact	20 mA
feedback loop: 24 VDC	45 mA

Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1

Utilisation category of safety contacts in accordance with **EN 60947-4-1**

AC1: 240 V	I_{min} : 0.01 A, I_{max} : 5.0 A P_{max} : 1250 VA
DC1: 24 V	I_{min} : 0.01 A, I_{max} : 5.0 A P_{max} : 125 W

Utilisation category of safety contacts in accordance with **EN 60947-5-1**

AC15: 230 V	I_{max} : 2.5 A
DC13 (6 cycles/min): 24 V	I_{max} : 1.5 A

Requirement class IIIC, EN 574

P2HZ X1

Electrical data

Utilisation category of auxiliary contact in accordance with

EN 60947-4-1

AC1: **240 V**

I_{min} : **0.01 A**, I_{max} : **2.0 A**

P_{max} : **500 VA**

DC1: **24 V**

I_{min} : **0.01 A**, I_{max} : **2.0 A**

P_{max} : **50 W**

Utilisation category of auxiliary contact in accordance with

EN 60947-5-1

AC15: **230 V**

I_{max} : **2.0 A**

DC13 (6 cycles/min): **24 V**

I_{max} : **1.5 A**

Contact material

AgSnO₂ + 0.2 σ m Au

External contact fuse protection for safety contacts (**EN 60947-5-1**)

Blow-out fuse, quick

6 A

Blow-out fuse, slow

4 A

Circuit breaker

4 A, 24 VAC/DC, characteristic B/C

External contact fuse protection for auxiliary contact (**EN 60947-5-1**)

Blow-out fuse, quick

4 A

Blow-out fuse, slow

2 A

Circuit breaker

2 A, 24 VAC/DC, characteristic B/C

Semiconductor outputs (short circuit proof)

24 V DC, **20 mA**

External supply voltage

24 V DC

Voltage tolerance

-15 % / +10 %

Max. overall cable resistance R_{lmax} per input circuit

14 Ohm

Times

Delay-on de-energisation (reaction time in accordance with EN 574)

N/O contact

15 ms

N/C contact

30 ms

Recovery time

250 ms

Simultaneity, channel 1 and 2

Max. **500 ms**

Environmental data

EMC

EN 60947-5-1, EN 61000-6-2

Vibration in accordance with **EN 60068-2-6**

Frequency

10 - 55 Hz

Amplitude

0.35 mm

Climatic suitability

EN 60068-2-78

Airgap creepage

VDE 0110-1

Ambient temperature

-10 - 55 °C

Storage temperature

-25 - 85 °C

Protection type

Mounting (e.g. cabinet)

IP54

Housing

IP40

Terminals

IP20

Mechanical data

Housing material

Housing

PPO UL 94 V0

Front

ABS UL 94 V0

Max. cross section of external conductors with screw terminals

1 core flexible

0.20 - 4.00 mm²

2 core, same cross section, flexible:

with crimp connectors, without insulating sleeve

0.20 - 2.50 mm²

without crimp connectors or with TWIN crimp connectors

0.20 - 2.50 mm²

Torque setting with screw terminals

0.60 Nm

Dimensions (H x W x D)

with screw terminals

87.0 mm x 45.0 mm x 121.0 mm

Weight

380 g Order no.: 774330, 774331, 774332, 774434, 774435,
774436, 774438, 774439

285 g Order no.: 774340, 774341

The standards current on **08/03** apply.

Requirement class IIIC, EN 574 P2HZ X1

Order reference

Type	Features	Terminals	Order no.
P2HZ X1	24 VAC	Screw terminals	774 330
P2HZ X1	42 VAC	Screw terminals	774 331
P2HZ X1	48 VAC	Screw terminals	774 332
P2HZ X1	110 VAC	Screw terminals	774 434
P2HZ X1	115 VAC	Screw terminals	774 435
P2HZ X1	120 VAC	Screw terminals	774 436
P2HZ X1	230 VAC	Screw terminals	774 438
P2HZ X1	240 VAC	Screw terminals	774 439
P2HZ X1	24 VDC	Screw terminals	774 340
P2HZ X1	26 VDC	Screw terminals	774 341

Requirement class IIIC, EN 574 P2HZ X2



Two-hand control unit for press controllers and safety circuits

Approvals

	P2HZ X2
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
- } Connection options for:
 - 2 operator elements (buttons)
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage

Unit description

The two-hand control relay meets the requirements of EN 574 Type IIIC. It forces the operator to keep his hands outside the danger zone area during the hazardous movement. The unit is suitable for use on controllers for metalworking presses as a component for simultaneous switching.

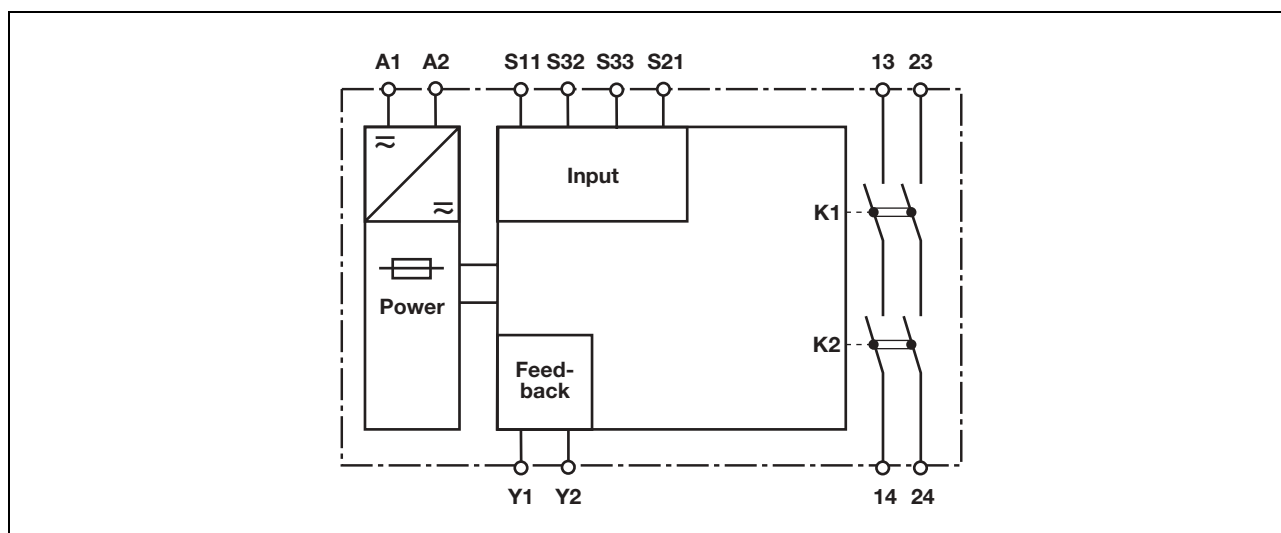
It can be used in applications with

- } Mechanical presses (EN 692)
- } Hydraulic presses (EN 693)
- } Safety circuits in accordance with EN 60204-1

Safety features

- The two-hand control relay meets the following safety requirements:
- } The circuit is redundant with built-in self-monitoring
 - } The safety function remains effective in the case of a component failure
 - } The circuit prevents a further press stroke in the case of:
 - Relay failure
 - Contact welding
 - Coil defect on a relay
 - Open circuit
 - Short circuit

Block diagram

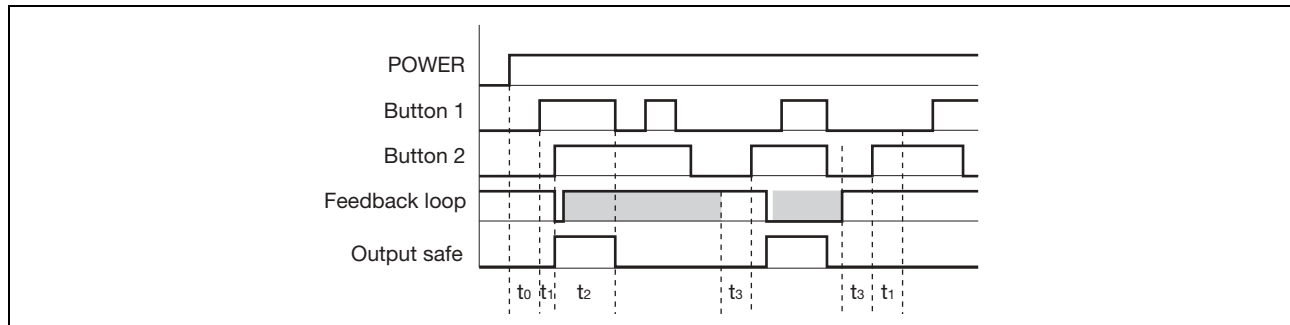


Requirement class IIIC, EN 574 P2HZ X2

Function description

- } The two-hand control relay must be activated by simultaneously pressing two buttons. If one or both of the buttons are released, the unit interrupts the control command for the hazardous movement.
- } Reactivation: The output relays will not re-energise until both operator elements have been released and then re-operated simultaneously.

Timing diagram



Key

- } POWER: Supply voltage
- } Button 1/Button 2: Input circuits S11, S21, S32, S33
- } Feedback loop: Feedback loop Y1-Y2
- } Output safe: Safety outputs 13-14, 23-24
- } t_0 : Recovery time after power on
- } t_1 : Simultaneity, channel 1 and 2
- } t_2 : Operating cycle ended through button 1 or 2
- } t_3 : Y1-Y2 must be closed before before the button is operated (recovery time)
- } Shaded area: Status irrelevant

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

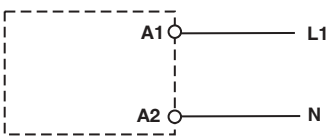
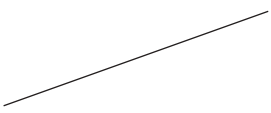
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

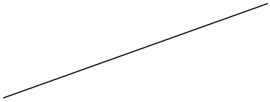
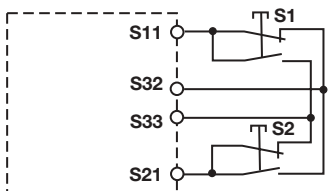
Requirement class IIIC, EN 574 P2HZ X2

Preparing for operation

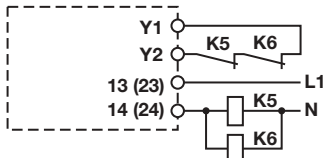
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
Two-hand button with detection of shorts across con- tacts		

} Feedback loop

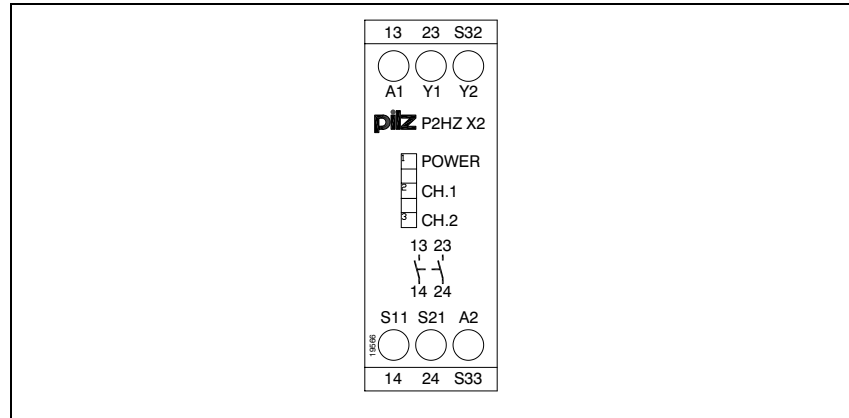
Feedback loop	
Contacts from external contactors	

} Key

S1/S2	Two-hand button

Requirement class IIIC, EN 574 P2HZ X2

Terminal configuration



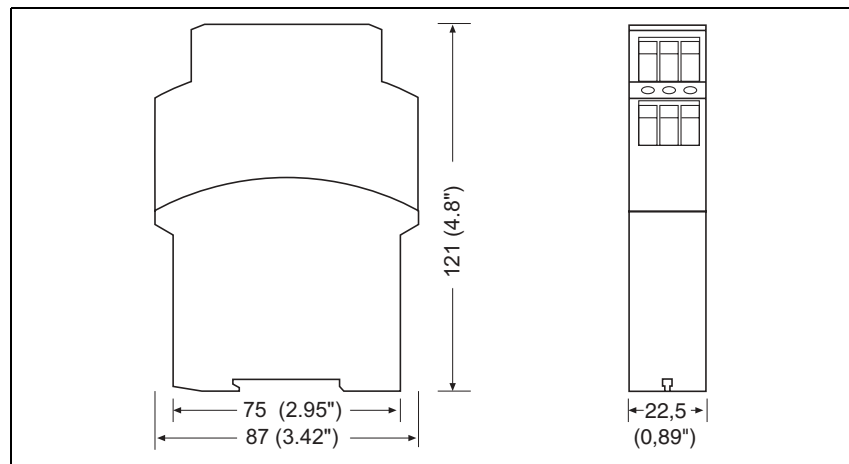
Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Notice

The distance of the button connected to the two-hand relay from the nearest danger zone must be large enough that if one of the buttons is released, the dangerous moment is interrupted before the operator can reach into the danger zone (see EN 999 "The positioning of protective equipment in respect of approach speeds of parts of the human body").

Dimensions

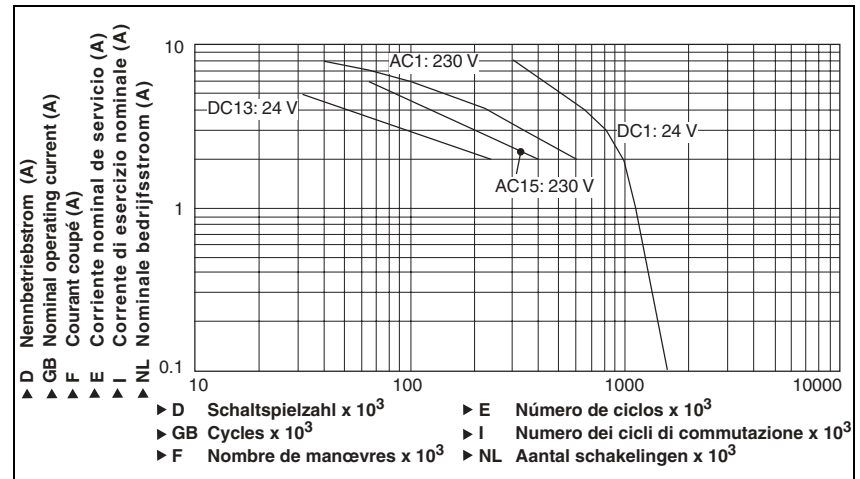


Requirement class IIIC, EN 574 P2HZ X2

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B AC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B AC	4.0 VA
Frequency range AC	50 - 60 Hz
Voltage and current at input circuit: 24 VDC	
N/O contact	15 mA
N/C contact	25 mA
feedback loop: 24 VDC	25 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 2
Utilisation category in accordance with EN 60947-4-1	
AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5.0 \text{ A}$ $P_{max}: 1250 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5.0 \text{ A}$ $P_{max}: 125 \text{ W}$
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	$I_{max}: 2.5 \text{ A}$
DC13 (6 cycles/min): 24 V	$I_{max}: 1.5 \text{ A}$
Contact material	AgSnO ₂ + 0.2 μm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} per input circuit	14 Ohm
Times	
Delay-on de-energisation (reaction time in accordance with EN 574)	
N/O contact	15 ms
Recovery time	250 ms
Simultaneity, channel 1 and 2	500 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78

Requirement class IIIC, EN 574 P2HZ X2

Environmental data	
Airgap creepage	VDE 0110-1
Ambient temperature	-25 - 55 °C
Storage temperature	-25 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. Cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	87 mm x 22.5 mm x 121 mm
Weight	220 g

The standards current on **08/03** apply.

Order reference			
Type	Features	Terminals	Order no.
P2HZ X2	24 VAC	Screw terminals	774 345

Requirement class IIIC, EN 574 P2HZ X3



Two-hand control unit for press controllers and safety circuits

Unit features

- } Positive-guided relay outputs:
 - 2 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } Connection options for:
 - 2 operator elements (buttons)
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage

Safety features

The two-hand control relay meets the following safety requirements:

- } The circuit is redundant with built-in self-monitoring
- } The safety function remains effective in the case of a component failure
- } The circuit prevents a further press stroke in the case of:
 - Relay failure
 - Contact welding
 - Coil defect on a relay
 - Open circuit
 - Short circuit

Unit description

The two-hand control relay meets the requirements of EN 574 Type IIIC. It forces the operator to keep his hands outside the danger zone area during the hazardous movement. The unit is suitable for use on controllers for metalworking presses as a component for simultaneous switching.

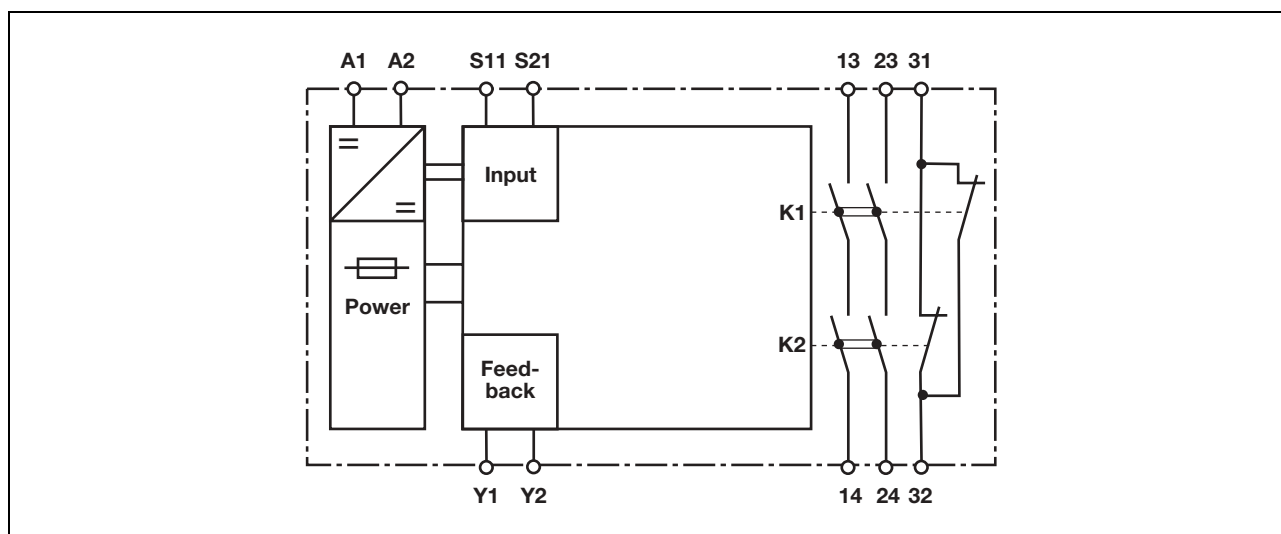
It can be used in applications with

- } Mechanical presses (EN 692)
- } Hydraulic presses (EN 693)
- } Safety circuits in accordance with EN 60204-1

Approvals

	P2HZ X3	
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	É	
	É	

Block diagram

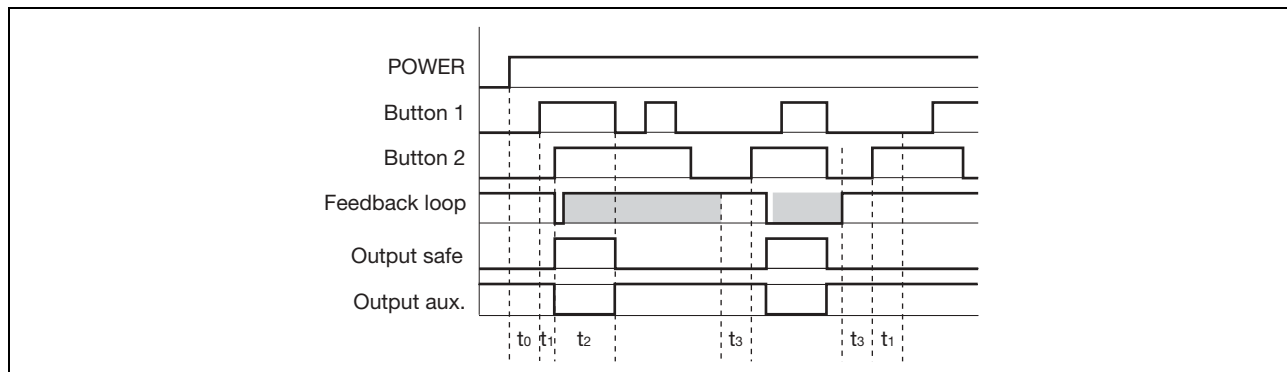


Requirement class IIIC, EN 574 P2HZ X3

Function description

- } The two-hand control relay must be activated by simultaneously pressing two buttons. If one or both of the buttons are released, the unit interrupts the control command for the hazardous movement.
- } Reactivation: The output relays will not re-energise until both operator elements have been released and then re-operated simultaneously.

Timing diagram



Key

- } POWER: Supply voltage
- } Button 1/Button 2: Input circuits S11, S21
- } Feedback loop: Feedback loop Y1-Y2
- } Output safe: Safety outputs 13-14, 23-24
- } Output aux: Auxiliary contacts 31-32
- } t_0 : Recovery time after power on
- } t_1 : Simultaneity, channel 1 and 2
- } t_2 : Operating cycle ended through button 1 or 2
- } t_3 : Y1-Y2 must be closed before the button is operated (recovery time)
- } Shaded area: Status irrelevant

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24 are safety contacts, output 31-32 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

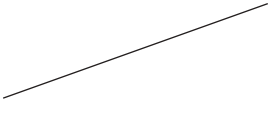
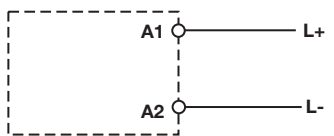
R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

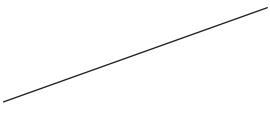
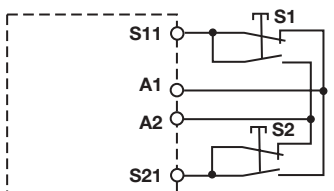
Requirement class IIIC, EN 574
P2HZ X3

Preparing for operation

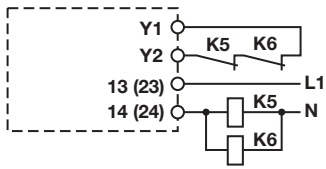
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

Input circuit	Single-channel	Dual-channel
Two-hand button with detection of shorts across con- tacts		

} Feedback loop

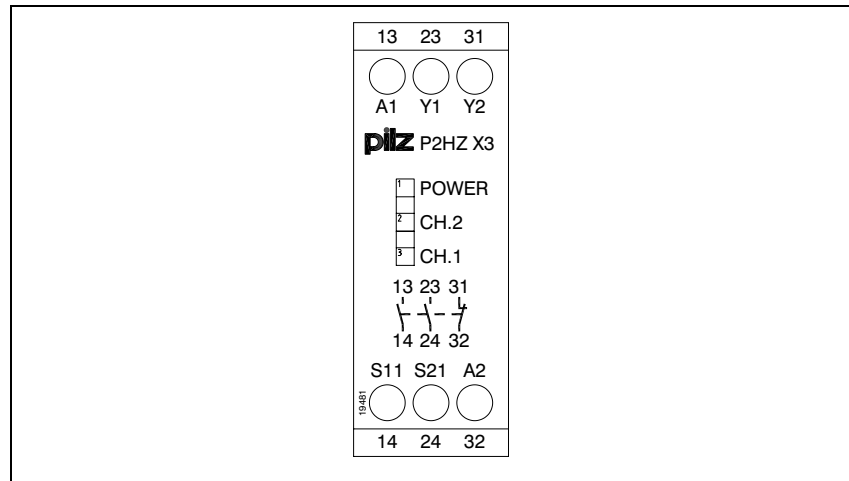
Feedback loop	
Contacts from external contactors	

} Key

S1/S2	Two-hand button

Requirement class IIIC, EN 574 P2HZ X3

Terminal configuration



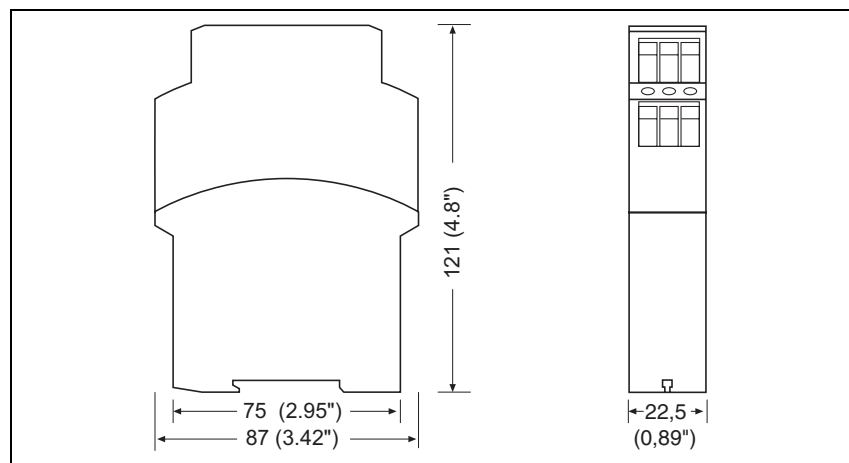
Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Notice

The distance of the button connected to the two-hand relay from the nearest danger zone must be large enough that if one of the buttons is released, the dangerous moment is interrupted before the operator can reach into the danger zone (see EN 999 "The positioning of protective equipment in respect of approach speeds of parts of the human body").

Dimensions

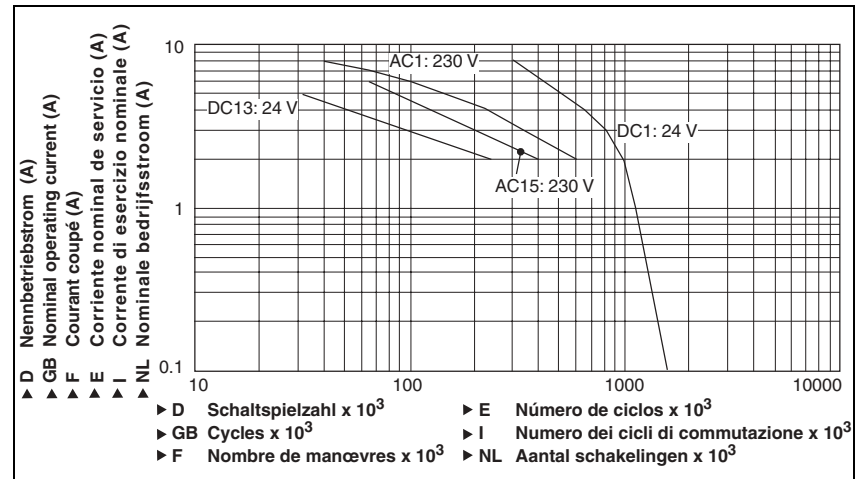


Requirement class IIIC, EN 574 P2HZ X3

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B DC	2.5 W
Residual ripple DC	10 %
Voltage and current at input circuit: 24 VDC	
N/O contact	15 mA
N/C contact	20 mA
feedback loop: 24 VDC	30.0 mA
Output contacts in accordance with EN 954-1 , Category 4	Safety contacts (N/O): 2 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
Safety contacts	
AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5.00 \text{ A}$ $P_{max}: 1250 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5.00 \text{ A}$ $P_{max}: 125 \text{ W}$
Auxiliary contacts	
AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 2.5 \text{ A}$ $P_{max}: 600 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 2.5 \text{ A}$ $P_{max}: 60 \text{ W}$
Utilisation category in accordance with EN 60947-5-1	
AC15: 230 V	$I_{max}: 2.5 \text{ A}$
DC13 (6 cycles/min): 24 V	$I_{max}: 1.5 \text{ A}$
Contact material	AgSnO₂ + 0.2 σm Au
External contact fuse protection (EN 60947-5-1)	
Safety contacts	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A, 24 VAC/DC, characteristic B/C
Auxiliary contacts	
Blow-out fuse, quick	4 A
Blow-out fuse, slow	2 A
Circuit breaker	2 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} per input circuit	14 Ohm

Requirement class IIIC, EN 574 P2HZ X3

Times	
Delay-on de-energisation (reaction time in accordance with EN 574)	
N/O contact	15 ms
N/C contact	30 ms
Recovery time	250 ms
Simultaneity, channel 1 and 2	Max. 500 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-25 - 55 °C
Storage temperature	-25 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 – 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 – 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	87.0 mm x 22.5 mm x 121.0 mm
Weight	210 g

The standards current on 08/03 apply.

Order reference			
Type	Features	Terminals	Order no.
P2HZ X3	24 VDC	Screw terminals	774 350

Voltage PU3Z



Voltage monitoring relay for the safe monitoring of 3-phase supplies

Unit features

- } Positive-guided relay outputs:
 - 3 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } 6 semiconductor outputs
- } LED indicator for:
 - Supply voltage
 - Semiconductor output
 - Status of measuring circuit
- } Semiconductor outputs signal:
 - Status of measuring circuit
- } See order reference for unit types

Safety features

- The relay conforms to the following safety criteria:
- } The circuit is redundant with built-in self-monitoring.
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
 - } AC relays have a short circuit-proof mains transformer
 - DC relays have an electronic fuse

Approvals

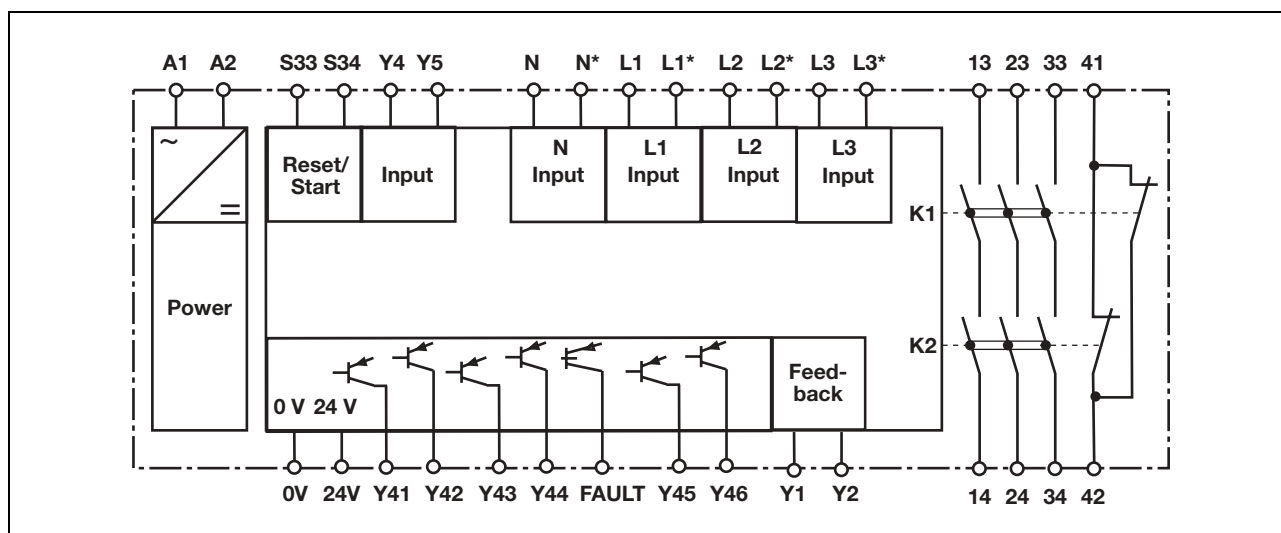
	PU3Z
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Unit description

The voltage monitoring relay operates as a device for the safe monitoring of 3-phase supplies and may be used in

- } Safety circuits in accordance with VDE 0113 and EN 60204-1 (e.g. on movable guards)

Block diagram



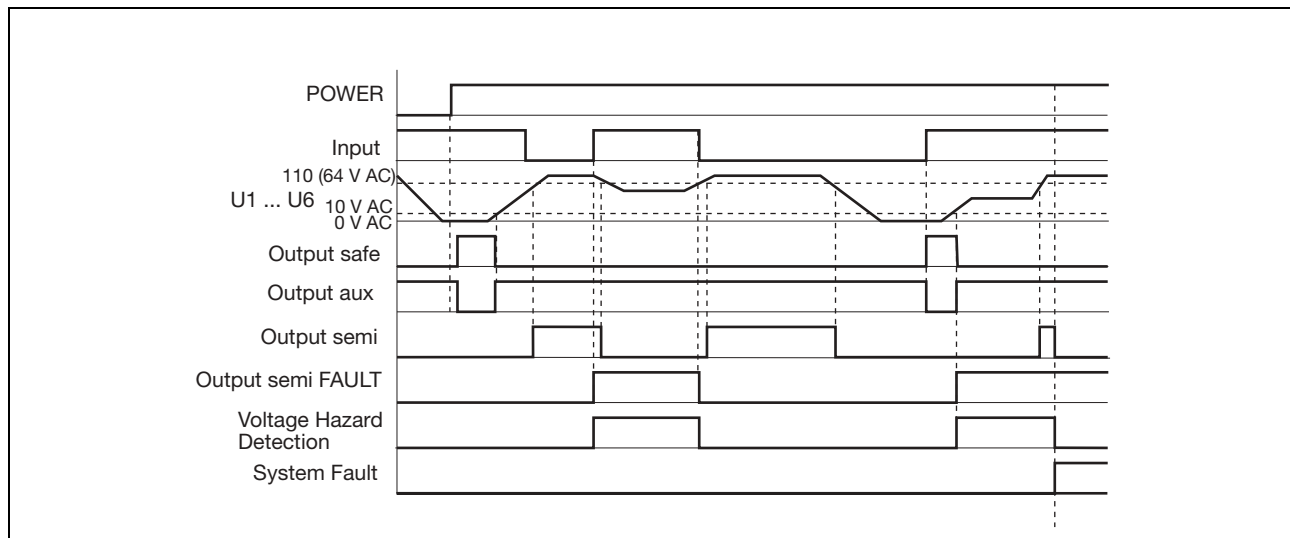
Voltage PU3Z

Function description

- } Automatic reset: Unit is active once the input circuit has been closed.
- } Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- } Self test: An internal self test is carried out during initial commissioning and each time the supply voltage is switched off and on. The process simulates switching all measuring voltages on and then off again. Provided no error occurs during the self test, the unit will then be ready for operation.
- } Increase in the number of available contacts by connecting contact expander modules or external contactors/relays.
- } The unit operates as a threshold switch. The switching thresholds of the three phase voltages L1, L2, L3 are 10 V and 110 VAC / 64 VAC when measured against the neutral conductor N.
- } The status of the measuring circuit is displayed via the semiconductor outputs and the relevant LEDs:

Measuring voltage	Semiconductor	LED
L1 – L2	Y41	VL1-L2 (Y41)
L2 – L3	Y42	VL2-L3 (Y42)
L1 – L3	Y43	VL1-L3 (Y43)
L1 – N	Y44	VL1-N (Y44)
L2 – N	Y45	VL2-N (Y45)
L3 – N	Y46	VL3-N (Y46)

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuit Y4-Y5
- } U1 ... U6: Phase voltages on the measuring circuit L1-L1*, L2-L2*, L3-L3*, N-N*
- } Output safe: Safety contacts 13-14, 23-24, 33-34
- } Output aux: Auxiliary contacts 41-42
- } Output semi: Semiconductor outputs Y41, Y42, Y43, Y44, Y45, Y46 indicate the status of the measuring circuit
- } Voltage Hazard Detection: LED lights when there is a measuring voltage of >10 VAC, although the input circuit is closed
- } System Fault: LED on: Open circuit on at least one measuring circuit or internal error
- } Output semi FAULT: "FAULT" semiconductor conducts when a "Voltage Hazard Detection" error or "System Fault" occurs

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34 are safety contacts, output 41-42 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the

Voltage PU3Z

output contacts (see technical details).

- } Calculation of the max. cable runs $I_{\max}$ in the input circuit:

$$I_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

$R_{l\max}$ = max. overall cable resistance (see technical details)

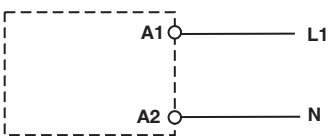
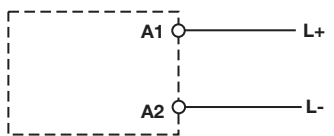
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.
- } To meet the requirements of the safety circuits, separate wires in separate multicore cables must be used for the measuring voltages L1, L2, L3, N and the measuring voltages L1*, L2*, L3*, N*
- } Connect the measuring voltages L1 and L1*, L2 and L2* and L3 and L3*, N and N* to separate terminals on the plant, so that at least one measuring voltage will be present if a terminal screw should come away unintentionally (single fault tolerance).
- } Always connect the neutral conductors N and N* to the same potential, e.g. neutral conductor on the three-phase supply, earth connection

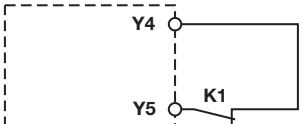
Voltage
PU3Z

Preparing for operation

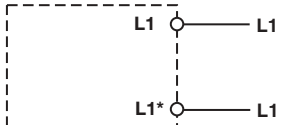
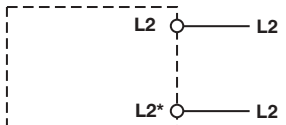
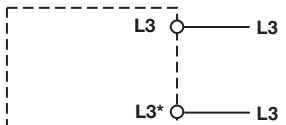
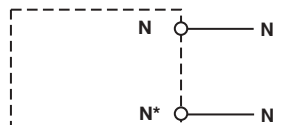
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

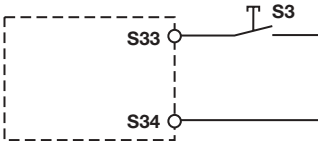
Input circuit	
Contactor to be monitored	

} Measuring circuit

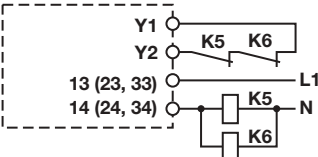
Measuring circuit	
Measuring voltage L1	
Measuring voltage L2	
Measuring voltage L3	
Measuring voltage N	

Voltage
PU3Z

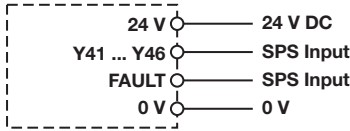
} Reset circuit

Reset circuit	
Automatic reset	
Manual reset	

} Feedback loop

Feedback loop	
Contacts from external contactors	

} Semiconductor output

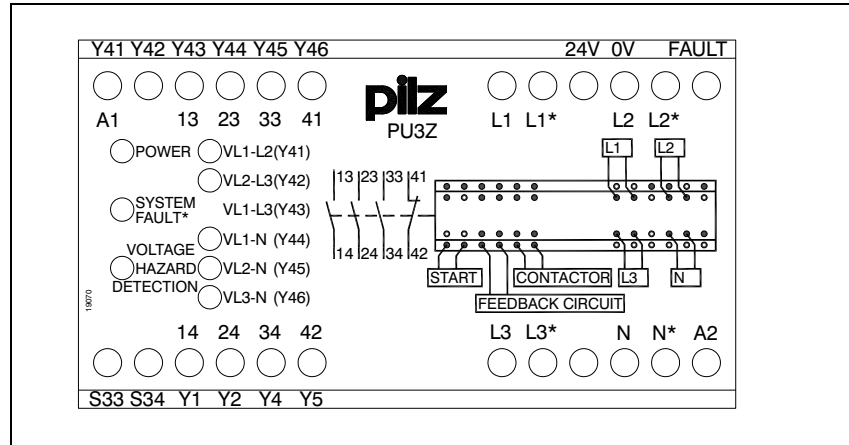
	

} Key

S3	Reset button

Voltage PU3Z

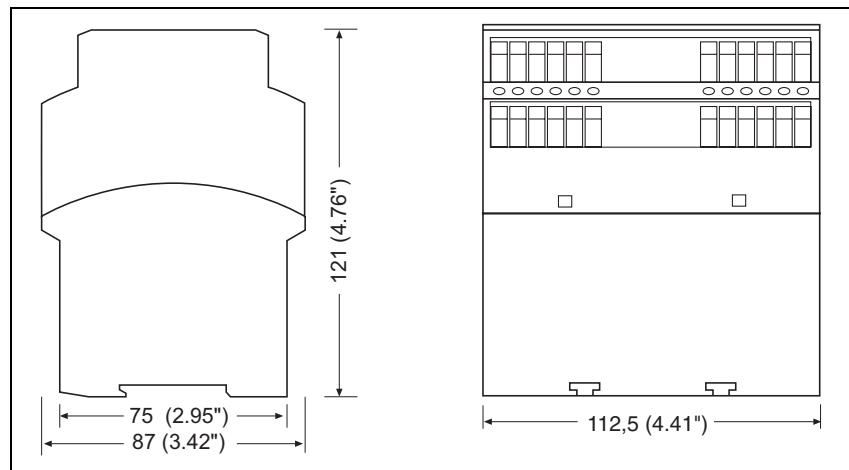
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

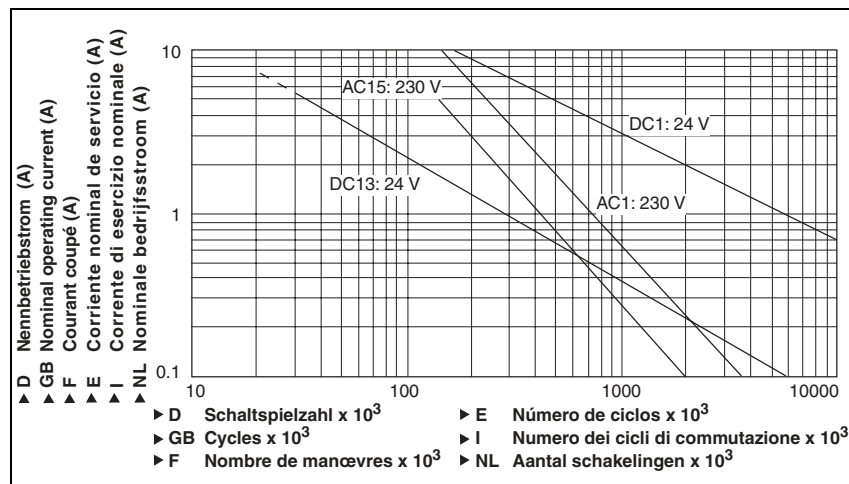


Voltage PU3Z

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U _B AC	120 V, 230 V
Supply voltage U _B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U _B AC	12.0 VA Order no.: 775500, 775507
Power consumption at U _B DC	8.0 W Order no.: 775510
Frequency range AC	50 - 60 Hz
Residual ripple DC	20 %
Voltage and current at	
input circuit DC: 24.0 V	60.0 mA
reset circuit DC: 24.0 V	60.0 mA
feedback loop DC: 24.0 V	35.0 mA
Output contacts in accordance with EN 954-1 Category 4	Safety contacts (N/O): 3 Auxiliary contacts (N/C): 1
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 5.00 A P _{max} : 1200 VA
Safety contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 5.0 A P _{max} : 120 W
Auxiliary contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 5.0 A P _{max} : 1200 VA
Auxiliary contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 5.0 A P _{max} : 120 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I _{max} : 5.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 5.0 A
Auxiliary contacts: AC15 at 230 V	I _{max} : 5.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 5.0 A
Contact material	AgSnO2 + 0.2 µm Au

Voltage PU3Z

2.3

Electrical data	
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	6 A
Auxiliary contacts:	6 A
Blow-out fuse, slow	
Safety contacts:	4 A
Auxiliary contacts:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	4 A
Auxiliary contacts:	4 A
Measuring voltage U_B AC Lx-Lx min.	110.0 V
Measuring voltage U_B AC Lx-Lx max.	600.0 V
Measuring voltage U_B AC Lx-N min.	64.0 V
Measuring voltage U_B AC Lx-N max.	346.0 V
Tolerance, measuring voltage	-15% / +10%
Frequency range, measuring voltage AC	50 –60 Hz
Semiconductor outputs (short circuit proof)	24.0 V DC, 50 mA
External supply voltage	24.0 V DC
Voltage tolerance	-20 %/+20 %
Times	
Switch-on delay	
with automatic reset typ.	1 s
with automatic reset after power on max.	2 s
Delay-on de-energisation after safety function	100 ms
Recovery time at max. switching frequency 1/s after power failure	
	2200 ms
Simultaneity, channel 1 and 2	3 s
Supply interruption before de-energisation	20 ms
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2, EN 61000-6-4
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm
Dimensions	
Height	87.0 mm
Width	112.5 mm
Depth	121.0 mm
Weight	
	700 g Order no.: 775510
	850 g Order no.: 775500, 775507

Voltage PU3Z

The standards current on **07/02** apply.

Order reference

Type	Features	Terminals	Order no.
PU3Z	120 VAC	Screw terminals	775 500
PU3Z	230 VAC	Screw terminals	775 507
PU3Z	24 VDC	Screw terminals	775 510

Delay-on energisation PZA



Delay-on energisation timer for unlocking an interlock with delay

Approvals

	PZA	
	É	
	É	
	É	

Unit features

- } Positive-guided relay outputs:
 - 1 safety contact (N/O), delay-on energisation
 - 2 auxiliary contacts (N/C), delay-on energisation
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } 12 time values, set via rotary switch
- } The circuit is redundant with built-in self-monitoring.
- } The safety function remains effective in the case of a component failure.
- } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Unit description

The unit operates as a time delay device

- } in accordance with prEN 1088 (release with delay through timer)
- } in safety circuits in accordance with VDE 0113-1 and EN 60204-1 (e.g. on movable guards)

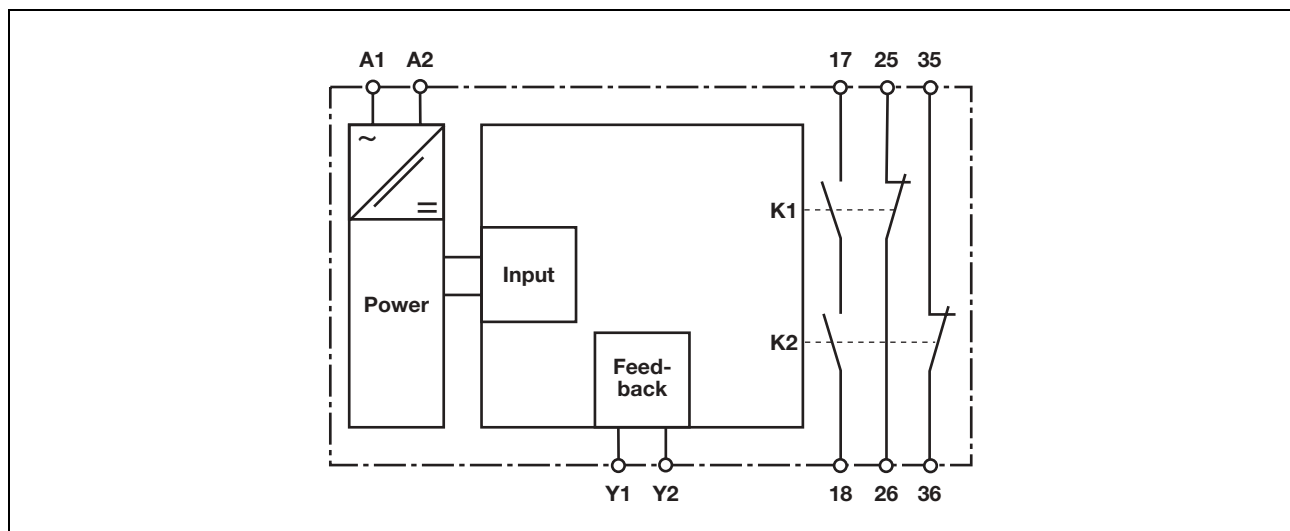
The unit is designed for use with

- } Safety relays from the PNOZ series
- } Safety gate monitors from the PST series

Safety features

The relay conforms to the following safety criteria:

Block diagram



Delay-on energisation PZA

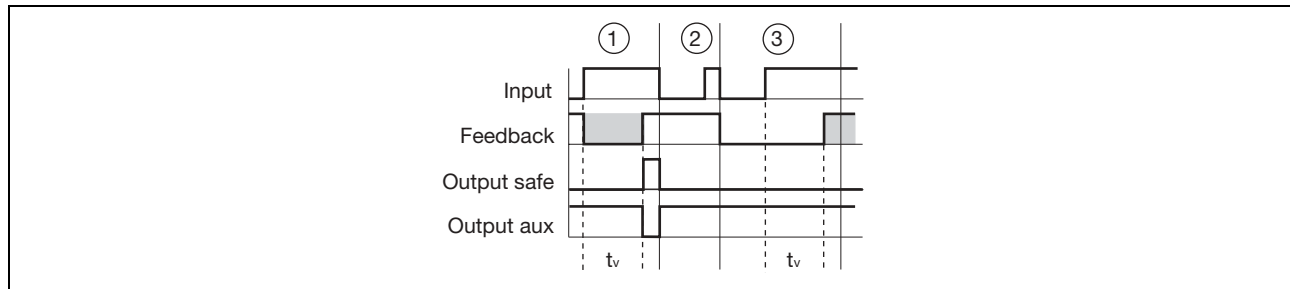
Function description

The time is ready to start once the feedback loop is closed. If the supply

voltage at the input circuit is interrupted, the safety contact will open and the auxiliary contacts will close. If the input circuit is closed, i.e. supply volt-

age is present, the safety contact will be closed with delay-on energisation and the auxiliary contacts will be opened.

Timing diagram



Key

- } Input: Input circuit A1-A2
- } Feedback: Feedback loop Y1-Y2
- } Output safe: Safety contact 17-18

- } Output aux: Auxiliary contacts 25-26, 35-36
- } t_v : Delay time
- } i : Normal operating cycle

- ¢ : Fault: Input circuit opened too early
- £ : Fault: Feedback loop closed too late after t_v elapsed

Wiring

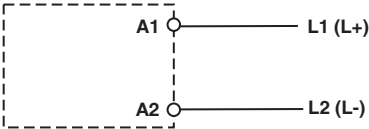
Please note:

- } Information given in the "Technical details" must be followed.
- } Output Terminals, safety contacts, instantaneous is a safety contact, outputs Terminals, aux. contacts, instantaneous are auxiliary contacts (e.g. for display)
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cabling runs I_{max} in the input circuit:
 R_{lmax} = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km
- } Use copper wire that can withstand 60/75 °C.
- } Supply voltage 24 VDC: Shorts between the input circuit and feedback loop or earth faults in the feedback loop can damage the unit.
- } We recommend the use of a short circuit-proof voltage supply with current limitation

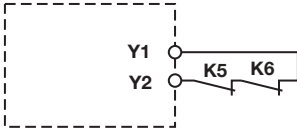
Delay-on energisation
PZA

Betriebsbereitschaft herstellen

} Supply voltage

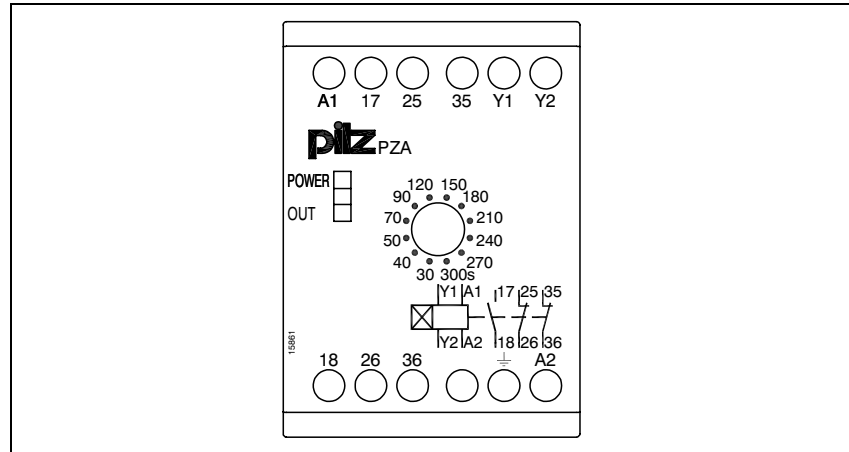
AC	
Input circuit is driven by connecting U_B	

} Feedback loop

Feedback loop	
Contacts from external contactors	

Delay-on energisation PZA

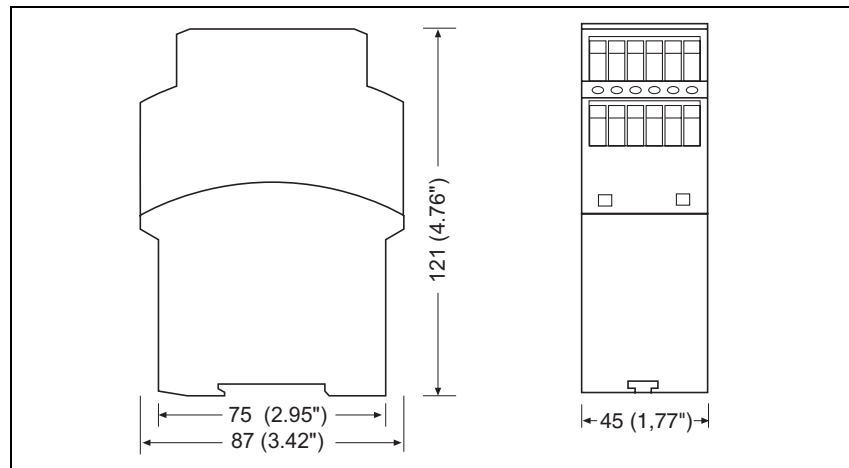
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

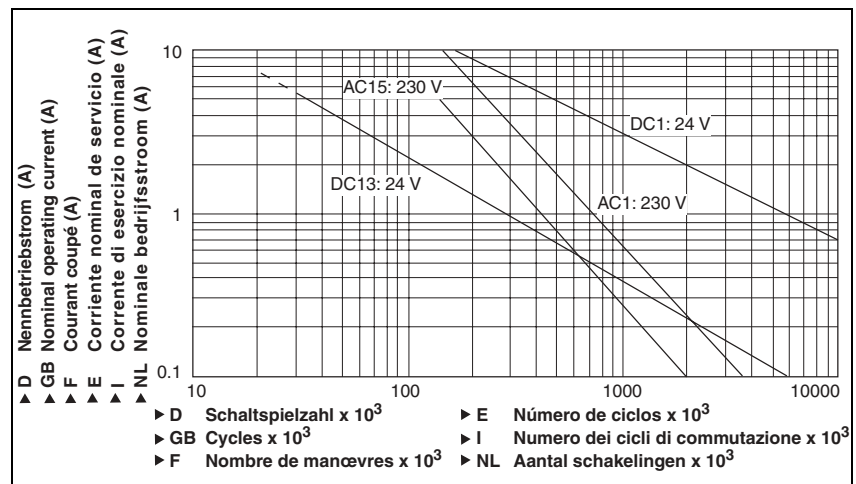


Delay-on energisation PZA

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage	24 V, 42 V, 48 V, 110 - 120 V, 230 V
Supply voltage U _B AC	24 V
Supply voltage U _B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U _B AC	4.5 VA Order no.: 774020, 774021, 774023, 774026, 774031, 774032, 774035, 774038, 774040
Power consumption at U _B DC	3.0 W Order no.: 774028, 774029, 774030, 774041
Frequency range AC	50 - 60 Hz
Residual ripple DC	10 %
Voltage and current at feedback loop DC: 24.0 V	50.0 mA
Output contacts in accordance with EN 954-1	Safety contacts (N/O), delayed: 1
Category 3 Order no.: 774020, 774021, 774023, 774026, 774029, 774030, 774031, 774032, 774035, 774038, 774040, 774041	Delay time <30 s
Category 1 Order no.: 774020, 774021, 774023, 774026, 774028, 774029, 774030, 774031, 774032, 774035, 774040	Delay time >30 s
Utilisation category in accordance with EN 60947-4-1	Auxiliary contacts (N/C), delayed: 2
Safety contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 6.00 A P _{max} : 1500 VA
Safety contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 6.0 A P _{max} : 150 W
Auxiliary contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 6.0 A P _{max} : 1500 VA
Auxiliary contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 6.0 A P _{max} : 150 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	I _{max} : 4.0 A
Safety contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 3.0 A
Auxiliary contacts: AC15 at 230 V	I _{max} : 4.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 3.0 A
Contact material	AgSnO2 + 0.2 µm Au

Delay-on energisation PZA

Electrical data

External contact fuse protection to **EN 60947-5-1**

Blow-out fuse, quick

Safety contacts: **6 A**

Auxiliary contacts: **6 A**

Blow-out fuse, slow

Safety contacts: **4 A**

Auxiliary contacts: **4 A**

Circuit breaker 24 VAC/DC, characteristic B/C

Safety contacts: **4 A**

Auxiliary contacts: **4 A**

Times

Delay-on de-energisation **40 ms**

Recovery time at max. switching frequency 1/s
after power failure **80 ms**

Delay time t_V : selectable
**30.00 s; 40.00 s; 50.00 s; 70.00 s; 90.00 s; 120.00 s; 150.00 s;
 180.00 s; 210.00 s; 240.00 s; 270.00 s; 300.00 s** Order no.:
 774020
**30.00 s; 40.00 s; 50.00 s; 70.00 s; 90.00 s; 120.00 s; 150.00 s;
 180.00 s; 210.00 s; 240.00 s; 270.00 s; 300.00 s** Order no.:
 774021
**30.00 s; 40.00 s; 50.00 s; 70.00 s; 90.00 s; 120.00 s; 150.00 s;
 180.00 s; 210.00 s; 240.00 s; 270.00 s; 300.00 s** Order no.:
 774023
**30.00 s; 40.00 s; 50.00 s; 70.00 s; 90.00 s; 120.00 s; 150.00 s;
 180.00 s; 210.00 s; 240.00 s; 270.00 s; 300.00 s** Order no.:
 774026
**60.00 s; 80.00 s; 100.00 s; 140.00 s; 180.00 s; 240.00 s; 300.00 s;
 360.00 s; 420.00 s; 480.00 s; 540.00 s; 600.00 s** Order no.:
 774028
**30.00 s; 40.00 s; 50.00 s; 70.00 s; 90.00 s; 120.00 s; 150.00 s;
 180.00 s; 210.00 s; 240.00 s; 270.00 s; 300.00 s** Order no.:
 774029
**3.00 s; 4.00 s; 5.00 s; 7.00 s; 9.00 s; 12.00 s; 15.00 s; 18.00 s;
 21.00 s; 24.00 s; 27.00 s; 30.00 s** Order no.: 774030
**3.00 s; 4.00 s; 5.00 s; 7.00 s; 9.00 s; 12.00 s; 15.00 s; 18.00 s;
 21.00 s; 24.00 s; 27.00 s; 30.00 s** Order no.: 774031
**3.00 s; 4.00 s; 5.00 s; 7.00 s; 9.00 s; 12.00 s; 15.00 s; 18.00 s;
 21.00 s; 24.00 s; 27.00 s; 30.00 s** Order no.: 774032
**3.00 s; 4.00 s; 5.00 s; 7.00 s; 9.00 s; 12.00 s; 15.00 s; 18.00 s;
 21.00 s; 24.00 s; 27.00 s; 30.00 s** Order no.: 774035
**0.30 s; 0.40 s; 0.50 s; 0.70 s; 0.90 s; 1.20 s; 1.50 s; 1.80 s; 2.10 s;
 2.40 s; 2.70 s; 3.00 s** Order no.: 774038
**3.00 s; 4.00 s; 5.00 s; 7.00 s; 9.00 s; 12.00 s; 15.00 s; 18.00 s;
 21.00 s; 24.00 s; 27.00 s; 30.00 s** Order no.: 774040
**0.30 s; 0.40 s; 0.50 s; 0.70 s; 0.90 s; 1.20 s; 1.50 s; 1.80 s; 2.10 s;
 2.40 s; 2.70 s; 3.00 s** Order no.: 774041
 Repetition accuracy **1 %**

Environmental data

EMC **EN 60947-5-1, EN 61000-6-2**

Vibration in accordance with **EN 60068-2-6**

Frequency **10 - 55 Hz**

Amplitude **0.35 mm**

Climatic suitability **EN 60068-2-78**

Airgap creepage **EN 60947-1**

Ambient temperature **-10 - 55 °C**

Storage temperature **-40 - 85 °C**

Protection type

Mounting (e.g. control cabinet) **IP54**

Housing **IP40**

Terminals **IP20**

Delay-on energisation PZA

Mechanical data

Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm² , 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm² , 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm² , 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm
Dimensions	
Height	87.0 mm
Width	45.0 mm
Depth	121.0 mm
Weight	260 g Order no.: 774028, 774029, 774030, 774041 350 g Order no.: 774020, 774021, 774023, 774026, 774031, 774032, 774035, 774038, 774040

The standards current on **04/04** apply.

Order reference

Type	Features		Terminals	Order no.	
PZA	24 VAC	300 s selectable	Screw terminals	774 020	
PZA	42 VAC	300 s selectable	Screw terminals	774 021	
PZA	110 - 120 VAC	300 s selectable	Screw terminals	774 023	
PZA	230 VAC	300 s selectable	Screw terminals	774 026	
PZA		24 VDC	600 s selectable	Screw terminals	774 028
PZA		24 VDC	300 s selectable	Screw terminals	774 029
PZA		24 VDC	30 s selectable	Screw terminals	774 030
PZA	24 VAC	30 s selectable	Screw terminals	774 031	
PZA	48 VAC	30 s selectable	Screw terminals	774 032	
PZA	110 - 120 VAC	30 s selectable	Screw terminals	774 035	
PZA	230 VAC	3 s selectable	Screw terminals	774 038	
PZA	230 VAC	30 s selectable	Screw terminals	774 040	
PZA		24 VDC	3 s selectable	Screw terminals	774 041

Pulsing PZW



Pulse-on timer relay for step-by-step control of movement sequences

Approvals

	PZW	
	É	
	É	
	É	

Unit features

- } Positive-guided relay outputs:
 - 1 safety contact, pulsing
 - 2 auxiliary contacts, pulsing
- } LED indicator for:
 - Supply voltage
 - Pulse time
- } Redundant output circuit
- } 12 pulse times, set via rotary switch
- } Feedback loop for monitoring external contacts

Unit description

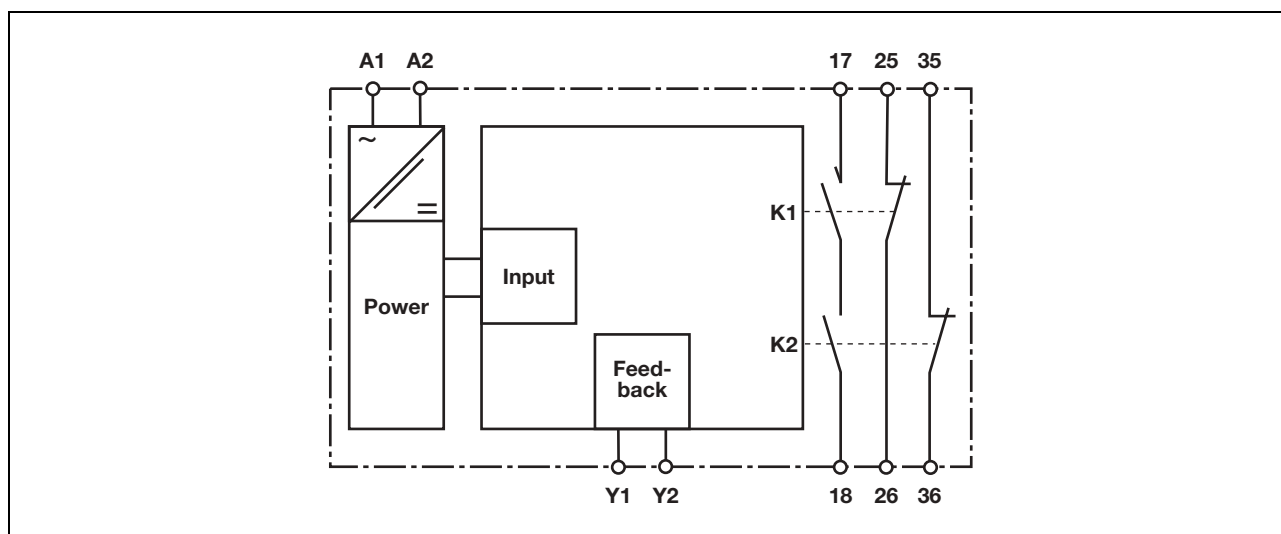
- The unit operates as a pulse relay
- } in accordance with EN 292 Part 2, clause 3.7.10 and 4.1.4 and EN 292 Part 1, clause 3.23.8 (inching circuit for limit movement of hazardous machine components during installation, set up and positioning)
 - } in safety circuits in accordance with VDE 0113 and EN 60204-1 (e.g. on movable guards)
- The unit is designed for use with
- } A safety relay from the PNOZ series
 - } Safety gate monitors from the PST series

- } Two-hand relays from the P2HZ series

Sicherheitseigenschaften

- The relay meets the following safety requirements:
- } The circuit is redundant in design
 - } The safety function remains effective in the case of a component failure.
 - } The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Block diagram



Pulsing PZW

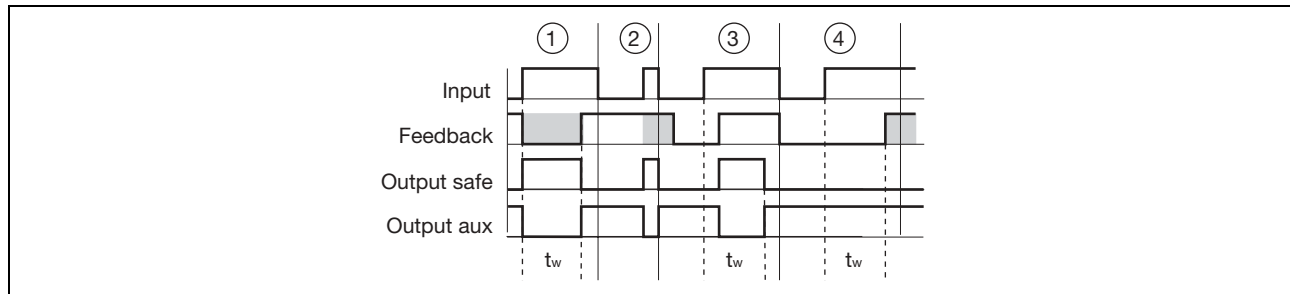
Function description

The time is ready to start once the feedback loop is closed. If the supply

voltage at the input circuit is interrupted, the safety contact will open. If the input circuit is closed, i.e. supply voltage is present, the safety contact will

be closed immediately. The safety contact will be closed again once the set pulse time has elapsed.

Timing diagram



Key

- } Input: Input circuit A1-A2
- } Feedback: Feedback loop Y1-Y2
- } Output safe: Safety contact 17-18
- } t_w : Pulse time

- ⊥ : Normal operating cycle
- ⊘ : Fault: Input circuit opened too early
- ⊞ : Fault: Feedback loop closed too late within t_w

- ⊞ : Fault: Feedback loop closed too late after t_w elapsed

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Output 17-18 is a safety contact, outputs 25-26, 35-36 are auxiliary contacts (e.g. for display)
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Do not use the unlabelled terminals!
- } Calculation of the max. cabling runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

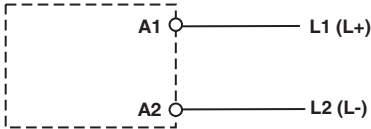
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Supply voltage 24 VDC: Shorts between the input circuit and feedback loop or earth faults in the feedback loop can damage the unit.
- } We recommend the use of a short circuit-proof voltage supply with current limitation

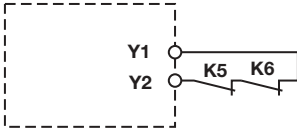
Pulsing PZW

Betriebsbereitschaft herstellen

} Supply voltage, input circuit

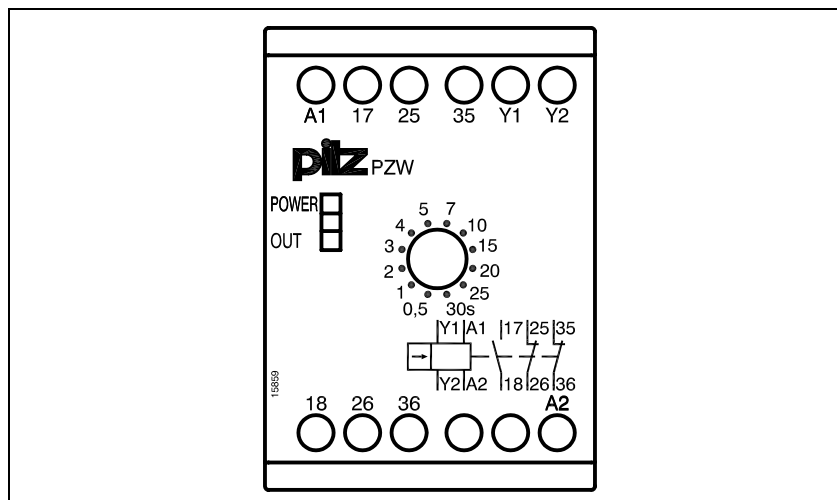
Supply voltage, input circuit	
Input circuit is driven by connecting U_B	

} Feedback loop

Feedback loop	
Contacts from external contactors	

Pulsing PZW

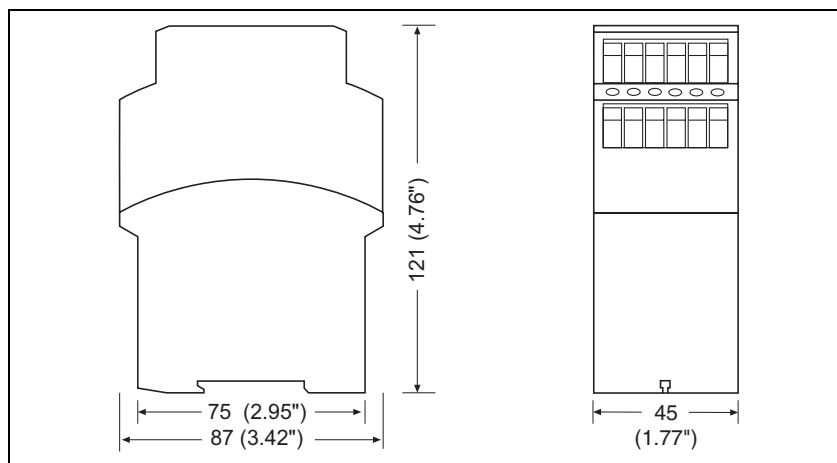
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

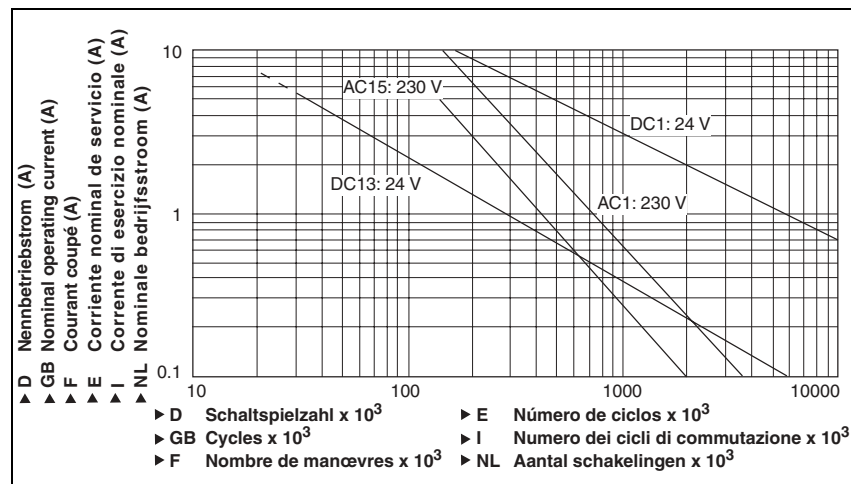


Pulsing PZW

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage	
Supply voltage U _B AC	110 - 120 V, 230 V
Supply voltage U _B DC	24 V
Voltage tolerance	-15 %/+10 %
Power consumption at U _B AC	4.5 VA Order no.: 774015, 774017, 774044, 774048
Power consumption at U _B DC	3.0 W Order no.: 774019, 774042
Frequency range AC	50 - 60 Hz
Residual ripple DC	10 %
Voltage and current at feedback loop DC: 24.0 V	50.0 mA
Output contacts in accordance with EN 954-1 Category 3	Safety contacts (N/O), pulsing: 1 Auxiliary contacts (N/C), pulsing: 2
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 6.00 A P _{max} : 1,500 VA
Safety contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 6.0 A P _{max} : 150 W
Auxiliary contacts: AC1 at 240 V	I _{min} : 0.01 A , I _{max} : 6.0 A P _{max} : 1,500 VA
Auxiliary contacts: DC1 at 24 V	I _{min} : 0.01 A , I _{max} : 6.0 A P _{max} : 150 W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V (6 cycles/min)	I _{max} : 4.0 A I _{max} : 3.0 A
Auxiliary contacts: AC15 at 230 V	I _{max} : 4.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I _{max} : 3.0 A
Contact material	AgSnO2 + 0.2 µm Au

Pulsing PZW

Electrical data	
External contact fuse protection to EN 60947-5-1	
Blow-out fuse, quick	
Safety contacts:	6 A
Auxiliary contacts:	6 A
Blow-out fuse, slow	
Safety contacts:	4 A
Auxiliary contacts:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	4 A
Min. unit fuse protection	1 A
Times	
Switch-on delay	100 ms Order no.: 774015, 774017, 774044, 774048 50 ms Order no.: 774019, 774042
Recovery time at max. switching frequency 1/s after power failure	80 ms
Delay time t_d : selectable	0.50 s; 1.00 s; 2.00 s; 3.00 s; 4.00 s; 5.00 s; 7.00 s; 10.00 s; 15.00 s; 20.00 s; 25.00 s; 30.00 s Order no.: 774015 0.50 s; 1.00 s; 2.00 s; 3.00 s; 4.00 s; 5.00 s; 7.00 s; 10.00 s; 15.00 s; 20.00 s; 25.00 s; 30.00 s Order no.: 774017 0.50 s; 1.00 s; 2.00 s; 3.00 s; 4.00 s; 5.00 s; 7.00 s; 10.00 s; 15.00 s; 20.00 s; 25.00 s; 30.00 s Order no.: 774019 0.05 s; 0.10 s; 0.20 s; 0.30 s; 0.40 s; 0.50 s; 0.70 s; 1.00 s; 1.50 s; 2.00 s; 2.50 s; 3.00 s Order no.: 774042 0.05 s; 0.10 s; 0.20 s; 0.30 s; 0.40 s; 0.50 s; 0.70 s; 1.00 s; 1.50 s; 2.00 s; 2.50 s; 3.00 s Order no.: 774044 0.05 s; 0.10 s; 0.20 s; 0.30 s; 0.40 s; 0.50 s; 0.70 s; 1.00 s; 1.50 s; 2.00 s; 2.50 s; 3.00 s Order no.: 774048
Repetition accuracy	1 %
Voltage dependency per 1 % U_B	+/- 0,06 %
Temperature dependency per 1 °C	+/- 0,1 %
Setting accuracy	
Start of range	0.03 s
End of range	0.6 s
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. control cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 - 4.00 mm², 24 - 10 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 - 2.50 mm², 24 - 14 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 2.50 mm², 24 - 14 AWG
Torque setting with screw terminals	0.60 Nm

Pulsing PZW

Mechanical data

Dimensions	
Height	87.0 mm
Width	45.0 mm
Depth	121.0 mm
Weight	330 g

The standards current on **04/04** apply.

Order reference

Type	Features			Terminals	Order no.
PZW		110 - 120 VDC	30 s selectable	Screw terminals	774 015
PZW	230 VAC		30 s selectable	Screw terminals	774 017
PZW		24 VDC	30 s selectable	Screw terminals	774 019
PZW		24 VDC	3 s selectable	Screw terminals	774 042
PZW		110 - 120 VDC	3 s selectable	Screw terminals	774 044
PZW	230 VAC		3 s selectable	Screw terminals	774 048

Instantaneous PZE X4



Contact expander module for increasing the number of available contacts

Approvals

	PZE X4	
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Unit features

- } Positive-guided relay outputs:
 - 4 safety contacts (N/O), instantaneous
- } Safe separation of safety contacts 13-14, 23-24, 33-34 from input circuit A1 and feedback loop Y1-Y2
- } Connection for feedback loop
- } Switch status channel 1/2
- } See order reference for unit types

Unit description

The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all

- } Safety relays with feedback loop
- } Programmable safety systems with feedback loop

The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this.

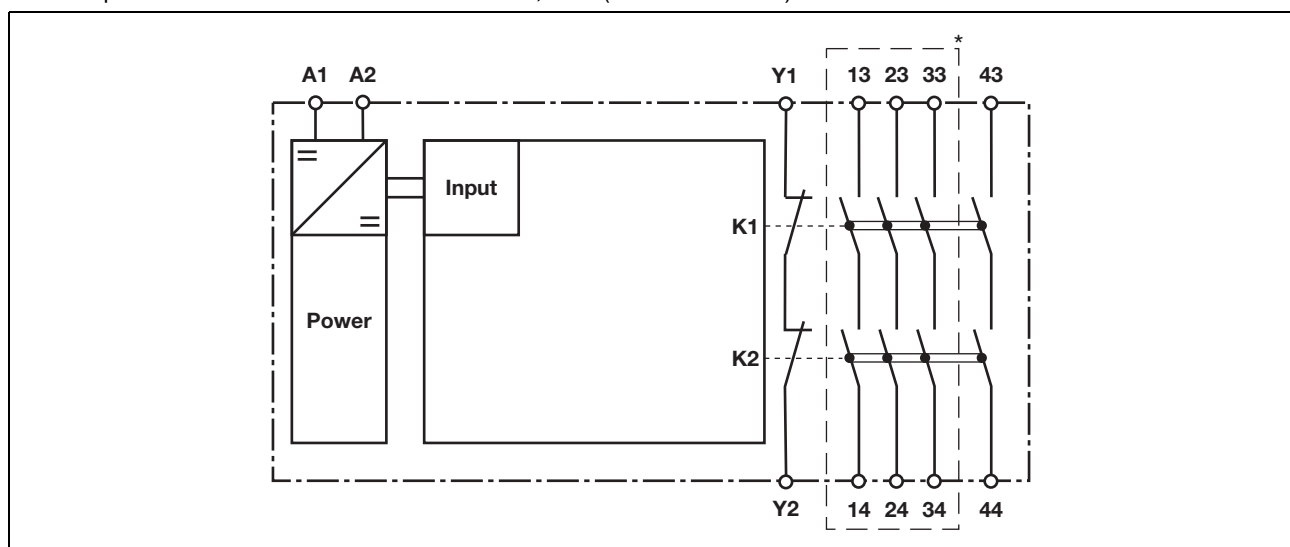
Safety features

The unit meets the following safety requirements:

- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Block diagram

* Safe separation in accordance with EN 60947-1, 6 kV (see unit features)

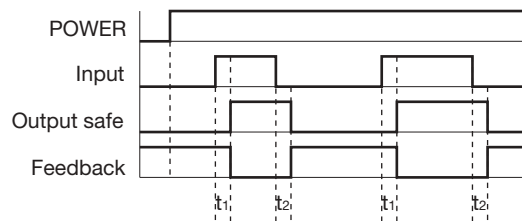


Instantaneous PZE X4

Function description

- } Single-channel operation: one input circuit affects both output relays

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits A1
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44
- } Feedback: Feedback loop Y1-Y2
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

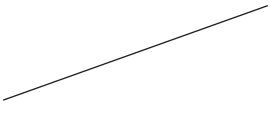
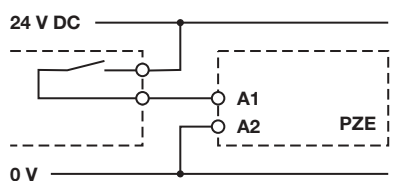
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

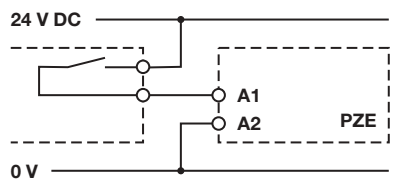
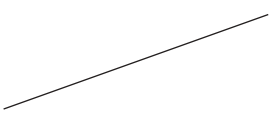
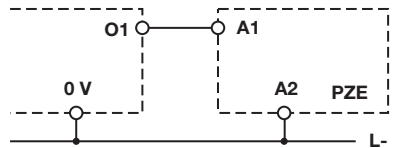
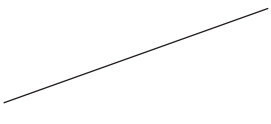
**Instantaneous
PZE X4**

Preparing for operation

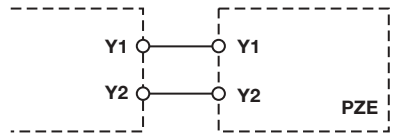
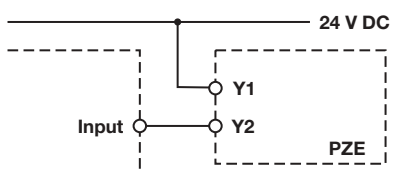
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

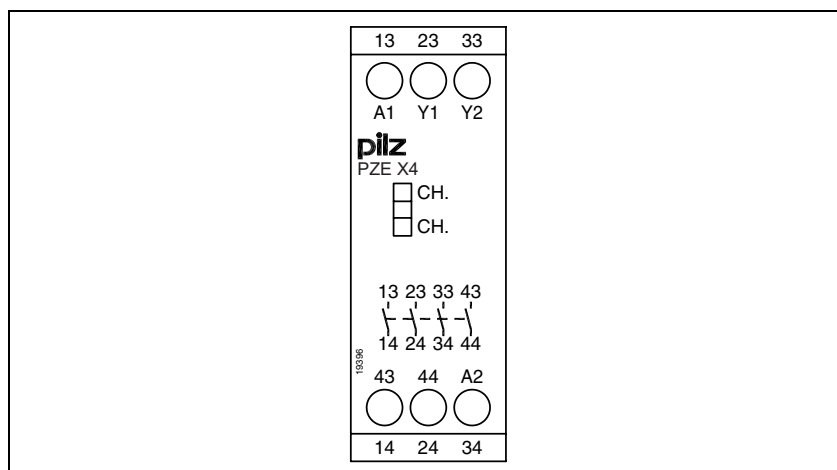
Input circuit	Single-channel	Dual-channel
Base unit: PNOZ X safety relay Driven via safety contacts		
Base unit: PNOZelog safety relay, programmable safety system or PNOZmulti Driven via semiconductor outputs (24 VDC)		

} Feedback loop

Feedback loop	Base unit: PNOZ X safety relay	Base unit: PNOZelog safety relay, pro- grammable safety system or PNOZ- multi
Y1, Y2 and Input are inputs on the base unit; they evaluate the feedback loop		

Instantaneous PZE X4

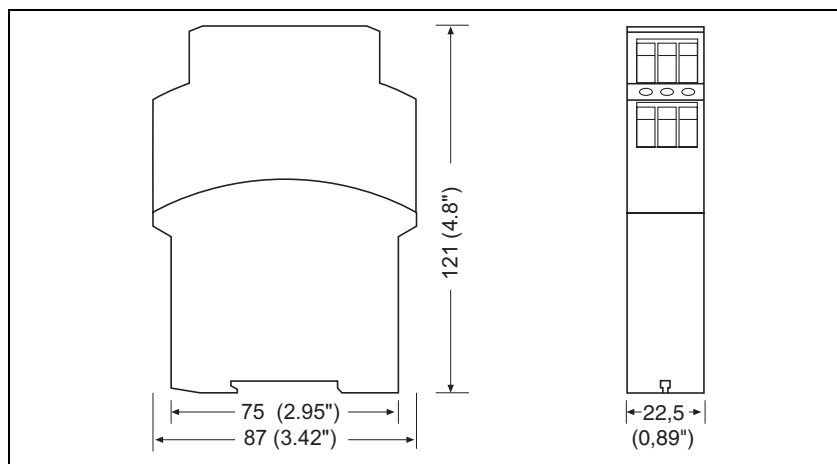
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

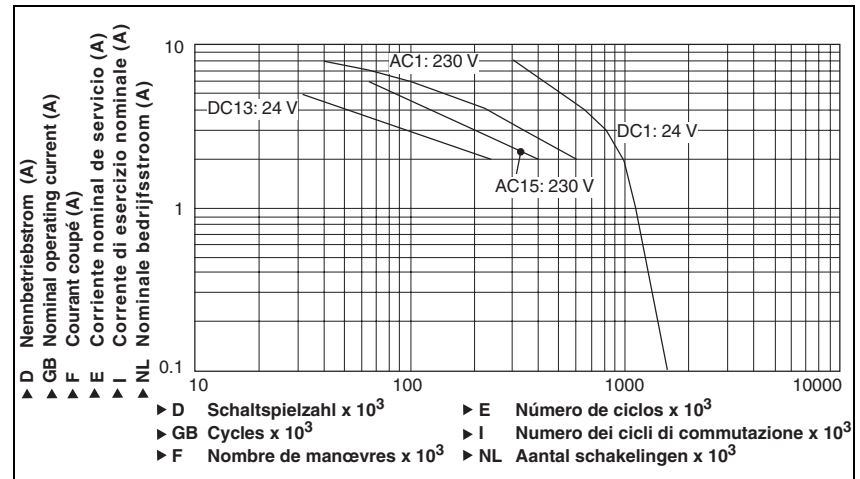


Instantaneous PZE X4

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / 10 %
Power consumption at U_B DC	2.5 W
Residual ripple DC	20 %
Voltage and current at Input circuit: 24 VDC	85 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 4
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5 \text{ A}$ $P_{max}: 1200 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5 \text{ A}$ $P_{max}: 120 \text{ W}$
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V DC13 (6 cycles/min): 24 V	$I_{max}: 3 \text{ A}$ $I_{max}: 4 \text{ A}$
Contact material	AgSnO₂ + 0.2 µm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} Input circuits Single-channel at U_B DC	30 Ohm
Times	
Switch-on delay	
with automatic reset after power on typ.	23 ms
with automatic reset after power on max.	40 ms
Delay-on de-energisation	
with E-STOP typ.	40 ms
with E-STOP max.	60 ms
with power failure typ.	40 ms
with power failure max.	60 ms
Supply interruption before de-energisation	20 ms

Instantaneous PZE X4

2.3

Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 – 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 – 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 2.50 mm ²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	
with screw terminals	87 mm x 22.5 mm x 121 mm
Weight	185 g

The standards current on **09/04** apply.

Max. continuous current				
Number of contacts	1	2	3	4
I _{max} (A) at U _B DC	5 A	5 A	4.5 A	4 A

Order reference			
Type	Features	Terminals	Order no.
PZE X4	24 VDC	Screw terminals	774 585

Delayed PZE X4V



Contact expander module for increasing the number of available contacts

Approvals

	PZE X4V	
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	É	
	É	

Unit features

- } Positive-guided relay outputs:
 - 4 safety contacts (N/O), delay-on de-energisation
- } Connection for feedback loop
- } LED indicator for:
 - Switch status channel 1/2
- } See order reference for unit types

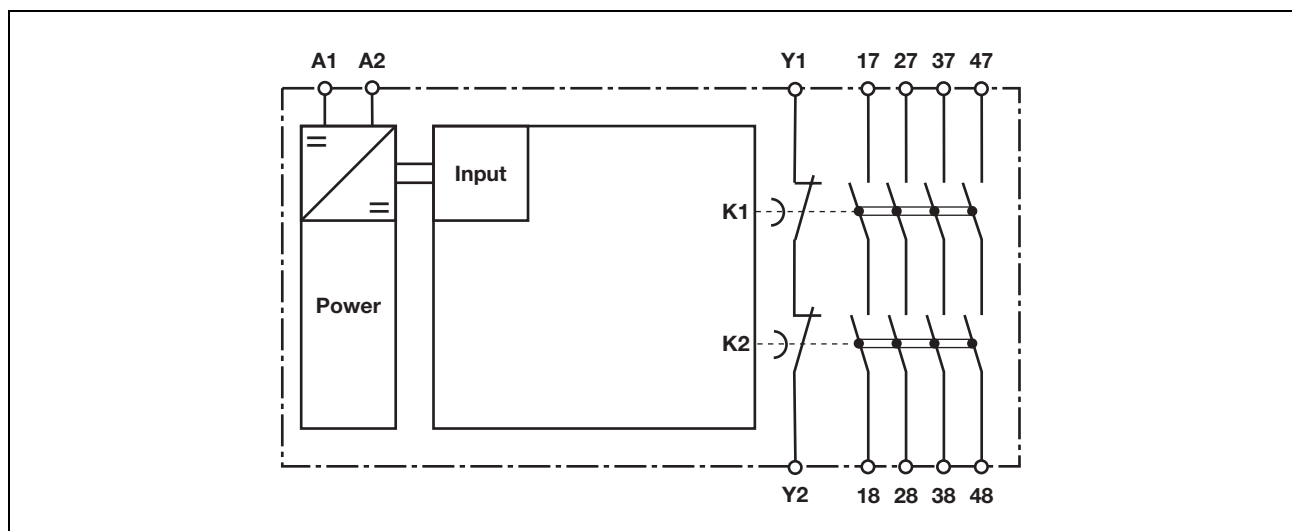
Unit description

The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all safety relays with feedback loop. The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this. The delay-on de-energisation safety contacts may only be used up to category 3.

Safety features

- The unit meets the following safety requirements:
- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
 - } The safety function remains effective in the case of a component failure.
 - } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
 - } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Block diagram

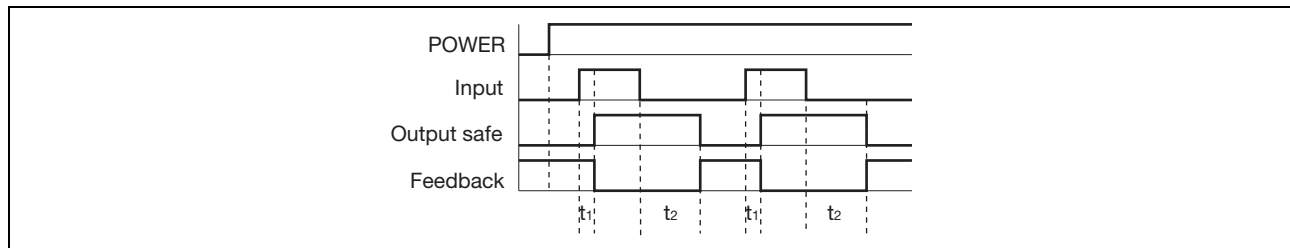


Delayed PZE X4V

Function description

- } Single-channel operation: one input circuit affects both output relays

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits A1
- } Output safe: Safety contacts 17-18, 27-28, 37-38, 47-48
- } Feedback: Feedback loop Y1-Y2
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 17-18, 27-28, 37-38, 47-48 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs

$I_{\max}$ in the input circuit:

$$I_{\max} = \frac{R_{l\max}}{R_l / \text{km}}$$

$R_{l\max}$ = max. overall cable resistance (see technical details)

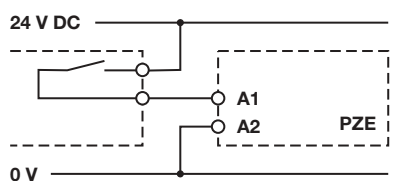
R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

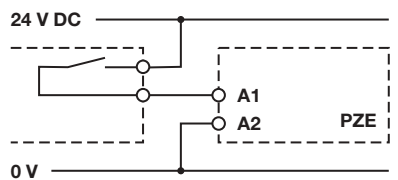
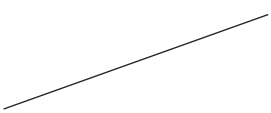
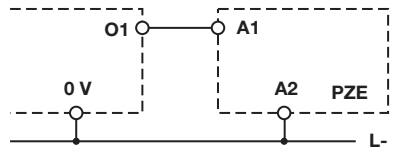
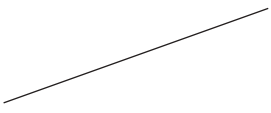
Delayed PZE X4V

Preparing for operation

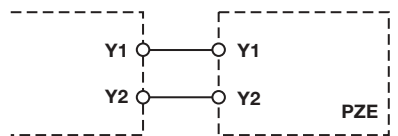
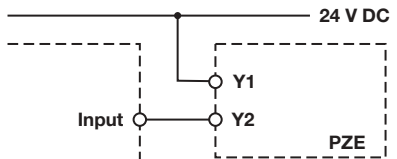
} Supply voltage

Supply voltage	AC	DC
		

} Input circuit

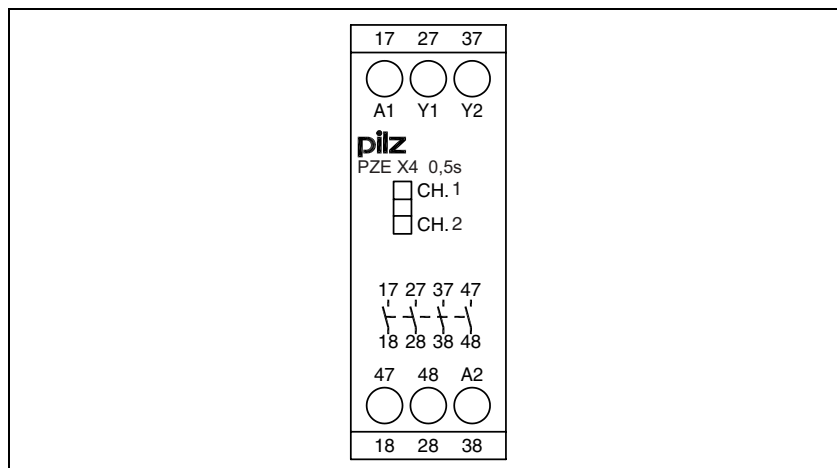
Input circuit	Single-channel	Dual-channel
Base unit: PNOZ X safety relay Driven via safety contacts		
Base unit: PNOZelog safety relay Driven via semiconductor outputs (24 VDC)		

} Feedback loop

Feedback loop	Base unit: PNOZ X safety relay	Base unit: PNOZelog safety relay
Y1, Y2 and Input are inputs on the base unit; they evaluate the feedback loop		

Delayed PZE X4V

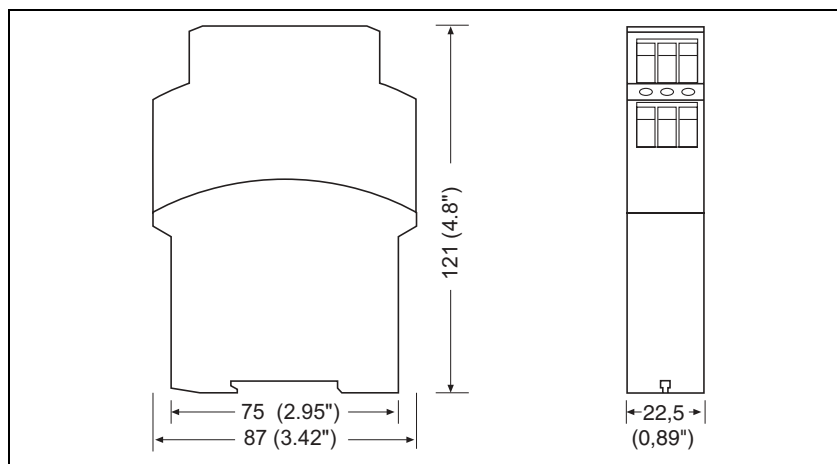
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

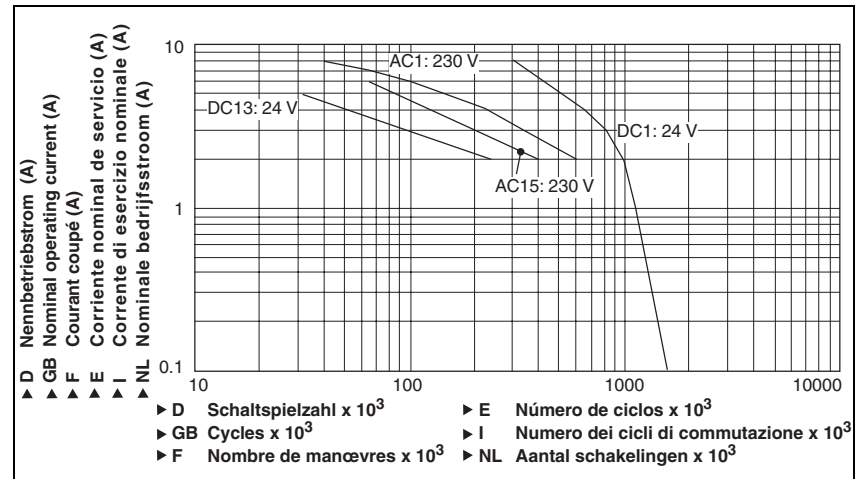


Delayed PZE X4V

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



2.3

Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B DC	2.5 W
Residual ripple DC	20 %
Voltage and current at Input circuit: 24 VDC	85 mA
Output contacts in accordance with EN 954-1, Category 4	Safety contacts (N/O): 4
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5 \text{ A}$ $P_{max}: 1200 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 5 \text{ A}$ $P_{max}: 120 \text{ W}$
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V	$I_{max}: 3 \text{ A}$
DC13 (6 cycles/min): 24 V	$I_{max}: 4 \text{ A}$
Contact material	AgSnO₂ + 0.2 µm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	6 A
Blow-out fuse, slow	4 A
Circuit breaker	4 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} Input circuits Single-channel at U_B DC	30 Ohm

Delayed PZE X4V

2.3

Times

Switch-on delay with automatic reset after power on typ. with automatic reset after power on max.	23 ms 40 ms
Delay-on de-energisation with E-STOP typ.	0.5 s Order no.: 774580 0.75 s Order no.: 774586 1 s Order no.: 774581 2 s Order no.: 774582 3 s Order no.: 774583
with power failure typ.	0.5 s Order no.: 774580 0.75 s Order no.: 774586 1 s Order no.: 774581 2 s Order no.: 774582 3 s Order no.: 774583
Tolerance	-50 % / +50 %
Supply interruption before de-energisation	20 ms

Environmental data

EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20

Mechanical data

Housing material	PPO UL 94 V0
Housing	ABS UL 94 V0
Front	
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 – 4.00 mm²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 – 2.50 mm²
without crimp connectors or with TWIN crimp connectors	0.20 – 2.50 mm²
Torque setting with screw terminals	0.60 Nm
Dimensions (H x W x D)	
with screw terminals	87 mm x 22.5 mm x 121 mm
Weight	200 g Order no.: 774580, 774586 205 g Order no.: 774581 215 g Order no.: 774582, 774583

The standards current on **09/04** apply.

Max. continuous current

Number of contacts	$I_{\max}$ (A) at U_B DC
1	5.0 A
2	5.0 A
3	4.5 A
4	4 A

Delayed PZE X4V

Order reference

Type	Features			Terminals	Order no.
PZE X4V	24 VDC	0.5 s fixed		Screw terminals	774 580
PZE X4V	24 VDC	0.75 s fixed		Screw terminals	774 586
PZE X4V	24 VDC	1 s fixed		Screw terminals	774 581
PZE X4V	24 VDC	2 s fixed		Screw terminals	774 582
PZE X4V	24 VDC	3 s fixed		Screw terminals	774 583

Instantaneous PZE X5



Contact expander module for increasing the number of available contacts

Approvals

	PZE X5
	É
	É
	É

Unit features

- } Positive-guided relay outputs:
 - 5 safety contacts (N/O), instantaneous
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } See order reference for unit types

Unit description

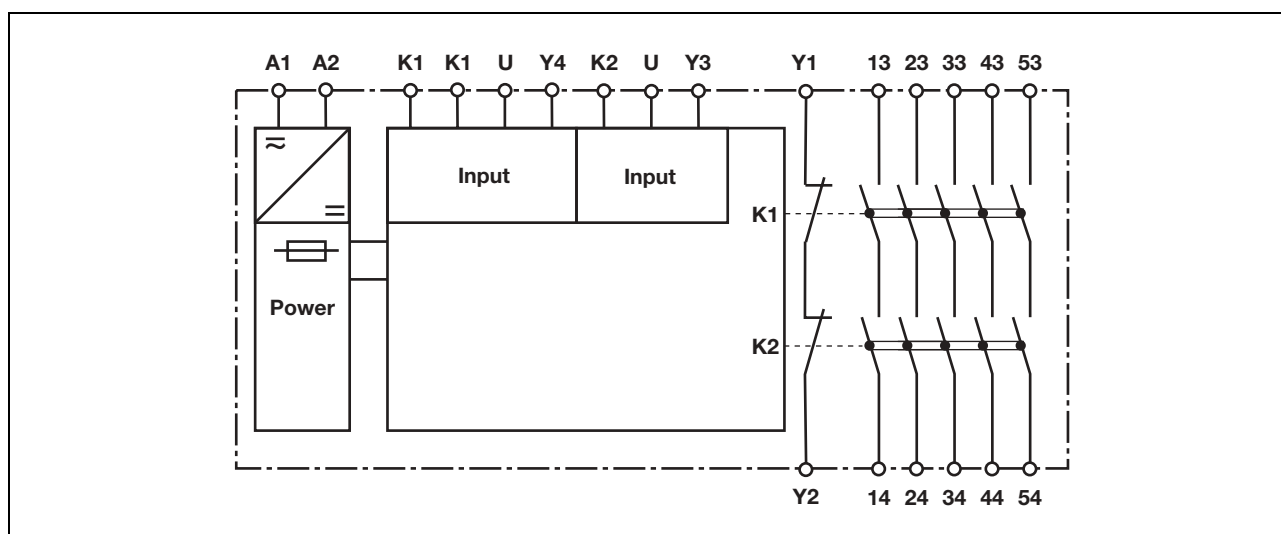
The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all safety relays with feedback loop. The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this.

Safety features

The unit meets the following safety requirements:

- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Block diagram

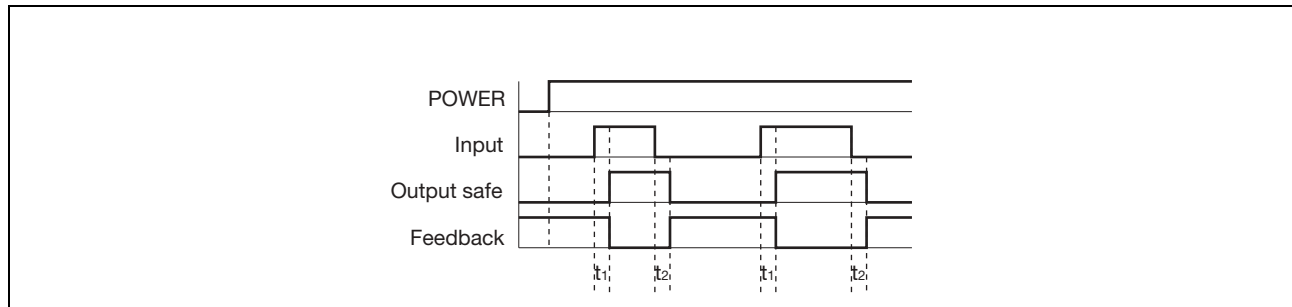


Instantaneous PZE X5

Function description

- } Single-channel operation: one input circuit affects both output relays
- } Dual-channel operation:
 - two redundant input circuits affect one output relay
 - Detection of shorts across contacts is also possible

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits K1-U-Y4, K2-U-Y3
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54
- } Feedback: Feedback loop Y1-Y2
- } t₁: Switch-on delay
- } t₂: Delay-on de-energisation

Wiring

Please note:

- } Information given in the “Technical details” must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54 are safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs $I_{\max}$ in the input circuit:

$$I_{\max} = \frac{R_{I\max}}{R_l / \text{km}}$$

$R_{I\max}$ = max. overall cable resistance (see technical details)
 R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Instantaneous
PZE X5

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

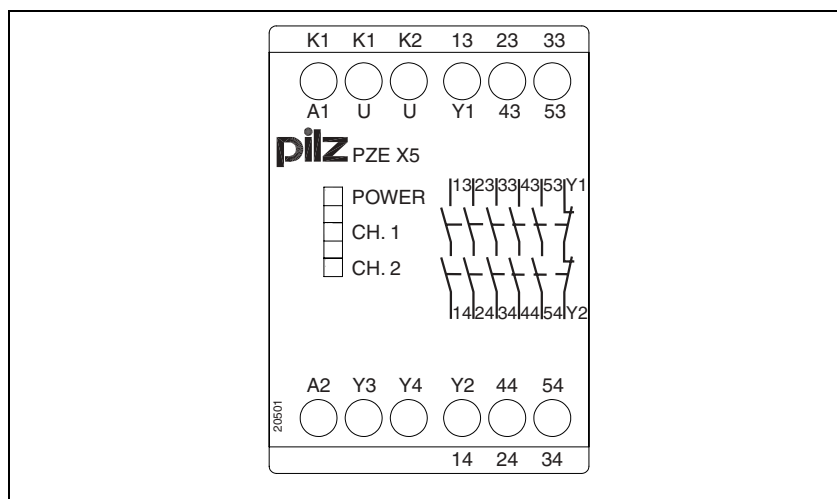
Input circuit	Single-channel	Dual-channel
without detection of shorts across contacts		
with detection of shorts across contacts		

} Feedback loop

Y1 and Y2 are feedback loop inputs on the base unit	

Instantaneous PZE X5

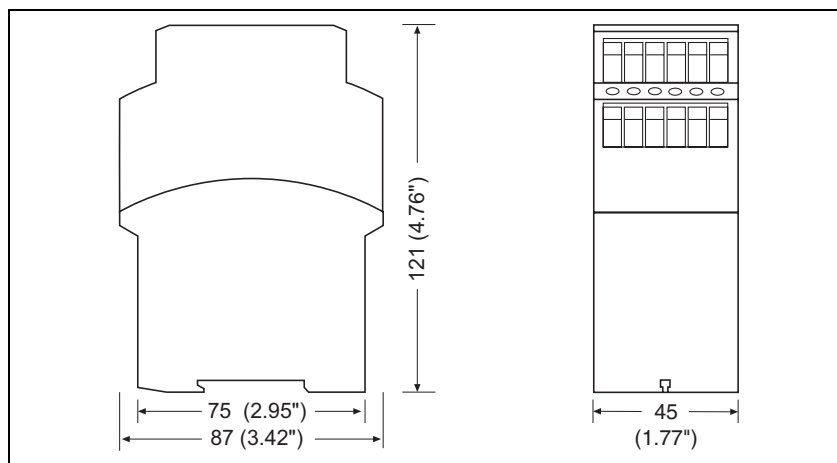
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

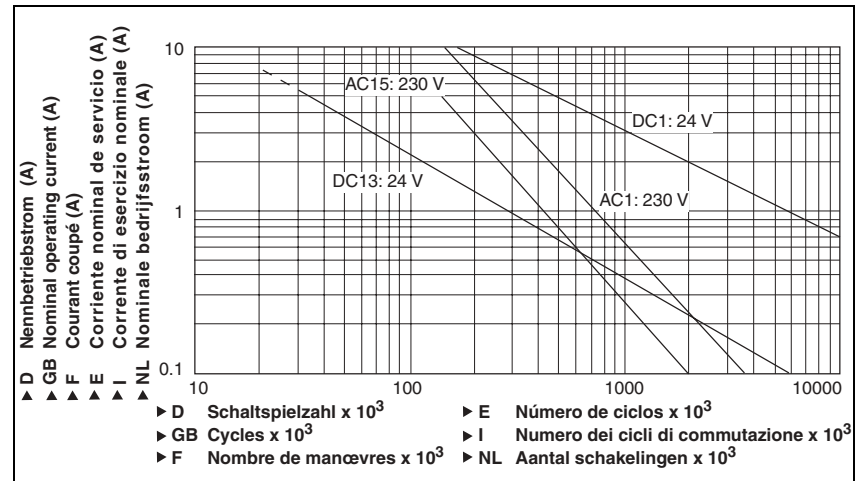


Instantaneous PZE X5

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B DC	3.5 W
Residual ripple DC	20 %
Voltage and current at Input circuit: 24 VDC	40 mA
Output contacts in accordance with EN 954-1	Safety contacts (N/O): 5
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	$I_{min}: 0.01 \text{ A}, I_{max}: 8 \text{ A}$ $P_{max}: 2000 \text{ VA}$
DC1: 24 V	$I_{min}: 0.01 \text{ A}, I_{max}: 8 \text{ A}$ $P_{max}: 200 \text{ W}$
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V DC13 (6 cycles/min): 24 V	$I_{max}: 5 \text{ A}$ $I_{max}: 7 \text{ A}$
Contact material	AgSnO₂ + 0.2 μm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} Input circuits, Single-channel at U_B DC	120 Ohm
Dual-channel without detect. of shorts across contacts at U_B DC	240 Ohm
Dual-channel with detect. of shorts across contacts at U_B DC	4 Ohm

Times

Switch-on delay with automatic reset typ. with automatic reset max.	16 ms 30 ms
Delay-on de-energisation with E-STOP typ. with E-STOP max. with power failure typ. with power failure max.	13 ms 30 ms 110 ms 150 ms
Supply interruption before de-energisation Supply voltage Input circuit	20 ms 8 ms

Instantaneous PZE X5

2.3

Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 – 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 – 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 2.50 mm ²
Torque setting with screw terminals	0.6 Nm
Dimensions (H x W x D)	
with screw terminals	87 mm x 45 mm x 121 mm
Weight	270 g

The standards current on 10/04 apply.

Max. continuous current	
Number of contacts	I _{max} (A) at U _B DC
1	8.00 A
2	8.00 A
3	6.50 A
4	5.60 A
5	5.00 A

Order reference			
Type	Features	Terminals	Order no.
PZE X5	24 VDC	Screw terminals	774 595

Delayed PZE X5V



Contact expander module for increasing the number of available contacts

Approvals

	PZE X5V
	É
	É
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Unit features

- } Positive-guided relay outputs:
 - 5 safety contacts (N/O), delay-on de-energisation
- } Cancellation of delay time
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } See order reference for unit types

Unit description

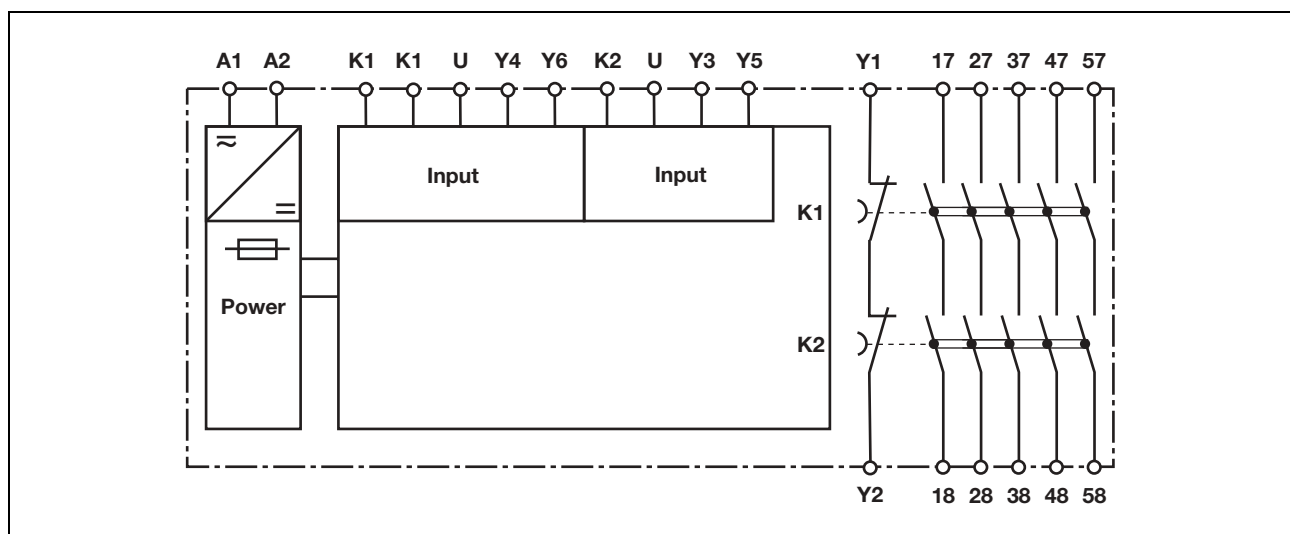
The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all safety relays with feedback loop. The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this. The delay-on de-energisation safety contacts may only be used up to category 3.

Safety features

The unit meets the following safety requirements:

- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Block diagram

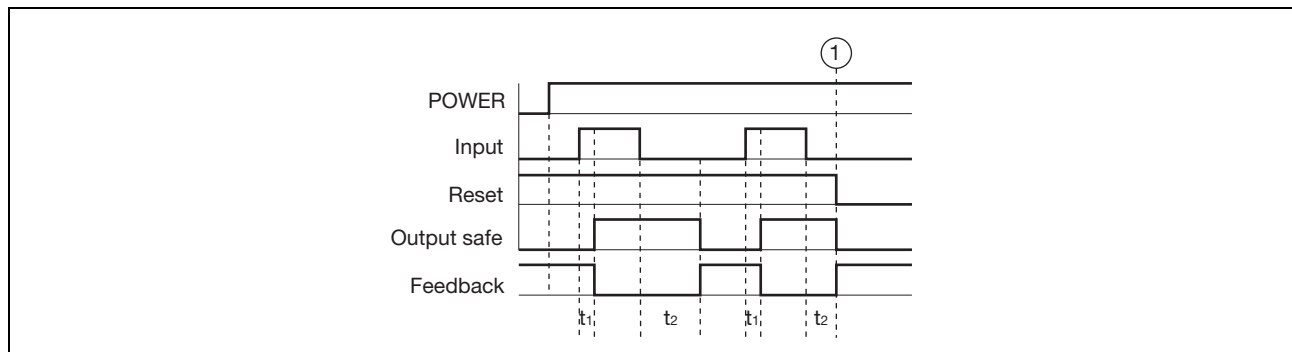


Delayed PZE X5V

Function description

- } Single-channel operation: one input circuit affects both output relays
- } Dual-channel operation:
 - two redundant input circuits affect one output relay
 - Detection of shorts across contacts is also possible

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits K1-U-Y4-Y6, K2-U-Y3-Y5
- } i : Cancellation of delay time
- } Output safe: Safety contacts 17-18, 27-28, 37-38, 47-48, 57-58
- } Feedback: Feedback loop Y1-Y2
- } t_1 : Switch-on delay
- } t_2 : Delay-on de-energisation

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 17-18, 27-28, 37-38, 47-48, 57-58 are delay-on de-energisation safety contacts.
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

**Delayed
PZE X5V**

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
without detection of shorts across contacts		
with detection of shorts across contacts		

} Feedback loop

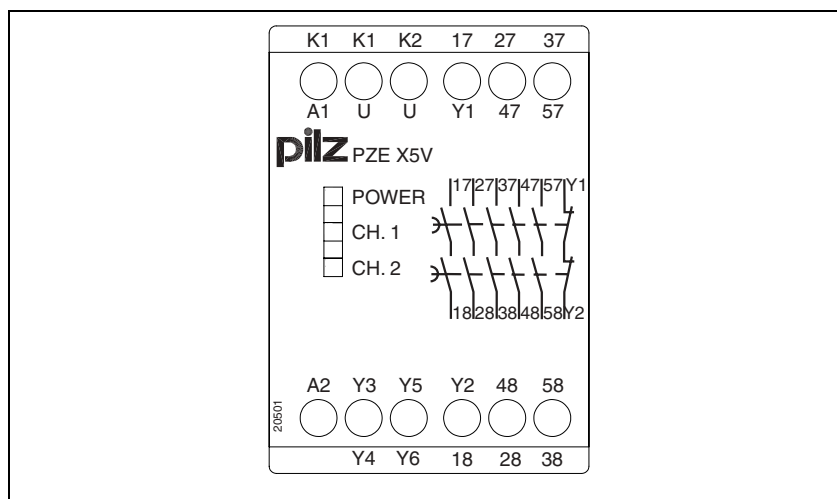
Y1 and Y2 are feedback loop inputs on the base unit	

} Cancellation of delay time

N/C contacts between Y3-Y5 and Y4-Y6	

Delayed PZE X5V

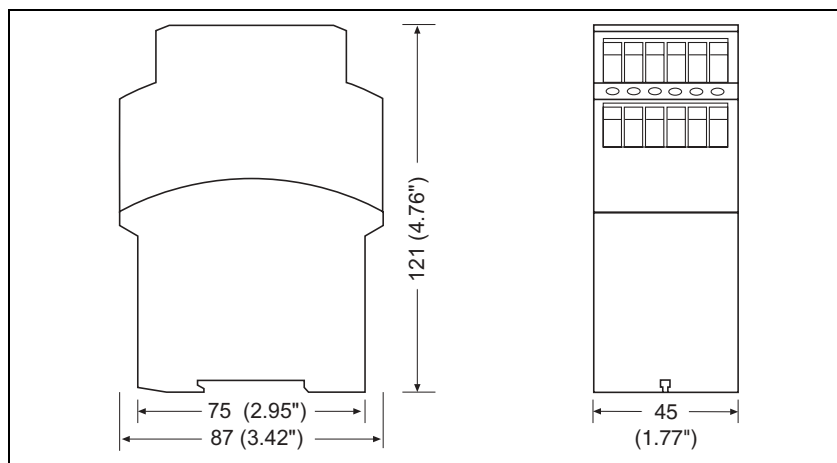
Terminal configuration



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

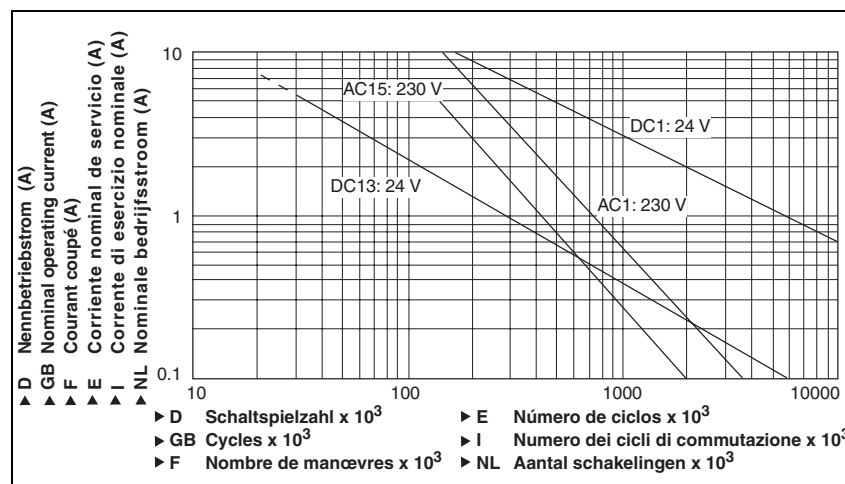


Delayed PZE X5V

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B DC	24 V, 48 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B DC	4 W Order no.: 774590 3.5 W Order no.: 774592, 774593
Residual ripple DC	20 %
Voltage and current at input circuit	48 VDC, 35 mA Order no.: 774590 24 VDC, 35 mA Order no.: 774592, 774593
Output contacts in accordance with EN 954-1 , Category 3	Safety contacts (N/O), delayed (<30 s): 5
Utilisation category in accordance with EN 60947-4-1 AC1: 240 V	I_{min} : 0.01 A , I_{max} : 8 A P_{max} : 2000 VA
DC1: 24 V	I_{min} : 0.01 A , I_{max} : 8 A P_{max} : 200 W
Utilisation category in accordance with EN 60947-5-1 AC15: 230 V	I_{max} : 5 A
DC13 (6 cycles/min): 24 V	I_{max} : 7 A
Contact material	AgSnO₂ + 0.2 σm Au
External contact fuse protection (EN 60947-5-1)	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A , 24 VAC/DC, characteristic B/C
Max. overall cable resistance R_{lmax} Input circuits, reset circuits	
single-channel at U_B DC	100 Ohm
dual-channel without detect. of shorts across contacts at U_B DC	200 Ohm
dual-channel with detect. of shorts across contacts at U_B DC	7 Ohm
Times	
Switch-on delay	
with automatic reset typ.	35 ms
with automatic reset max.	50 ms
with automatic reset after power on typ.	35 ms
with automatic reset after power on max.	50 ms
Delay time t_v	
Fixed	1.5 s Order no.: 774592 3 s Order no.: 774590, 774593
Time accuracy	-50 % / + 50 %

Delayed PZE X5V

2.3

Supply interruption before de-energisation	0.7 s Order no.: 774592
Supply voltage	0.7 s Order no.: 774590, 774593
Input circuit	1.4 s Order no.: 774592
	1.4 s Order no.: 774590, 774593
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	VDE 0110-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20
Mechanical data	
Housing material	
Housing	PPO UL 94 V0
Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 – 4.00 mm²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 – 2.50 mm²
without crimp connectors or with TWIN crimp connectors	0.20 – 2.50 mm²
Torque setting with screw terminals	0.6 Nm
Dimensions (H x W x D)	
with screw terminals	87 mm x 45 mm x 121 mm
Weight	300 g Order no.: 774590
	305 g Order no.: 774592, 774593

The standards current on **10/04** apply.

Max. continuous current	
Number of contacts	$I_{\max}$ (A) at U_B DC
1	8 A
2	8 A
3	6.5 A
4	5.6 A
5	5 A

Order reference				
Type			Terminals	Order no.
PZE X5V	24 VDC	1.5 s fixed	Screw terminals	774 592
PZE X5V	24 VDC	3 s fixed	Screw terminals	774 593
PZE X5V	48 VDC	3 s fixed	Screw terminals	774 590

Instantaneous PZE 9



Contact expander module for increasing the number of available contacts

Approvals

	PZE 9
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	É
	É

Unit features

- } Positive-guided relay outputs:
 - 8 safety contacts (N/O), instantaneous
 - 1 auxiliary contact (N/C), instantaneous
- } LED indicator for:
 - Switch status channel 1/2
 - Supply voltage
- } See order reference for unit types

Gerätebeschreibung

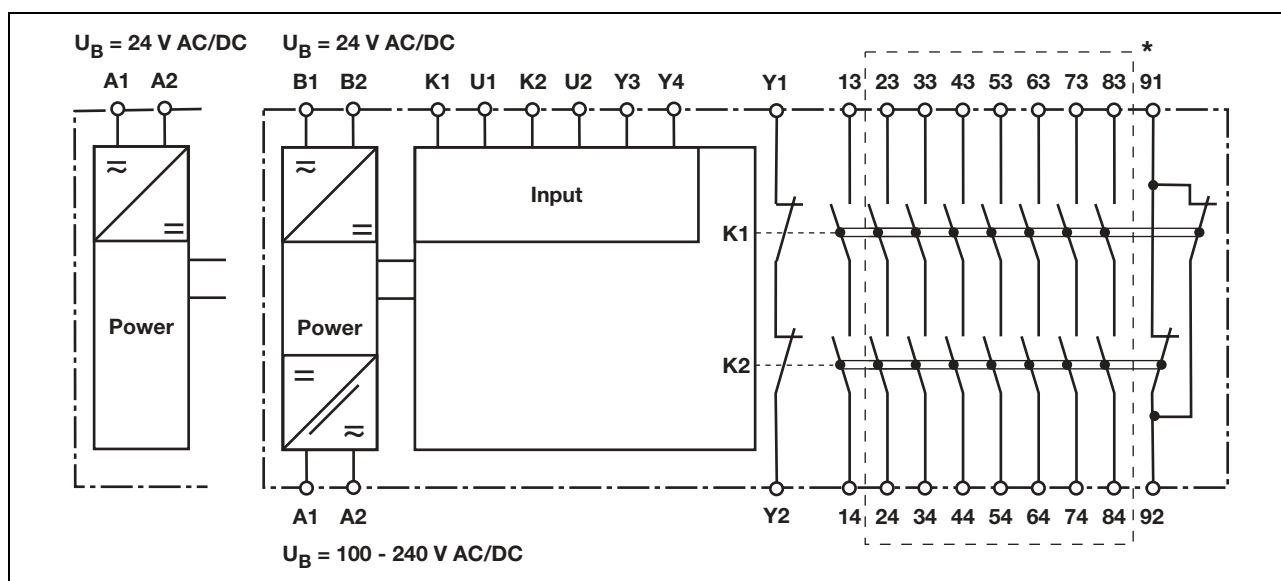
The unit meets the requirements of EN 60204-1 and IEC 60204-1. The contact expander module is used to increase the number of contacts available on a base unit. Base units are all safety relays with feedback loop. The category that can be achieved in accordance with EN 954-1 depends on the category of the base unit. The contact expander module may not exceed this.

Safety features

The unit meets the following safety requirements:

- } The contact expander module expands an existing circuit. As the output relays are monitored via the base unit's feedback loop, the safety functions on the existing circuit are transferred to the contact expander module.
- } The safety function remains effective in the case of a component failure.
- } Earth fault in the feedback loop: Detected, depending on the base unit that is used.
- } Earth fault in the input circuit: The output relays de-energise and the safety contacts open.

Blockschaltbild



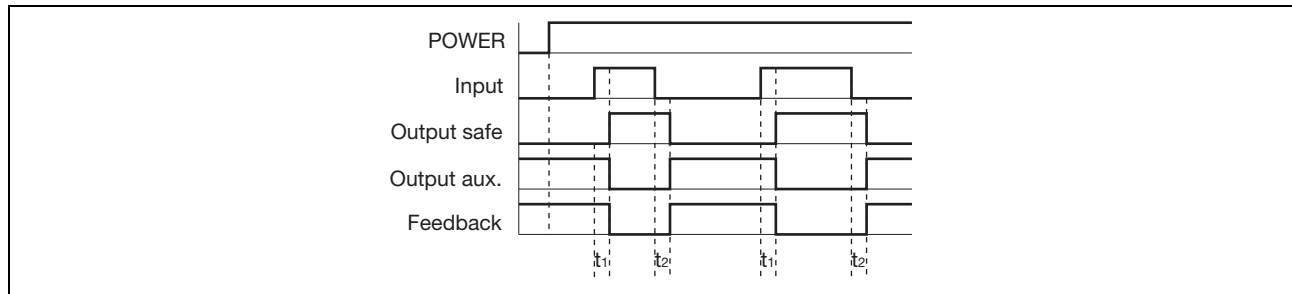
* Galvanic isolation at UB AC

Instantaneous PZE 9

Function description

- } Single-channel operation: one input circuit affects both output relays
- } Dual-channel operation:
- two redundant input circuits affect one output relay
- Detection of shorts across contacts is also possible

Timing diagram



Key

- } Power: Supply voltage
- } Input: Input circuits U1, U2, K1, K2, Y3, Y4
- } Output safe: Safety contacts 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74, 83-84
- } Output aux: Auxiliary contacts 91-92
- } Feedback: Feedback loop Y1-Y2
- } t1: Switch-on delay

Wiring

Please note:

- } Information given in the "Technical details" must be followed.
- } Outputs 13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74, 83-84 are safety contacts, output 91-92 is an auxiliary contact (e.g. for display).
- } To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- } Calculation of the max. cable runs I_{max} in the input circuit:

$$I_{max} = \frac{R_{lmax}}{R_l / km}$$

R_{lmax} = max. overall cable resistance (see technical details)

R_l / km = cable resistance/km

- } Use copper wire that can withstand 60/75 °C.
- } Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.

Instantaneous
PZE 9

Preparing for operation

} Supply voltage

Supply voltage	AC	DC

} Input circuit

Input circuit	Single-channel	Dual-channel
without detection of shorts across contacts		
with detection of shorts across contacts		

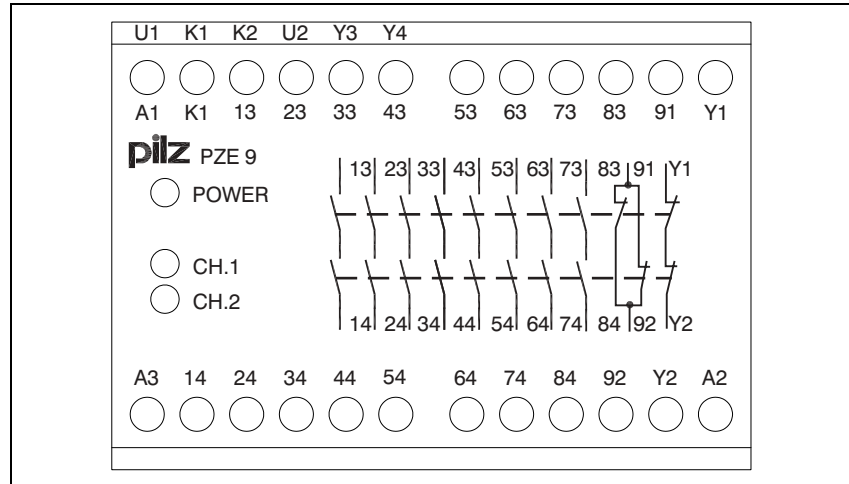
} Feedback loop

Y1 and Y2 are feedback loop inputs on the base unit	

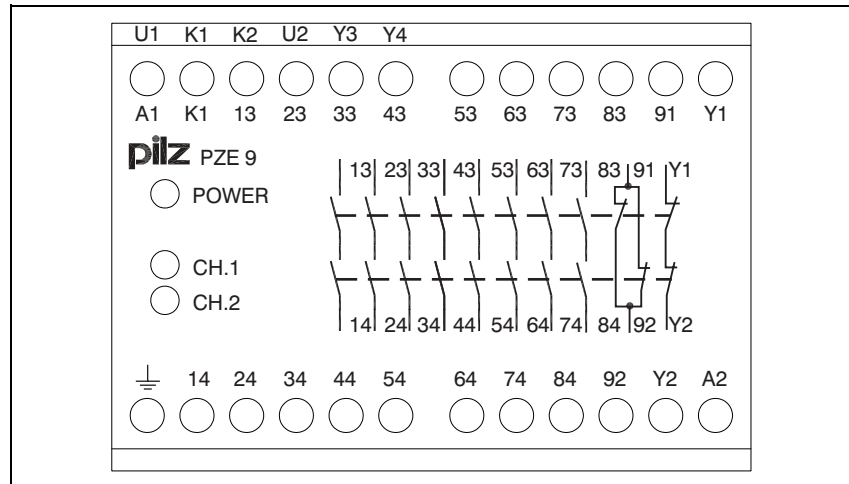
Instantaneous PZE 9

Terminal configuration

UB = 24 VDC



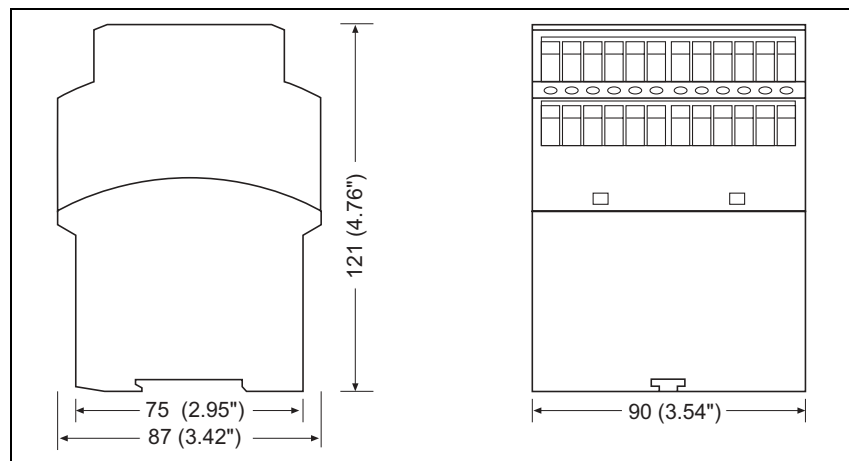
UB = 24 V, 42 V, 48 V, 110 – 120 V, 230 – 240 VAC



Installation

- } The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- } Use the notch on the rear of the unit to attach it to a DIN rail.
- } Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions

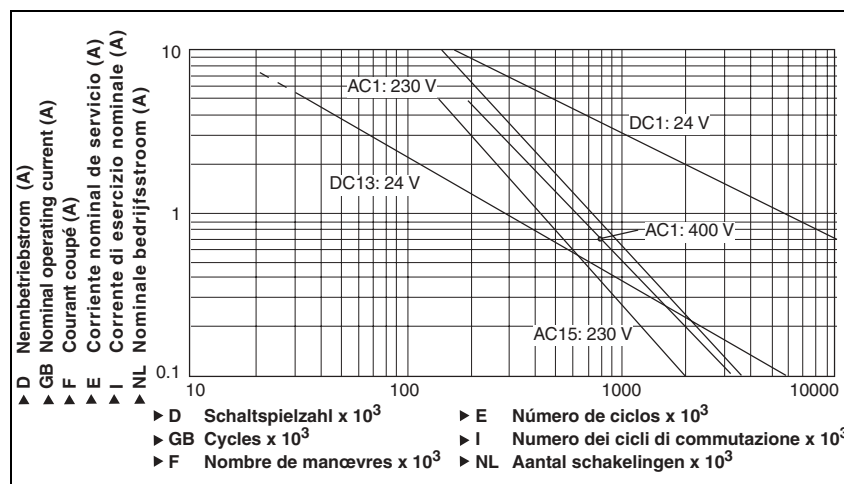


Instantaneous PZE 9

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical details

Electrical data

Supply voltage U_B AC	24 V, 42 V, 48 V, 110 – 120 V, 230 – 240 V
Supply voltage U_B DC	24 V
Voltage tolerance	-15 % / +10 %
Power consumption at U_B AC	7 VA
Power consumption at U_B DC	3.5 W
Frequency range AC	50 – 60 Hz
Residual ripple DC	160 %

Voltage and current at

Input circuit: **24 VDC**

40 mA

Output contacts in accordance with **EN 954-1**

Safety contacts (N/O): **8**

Auxiliary contacts (N/C): **1**

Utilisation category in accordance with **EN 60947-4-1**

Safety contacts:

AC1: **240 V**

I_{min} : 0.01 A, I_{max} : 8 A

P_{max} : 2000 VA

AC1: **400 V**

I_{min} : 0.01 A, I_{max} : 5 A

P_{max} : 2000 VA

DC1: **24 V**

I_{min} : 0.01 A, I_{max} : 8 A

P_{max} : 200 W

Utilisation category in accordance with **EN 60947-5-1**

AC15: **230 V**

I_{max} : 5 A

DC13 (6 cycles/min): **24 V**

I_{max} : 7 A

Utilisation category in accordance with **EN 60947-4-1**

Auxiliary contacts

AC1: **240 V**

I_{min} : 0.01 A, I_{max} : 2 A

P_{max} : 500 VA

DC1: **24 V**

I_{min} : 0.01 A, I_{max} : 2 A

P_{max} : 50 VA

Utilisation category in accordance with **EN 60947-5-1**

AC15: **230 V**

I_{max} : 2 A

DC13 (6 cycles/min): **24 V**

I_{max} : 2 A

Instantaneous PZE 9

2.3

Electrical data	
Contact material	AgSnO ₂ + 0.2 µm Au
External contact fuse protection (EN 60947-5-1)	
Safety contacts	
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Circuit breaker	6 A, 24 VAC/DC, characteristic B/C
External contact fuse protection (EN 60947-5-1)	
Auxiliary contacts	
Blow-out fuse, quick	4 A
Blow-out fuse, slow	2 A
Circuit breaker	2 A, 24 VAC/DC, characteristic B/C
Max. overall cable resistance R _{I max} Input circuits, reset circuits	
Single-channel at U _B DC	50 Ohm Order no.: 774150
Single-channel at U _B AC	80 Ohm Order no.: 777140, 774141, 777142, 777143, 774148
Dual-channel without detect. of shorts across contacts at U _B DC	100 Ohm Order no.: 774150
Dual-channel without detect. of shorts across contacts at U _B AC	160 Ohm Order No.: 777140, 774141, 777142, 777143, 774148
Dual-channel with detect. of shorts across contacts at U _B DC	5 Ohm Order no.: 774150
Dual-channel with detect. of shorts across contacts at U _B AC	10 Ohm Order no.: 777140, 774141, 777142, 777143, 774148
Times	
Switch-on delay	
After closing the input circuits typ.	30 ms Order no.: 774150
	25 ms Order no.: 777140, 774141, 777142, 777143, 774148
After closing the input circuits max.	40 ms
After power on typ.	30 ms Order no.: 774150
	50 ms Order no.: 777140, 774141, 777142, 777143, 774148
Power on max.	40 ms Order no.: 774150
	70 ms Order no.: 777140, 774141, 777142, 777143, 774148
Delay-on de-energisation	
After opening the input circuits typ.	20 ms
After opening the input circuits max.	30 ms
with power failure typ.	110 ms Order no.: 774150
	220 ms Order no.: 777140, 774141, 777142, 777143, 774148
with power failure max.	150 ms Order no.: 774150
	300 ms Order no.: 777140, 774141, 777142, 777143, 774148
Supply interruption before de-energisation	
	20 ms Order no.: 774150
	150 ms Order no.: 777140, 774141, 777142, 777143, 774148
Environmental data	
EMC	EN 60947-5-1, EN 61000-6-2
Vibration in accordance with EN 60068-2-6	
Frequency	10 - 55 Hz
Amplitude	0.35 mm
Climatic suitability	EN 60068-2-78
Airgap creepage	EN 60947-1
Ambient temperature	-10 - 55 °C
Storage temperature	-40 - 85 °C
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP40
Terminals	IP20

Instantaneous PZE 9

Mechanical data	
Housing material	PPO UL 94 V0
Housing Front	ABS UL 94 V0
Max. cross section of external conductors with screw terminals	
1 core flexible	0.20 – 4.00 mm ²
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.20 – 2.50 mm ²
without crimp connectors or with TWIN crimp connectors	0.20 – 2.50 mm ²
Torque setting with screw terminals	0.6 Nm
Dimensions (H x W x D) with screw terminals	87 mm x 90 mm x 121 mm
Weight	450 g Order no.: 774150 600 g Order no.: 777140, 774141, 777142, 777143, 774148

The standards current on **03/01** apply.

2.3

Max. continuous current			
Number of con- tacts	I _{max} (A) at U _B DC	I _{max} (A) at U _B AC	I _{max} (A) at U _B AC, DC: AC1 = 400 V
1	8.0 A Order no.: 774150	8.0 A Order no.: 774140, 774141, 774142, 774143, 774148	5.0 A
2	8.0 A Order no.: 774150	8.0 A Order no.: 774140, 774141, 774142, 774143, 774148	5.0 A
3	8.0 A Order no.: 774150	7.4 A Order no.: 774140, 774141, 774142, 774143, 774148	5.0 A
4	7.1 A Order no.: 774150	6.4 A Order no.: 774140, 774141, 774142, 774143, 774148	5.0 A
5	6.3 A Order no.: 774150	5.7 A Order no.: 774140, 774141, 774142, 774143, 774148	5.0 A
6	5.8 A Order no.: 774150	5.2 A Order no.: 774140, 774141, 774142, 774143, 774148	5.0 A
7	5.4 A Order no.: 774150	4.8 A Order no.: 774140, 774141, 774142, 774143, 774148	4.8 A
8	5.0 A Order no.: 774150	4.5 A Order no.: 774140, 774141, 774142, 774143, 774148	4.5 A

Order reference			
Type	Features	Terminals	Order no.
PZE 9	24 VAC	Screw terminals	774 140
PZE 9	42 VAC	Screw terminals	774 141
PZE 9	48 VAC	Screw terminals	774 142
PZE 9	110 - 120 VAC	Screw terminals	774 143
PZE 9	230 - 240 VAC	Screw terminals	774 148
PZE 9	24 VDC	Screw terminals	774 150

Order reference

Content	Page
Order reference	
Electronic monitoring relays S-Range	
Alphabetically by type	3.1-2
Numerically by order number	3.1-4
Safety relays, compact	
Alphabetically by type	3.1-6
Numerically by order number	3.1-12

Electronic monitoring relays S-Range

Alphabetically by type

Type	U _B	U _M	I _M	R _{on}	Order no.	Page
PFU6	24 - 42 VAC/DC, 42 V - 240 VAC/DC				841 000	1.1-16
S1EN	24 - 240 VAC/DC			50 KT	884 100	1.1-30
S1EN	24 - 240 VAC/DC			200 KT	884 110	1.1-30
S1IM	24 VAC		15 A		828 020	1.1-26
S1IM	42 - 48 VAC		15 A		828 030	1.1-26
S1IM	110 - 130 V AC		15 A		828 040	1.1-26
S1IM	230 - 240 VAC		15 A		828 050	1.1-26
S1IM UP	24 VDC		15 A		828 035	1.1-26
S1M0	24 VAC/DC				839 600	1.1-42
S1M0	48 VAC				839 620	1.1-42
S1M0	110 VAC				839 630	1.1-42
S1M0	230 VAC				839 650	1.1-42
S1M0	240 VAC				839 655	1.1-42
S1M0	400 VAC				839 660	1.1-42
S1MN	24 VAC/DC				839 400	1.1-39
S1MN	48 VAC				839 405	1.1-39
S1MN	110 VAC				839 410	1.1-39
S1MN	230 VAC				839 415	1.1-39
S1MN	240 VAC				839 420	1.1-39
S1MN	400 VAC				839 425	1.1-39
S1MS	24 VAC/DC				839 775	1.1-36
S1MS	48 VAC				839 725	1.1-36
S1MS	110 VAC				839 740	1.1-36
S1MS	230 VAC				839 760	1.1-36
S1MS	240 VAC				839 765	1.1-36
S1MS	400 VAC				839 770	1.1-36
S1PN	200 - 240 V				890 200	1.1-13
S1PN	400 - 500 V				890 210	1.1-13
S1PN	550 - 690 V				890 220	1.1-13
S1SW P	24 - 230 VAC/DC	690 VAC/DC			407 710	1.1-45
S1UM	24 VAC	500 VAC/DC			827 230	1.1-2
S1UM	42 - 48 VAC	500 VAC/DC			827 240	1.1-2
S1UM	110 - 130 VAC	500 VAC/DC			827 250	1.1-2
S1UM	230 - 240 VAC	500 VAC/DC			827 260	1.1-2
S1UM UP	24 VDC	500 VAC/DC			827 225	1.1-2
S1UM UP	24 VAC	500 VAC/DC			827 235	1.1-2
S1UM UP	42 - 48 VAC	500 VAC/DC			827 245	1.1-2
S1UM UP	110 - 130 VAC	500 VAC/DC			827 255	1.1-2
S1UM UP	230 - 240 VAC	500 VAC/DC			827 265	1.1-2
S1WP	24 VDC	0 - 120 VAC/DC	9 A		890 000	1.1-19
S1WP	24 VDC	0 - 240 VAC/DC	9 A		890 010	1.1-19
S1WP	24 VDC	0 - 415 VAC/DC	9 A		890 020	1.1-19
S1WP	24 VDC	0 - 550 VAC/DC	9 A		890 030	1.1-19
S1WP	230 VAC/DC	0 - 120 VAC/DC	9 A		890 040	1.1-19
S1WP	230 VAC/DC	0 - 240 VAC/DC	9 A		890 050	1.1-19
S1WP	230 VAC/DC	0 - 415 VAC/DC	9 A		890 060	1.1-19
S1WP	230 VAC/DC	0 - 550 VAC/DC	9 A		890 070	1.1-19
S1WP	24 VDC	0 - 120 VAC/DC	18 A		890 100	1.1-19
S1WP	24 VDC	0 - 240 VAC/DC	18 A		890 110	1.1-19
S1WP	24 VDC	0 - 415 VAC/DC	18 A		890 120	1.1-19
S1WP	24 VDC	0 - 550 VAC/DC	18 A		890 130	1.1-19
S1WP	230 VAC/DC	0 - 120 VAC/DC	18 A		890 140	1.1-19
S1WP	230 VAC/DC	0 - 240 VAC/DC	18 A		890 150	1.1-19
S1WP	230 VAC/DC	0 - 415 VAC/DC	18 A		890 160	1.1-19
S1WP	230 VAC/DC	0 - 550 VAC/DC	18 A		890 170	1.1-19

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S3UM	24 VDC	42 VAC			837 240	1.1-9
S3UM	24 VDC	100/110 VAC			837 250	1.1-9
S3UM	24 VDC	230 VAC			837 260	1.1-9
S3UM	24 VDC	400/440 VAC			837 270	1.1-9
S3UM	24 VDC	415/460 VAC			837 280	1.1-9
S3UM	24 VDC	440/480 VAC			837 285	1.1-9
S3UM	24 VDC	500/550 VAC			837 290	1.1-9
S3UM	120 VAC	440/480 VAC			837 395	1.1-9
S3UM	230 VAC	42 VAC			837 340	1.1-9
S3UM	230 VAC	100/110 VAC			837 350	1.1-9
S3UM	230 VAC	230 VAC			837 360	1.1-9
S3UM	230 VAC	400/440 VAC			837 370	1.1-9
S3UM	230 VAC	415/460 VAC			837 380	1.1-9
S3UM	230 VAC	500/550 VAC			837 390	1.1-9
ZUZ	24 VDC, 24, 110, 230 VAC				827 100	1.1-6

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Order no.	Type	U _B	U _M	I _M	R _{on}	Page
407 710	S1SW P	24 - 230 VAC/DC	690 VAC/DC			1.1-45
827 100	ZUZ	24 VDC, 24, 110, 230 VAC				1.1-6
827 225	S1UM UP	24 VDC	500 VAC/DC			1.1-2
827 230	S1UM	24 VAC	500 VAC/DC			1.1-2
827 235	S1UM UP	24 VAC	500 VAC/DC			1.1-2
827 240	S1UM	42 - 48 VAC	500 VAC/DC			1.1-2
827 245	S1UM UP	42 - 48 VAC	500 VAC/DC			1.1-2
827 250	S1UM	110 - 130 VAC	500 VAC/DC			1.1-2
827 255	S1UM UP	110 - 130 VAC	500 VAC/DC			1.1-2
827 260	S1UM	230 - 240 VAC	500 VAC/DC			1.1-2
827 265	S1UM UP	230 - 240 VAC	500 VAC/DC			1.1-2
828 020	S1IM	24 VAC		15 A		1.1-26
828 030	S1IM	42 - 48 VAC		15 A		1.1-26
828 035	S1IM UP	24 VDC		15 A		1.1-26
828 040	S1IM	110 - 130 V AC		15 A		1.1-26
828 050	S1IM	230 - 240 VAC		15 A		1.1-26
837 240	S3UM	24 VDC	42 VAC			1.1-9
837 250	S3UM	24 VDC	100/110 VAC			1.1-9
837 260	S3UM	24 VDC	230 VAC			1.1-9
837 270	S3UM	24 VDC	400/440 VAC			1.1-9
837 280	S3UM	24 VDC	415/460 VAC			1.1-9
837 285	S3UM	24 VDC	440/480 VAC			1.1-9
837 290	S3UM	24 VDC	500/550 VAC			1.1-9
837 340	S3UM	230 VAC	42 VAC			1.1-9
837 350	S3UM	230 VAC	100/110 VAC			1.1-9
837 360	S3UM	230 VAC	230 VAC			1.1-9
837 370	S3UM	230 VAC	400/440 VAC			1.1-9
837 380	S3UM	230 VAC	415/460 VAC			1.1-9
837 390	S3UM	230 VAC	500/550 VAC			1.1-9
837 395	S3UM	120 VAC	440/480 VAC			1.1-9
839 400	S1MN	24 VAC/DC				1.1-39
839 405	S1MN	48 VAC				1.1-39
839 410	S1MN	110 VAC				1.1-39
839 415	S1MN	230 VAC				1.1-39
839 420	S1MN	240 VAC				1.1-39
839 425	S1MN	400 VAC				1.1-39
839 600	S1M0	24 VAC/DC				1.1-42
839 620	S1M0	48 VAC				1.1-42
839 630	S1M0	110 VAC				1.1-42
839 650	S1M0	230 VAC				1.1-42
839 655	S1M0	240 VAC				1.1-42
839 660	S1M0	400 VAC				1.1-42
839 725	S1MS	48 VAC				1.1-36
839 740	S1MS	110 VAC				1.1-36
839 760	S1MS	230 VAC				1.1-36
839 765	S1MS	240 VAC				1.1-36
839 770	S1MS	400 VAC				1.1-36
839 775	S1MS	24 VAC/DC				1.1-36
841 000	PFU6	24 - 42 VAC/DC, 42 V - 240 VAC/DC				1.1-16
884 100	S1EN	24 - 240 VAC/DC			50 KT	1.1-30
884 110	S1EN	24 - 240 VAC/DC			200 KT	1.1-30
890 000	S1WP	24 VDC	0 - 120 VAC/DC	9 A		1.1-19
890 010	S1WP	24 VDC	0 - 240 VAC/DC	9 A		1.1-19
890 020	S1WP	24 VDC	0 - 415 VAC/DC	9 A		1.1-19
890 030	S1WP	24 VDC	0 - 550 VAC/DC	9 A		1.1-19

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890 040	S1WP	230 VAC/DC	0 - 120 VAC/DC	9 A		1.1-19
890 050	S1WP	230 VAC/DC	0 - 240 VAC/DC	9 A		1.1-19
890 060	S1WP	230 VAC/DC	0 - 415 VAC/DC	9 A		1.1-19
890 070	S1WP	230 VAC/DC	0 - 550 VAC/DC	9 A		1.1-19
890 100	S1WP	24 VDC	0 - 120 VAC/DC	18 A		1.1-19
890 110	S1WP	24 VDC	0 - 240 VAC/DC	18 A		1.1-19
890 120	S1WP	24 VDC	0 - 415 VAC/DC	18 A		1.1-19
890 130	S1WP	24 VDC	0 - 550 VAC/DC	18 A		1.1-19
890 140	S1WP	230 VAC/DC	0 - 120 VAC/DC	18 A		1.1-19
890 150	S1WP	230 VAC/DC	0 - 240 VAC/DC	18 A		1.1-19
890 160	S1WP	230 VAC/DC	0 - 415 VAC/DC	18 A		1.1-19
890 170	S1WP	230 VAC/DC	0 - 550 VAC/DC	18 A		1.1-19
890 200	S1PN	200 - 240 V				1.1-13
890 210	S1PN	400 - 500 V				1.1-13
890 220	S1PN	550 - 690 V				1.1-13

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P2HZ X1	24 VAC	Screw terminals	774 330	2.3-157
P2HZ X1	42 VAC	Screw terminals	774 331	2.3-157
P2HZ X1	48 VAC	Screw terminals	774 332	2.3-157
P2HZ X1	110 VAC	Screw terminals	774 434	2.3-157
P2HZ X1	115 VAC	Screw terminals	774 435	2.3-157
P2HZ X1	120 VAC	Screw terminals	774 436	2.3-157
P2HZ X1	230 VAC	Screw terminals	774 438	2.3-157
P2HZ X1	240 VAC	Screw terminals	774 439	2.3-157
P2HZ X1	24 VDC	Screw terminals	774 340	2.3-157
P2HZ X1	26 VDC	Screw terminals	774 341	2.3-157
P2HZ X1.10P	24 VDC	Screw terminals	777 341	2.2-170
P2HZ X1.10P C	24 VDC	Cage clamp terminals	787 341	2.2-170
P2HZ X1P	24 VAC	Screw terminals	777 330	2.2-163
P2HZ X1P	42 VAC	Screw terminals	777 331	2.2-163
P2HZ X1P	48 VAC	Screw terminals	777 332	2.2-163
P2HZ X1P	110 VAC	Screw terminals	777 434	2.2-163
P2HZ X1P	115 VAC	Screw terminals	777 435	2.2-163
P2HZ X1P	120 VAC	Screw terminals	777 436	2.2-163
P2HZ X1P	230 VAC	Screw terminals	777 438	2.2-163
P2HZ X1P	240 VAC	Screw terminals	777 439	2.2-163
P2HZ X1P	24 VDC	Screw terminals	777 340	2.2-163
P2HZ X1P C	24 VAC	Cage clamp terminals	787 330	2.2-163
P2HZ X1P C	42 VAC	Cage clamp terminals	787 331	2.2-163
P2HZ X1P C	48 VAC	Cage clamp terminals	787 332	2.2-163
P2HZ X1P C	110 VAC	Cage clamp terminals	787 434	2.2-163
P2HZ X1P C	115 VAC	Cage clamp terminals	787 435	2.2-163
P2HZ X1P C	120 VAC	Cage clamp terminals	787 436	2.2-163
P2HZ X1P C	230 VAC	Cage clamp terminals	787 438	2.2-163
P2HZ X1P C	240 VAC	Cage clamp terminals	787 439	2.2-163
P2HZ X1P C	24 VDC	Cage clamp terminals	787 340	2.2-163
P2HZ X2	24 VAC	Screw terminals	774 345	2.3-164
P2HZ X3	24 VDC	Screw terminals	774 350	2.3-170
P2HZ X4P	24 VAC	Screw terminals	777 354	2.2-177
P2HZ X4P	24 VDC	Screw terminals	777 355	2.2-177
P2HZ X4P C	24 VAC	Cage clamp terminals	787 354	2.2-177
P2HZ X4P C	24 VDC	Cage clamp terminals	787 355	2.2-177
PMUT X1P	24 VDC	Screw terminals	778 010	2.2-155
PMUT X1P C	24 VDC	Cage clamp terminals	788 010	2.2-155
PNOZ 11	24 VAC	24 VDC	774 080	2.3-86
PNOZ 11	42 VAC	24 VDC	774 081	2.3-86
PNOZ 11	48 VAC	24 VDC	774 082	2.3-86
PNOZ 11	110 - 120 VAC	24 VDC	774 085	2.3-86
PNOZ 11	230 - 240 VAC	24 VDC	774 086	2.3-86
PNOZ 16	24 VAC/DC	Screw terminals	774 060	2.3-103
PNOZ 16	42 VAC	24 VDC	774 061	2.3-103
PNOZ 16	48 VAC	24 VDC	774 062	2.3-103
PNOZ 16	110 VAC	24 VDC	774 063	2.3-103
PNOZ 16	115 VAC	24 VDC	774 064	2.3-103
PNOZ 16	120 VAC	24 VDC	774 065	2.3-103
PNOZ 16	230 VAC	24 VDC	774 066	2.3-103
PNOZ 16	240 VAC	24 VDC	774 067	2.3-103

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PNOZ 16S	42 VAC	24 VDC	Screw terminals	774 071	2.3-111
PNOZ 16S	48 VAC	24 VDC	Screw terminals	774 072	2.3-111
PNOZ 16S	110 VAC	24 VDC	Screw terminals	774 073	2.3-111
PNOZ 16S	115 VAC	24 VDC	Screw terminals	774 074	2.3-111
PNOZ 16S	120 VAC	24 VDC	Screw terminals	774 075	2.3-111
PNOZ 16S	230 VAC	24 VDC	Screw terminals	774 076	2.3-111
PNOZ 16S	240 VAC	24 VDC	Screw terminals	774 077	2.3-111
PNOZ 2VQ		24 VDC	Screw terminals	774 013	2.3-143
PNOZ Ex	230 VAC		Screw terminals	774 100	2.3-119
PNOZ Ex	115 VAC		Screw terminals	774 104	2.3-119
PNOZ Ex	120 VAC		Screw terminals	774 105	2.3-119
PNOZ X1	24 VAC	24 VDC	Screw terminals	774 300	2.3-2
PNOZ X10.1	24 VAC		Screw terminals	774 740	2.3-78
PNOZ X10.1	42 VAC		Screw terminals	774 741	2.3-78
PNOZ X10.1	110 - 120 VAC		Screw terminals	774 745	2.3-78
PNOZ X10.1	230 - 240 VAC		Screw terminals	774 746	2.3-78
PNOZ X10.1		24 VDC	Screw terminals	774 749	2.3-78
PNOZ X10.11P		24 VDC	Screw terminals	777 750	2.2-96
PNOZ X10.11P C		24 VDC	Cage clamp terminals	787 750	2.2-96
PNOZ X11P	24 VAC/DC		Screw terminals	777 080	2.2-104
PNOZ X11P	110 - 120 VAC	24 VDC	Screw terminals	777 083	2.2-104
PNOZ X11P	230 - 240 VAC	24 VDC	Screw terminals	777 086	2.2-104
PNOZ X11P C	24 VAC/DC		Cage clamp terminals	787 080	2.2-104
PNOZ X11P C	110 - 120 VAC	24 VDC	Cage clamp terminals	787 083	2.2-104
PNOZ X11P C	230 - 240 VAC	24 VDC	Cage clamp terminals	787 086	2.2-104
PNOZ X13		24 VDC	Screw terminals	774 549	2.3-95
PNOZ X1P		24 VDC	Screw terminals	777 100	2.2-2
PNOZ X1P C		24 VDC	Cage clamp terminals	787 100	2.2-2
PNOZ X2	24 VAC	24 VDC	Screw terminals	774 303	2.3-9
PNOZ X2.1	24 VAC	24 VDC	Screw terminals	774 306	2.3-16
PNOZ X2.1VP		24 VDC	Screw terminals	777 600	2.2-17
PNOZ X2.1VP C		24 VDC	Cage clamp terminals	787 600	2.2-17
PNOZ X2.3P	24 VAC/DC		Screw terminals	777 304	2.2-25
PNOZ X2.3P C	24 VAC/DC		Cage clamp terminals	787 304	2.2-25
PNOZ X2.7P	24 VAC	24 VDC	Screw terminals	777 305	2.2-33
PNOZ X2.7P	24 - 240 VAC	24 - 240 VDC	Screw terminals	777 306	2.2-33
PNOZ X2.7P C	24 VAC	24 VDC	Cage clamp terminals	787 305	2.2-33
PNOZ X2.7P C	24 - 240 VAC	24 - 240 VDC	Cage clamp terminals	787 306	2.2-33
PNOZ X2.8P	24 VAC	24 VDC	Screw terminals	777 301	2.2-41
PNOZ X2.8P	24 - 240 VAC	24 - 240 VDC	Screw terminals	777 302	2.2-41
PNOZ X2.8P C	24 VAC	24 VDC	Cage clamp terminals	787 301	2.2-41
PNOZ X2.8P C	24 - 240 VAC	24 - 240 VDC	Cage clamp terminals	787 302	2.2-41
PNOZ X2.9P		24 VDC	Screw terminals	777 300	2.2-49
PNOZ X2.9P C		24 VDC	Cage clamp terminals	787 300	2.2-49
PNOZ X2C	24 VAC	24 VDC	Screw terminals	774 304	2.3-23
PNOZ X2P	24 VAC	24 VDC	Screw terminals	777 303	2.2-9
PNOZ X2P	48 - 240 VAC	48 - 240 VDC	Screw terminals	777 307	2.2-9
PNOZ X2P C	24 VAC	24 VDC	Cage clamp terminals	787 303	2.2-9
PNOZ X2P C	48 - 240 VAC	48 - 240 VDC	Cage clamp terminals	787 307	2.2-9

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PNOZ X3	48 VAC	24 VDC	Screw terminals	774 312	2.3-30
PNOZ X3	110 VAC	24 VDC	Screw terminals	774 314	2.3-30
PNOZ X3	115 VAC	24 VDC	Screw terminals	774 315	2.3-30
PNOZ X3	120 VAC	24 VDC	Screw terminals	774 316	2.3-30
PNOZ X3	230 VAC	24 VDC	Screw terminals	774 318	2.3-30
PNOZ X3	240 VAC	24 VDC	Screw terminals	774 319	2.3-30
PNOZ X3.10P	24 VAC/DC		Screw terminals	777 314	2.2-65
PNOZ X3.10P C	24 VAC/DC		Cage clamp terminals	787 314	2.2-65
PNOZ X3P	24 VAC/DC		Screw terminals	777 310	2.2-57
PNOZ X3P	24 - 240 VAC/DC		Screw terminals	777 313	2.2-57
PNOZ X3P C	24 VAC/DC		Cage clamp terminals	787 310	2.2-57
PNOZ X3P C	24 - 240 VAC/DC		Cage clamp terminals	787 313	2.2-57
PNOZ X4	24 VAC		Screw terminals	774 731	2.3-38
PNOZ X4	110 VAC		Screw terminals	774 734	2.3-38
PNOZ X4	115 VAC		Screw terminals	774 735	2.3-38
PNOZ X4	120 VAC		Screw terminals	774 736	2.3-38
PNOZ X4	230 VAC		Screw terminals	774 738	2.3-38
PNOZ X4	240 VAC		Screw terminals	774 739	2.3-38
PNOZ X4		24 VDC	Screw terminals	774 730	2.3-38
PNOZ X5	24 VAC/DC		Screw terminals	774 325	2.3-47
PNOZ X5		12 VDC	Screw terminals	774 326	2.3-47
PNOZ X6	42 VAC		Screw terminals	774 721	2.3-54
PNOZ X6	110 - 120 VAC		Screw terminals	774 725	2.3-54
PNOZ X6	230 - 240 VAC		Screw terminals	774 726	2.3-54
PNOZ X6	24 VAC/DC		Screw terminals	774 729	2.3-54
PNOZ X7	42 VAC		Screw terminals	774 058	2.3-62
PNOZ X7	48 VAC		Screw terminals	774 049	2.3-62
PNOZ X7	110 VAC		Screw terminals	774 053	2.3-62
PNOZ X7	115 VAC		Screw terminals	774 054	2.3-62
PNOZ X7	120 VAC		Screw terminals	774 055	2.3-62
PNOZ X7	230 VAC		Screw terminals	774 056	2.3-62
PNOZ X7	240 VAC		Screw terminals	774 057	2.3-62
PNOZ X7	24 VAC/DC		Screw terminals	774 059	2.3-62
PNOZ X7P	24 VAC/DC		Screw terminals	777 059	2.2-73
PNOZ X7P	110 - 120 VAC		Screw terminals	777 053	2.2-73
PNOZ X7P	230 - 240 VAC		Screw terminals	777 056	2.2-73
PNOZ X7P C	24 VAC/DC		Cage clamp terminals	787 059	2.2-73
PNOZ X7P C	110 - 120 VAC		Cage clamp terminals	787 053	2.2-73
PNOZ X7P C	230 - 240 VAC		Cage clamp terminals	787 056	2.2-73
PNOZ X8P		24 VDC	Screw terminals	777 760	2.2-80
PNOZ X8P	110 VAC		Screw terminals	777 764	2.2-80
PNOZ X8P	115 VAC		Screw terminals	777 765	2.2-80
PNOZ X8P	120 VAC		Screw terminals	777 766	2.2-80
PNOZ X8P	230 VAC		Screw terminals	777 768	2.2-80
PNOZ X8P	24 VAC		Screw terminals	777 770	2.2-80
PNOZ X8P C		24 VDC	Cage clamp terminals	787 760	2.2-80
PNOZ X8P C	110 VAC		Cage clamp terminals	787 764	2.2-80
PNOZ X8P C	115 VAC		Cage clamp terminals	787 765	2.2-80
PNOZ X8P C	120 VAC		Cage clamp terminals	787 766	2.2-80
PNOZ X8P C	230 VAC		Cage clamp terminals	787 768	2.2-80
PNOZ X8P C	24 VAC		Cage clamp terminals	787 770	2.2-80
PNOZ X9	24 VAC/DC		Screw terminals	774 609	2.3-70
PNOZ X9	42 VAC	24 VDC	Screw terminals	774 601	2.3-70
PNOZ X9	110 - 120 VAC	24 VDC	Screw terminals	774 605	2.3-70
PNOZ X9	220 - 230 VAC	24 VDC	Screw terminals	774 606	2.3-70

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PNOZ X9P C	110 - 240 VAC	24 VDC		Cage clamp terminals	787 606	2.2-88
PNOZ X9P C		24 VDC		Cage clamp terminals	787 609	2.2-88
PNOZ XV1P		24 VDC	3 s selectable	Screw terminals	777 601	2.2-112
PNOZ XV1P		24 VDC	30 s selectable	Screw terminals	777 602	2.2-112
PNOZ XV1P C		24 VDC	3 s selectable	Cage clamp terminals	787 601	2.2-112
PNOZ XV1P C		24 VDC	30 s selectable	Cage clamp terminals	787 602	2.2-112
PNOZ XV2		24 VDC	0.5 s fixed	Screw terminals	774 504	2.3-127
PNOZ XV2		24 VDC	3.0 s fixed	Screw terminals	774 505	2.3-127
PNOZ XV2		24 VDC	10.0 s fixed	Screw terminals	774 506	2.3-127
PNOZ XV2		24 VDC	3 s selectable	Screw terminals	774 502	2.3-127
PNOZ XV2		24 VDC	30 s selectable	Screw terminals	774 500	2.3-127
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777 512	PNOZ XV3P		24 VDC	3 s selectable	Screw terminals	2.2-137
777 514	PNOZ XV3P		24 VDC	0.5 s fixed	Screw terminals	2.2-137
777 515	PNOZ XV3P		24 VDC	3 s fixed	Screw terminals	2.2-137
777 517	PNOZ XV3P		24 VDC	10 s fixed	Screw terminals	2.2-137
777 518	PNOZ XV3P		24 VDC	300 s selectable	Screw terminals	2.2-137
777 520	PNOZ XV3.1P		24 VDC	30 s selectable	Screw terminals	2.2-145
777 522	PNOZ XV3.1P		24 VDC	3 s selectable	Screw terminals	2.2-145
777 525	PNOZ XV3.1P		24 VDC	3 s fixed	Screw terminals	2.2-145
777 530	PNOZ XV3.1P	24 - 240 VAC/DC		30 s selectable	Screw terminals	2.2-145
777 532	PNOZ XV3.1P	24 - 240 VAC/DC		3 s selectable	Screw terminals	2.2-145
777 538	PNOZ XV3.1P	24 - 240 VAC/DC		300 s selectable	Screw terminals	2.2-145
777 540	PNOZ XV2.1P	24 - 240 VAC/DC		30 s selectable	Screw terminals	2.2-128
777 542	PNOZ XV2.1P	24 - 240 VAC/DC		3 s selectable	Screw terminals	2.2-128
777 544	PNOZ XV2.1P	24 - 240 VAC/DC		0.5 s fixed	Screw terminals	2.2-128
777 545	PNOZ XV2.1P	24 - 240 VAC/DC		3 s fixed	Screw terminals	2.2-128
777 547	PNOZ XV2.1P	24 - 240 VAC/DC		10 s fixed	Screw terminals	2.2-128
777 548	PNOZ XV2.1P	24 - 240 VAC/DC		300 s selectable	Screw terminals	2.2-128
777 580	PZE X4VP		24 VDC	0.5 s fixed	Screw terminals	2.2-203
777 581	PZE X4VP		24 VDC	1 s fixed	Screw terminals	2.2-203
777 582	PZE X4VP		24 VDC	2 s fixed	Screw terminals	2.2-203
777 583	PZE X4VP		24 VDC	3 s fixed	Screw terminals	2.2-203
777 584	PZE X4VP8		24 VDC	8 s selectable	Screw terminals	2.2-217
777 585	PZE X4P		24 VDC		Screw terminals	2.2-191
777 586	PZE X4VP4		24 VDC	4 s selectable	Screw terminals	2.2-210
777 587	PZE X4.1P		24 VDC		Screw terminals	2.2-197
777 600	PNOZ X2.1VP		24 VDC		Screw terminals	2.2-17
777 601	PNOZ XV1P		24 VDC	3 s selectable	Screw terminals	2.2-112
777 602	PNOZ XV1P		24 VDC	30 s selectable	Screw terminals	2.2-112
777 606	PNOZ X9P	110 - 240 VAC	24 VDC		Screw terminals	2.2-88
777 609	PNOZ X9P		24 VDC		Screw terminals	2.2-88
777 750	PNOZ X10.11P		24 VDC		Screw terminals	2.2-96
777 760	PNOZ X8P		24 VDC		Screw terminals	2.2-80
777 764	PNOZ X8P	110 VAC			Screw terminals	2.2-80
777 765	PNOZ X8P	115 VAC			Screw terminals	2.2-80
777 766	PNOZ X8P	120 VAC			Screw terminals	2.2-80
777 768	PNOZ X8P	230 VAC			Screw terminals	2.2-80
777 770	PNOZ X8P	24 VAC			Screw terminals	2.2-80
777 949	PSWZ X1P	24 - 240 VAC/DC		0.5 V	Screw terminals	2.2-184
777 950	PSWZ X1P	24 - 240 VAC/DC		3 V	Screw terminals	2.2-184
778 010	PMUT X1P		24 VDC		Screw terminals	2.2-155
787 053	PNOZ X7P C	110 - 120 VAC			Cage clamp terminals	2.2-73
787 056	PNOZ X7P C	230 - 240 VAC			Cage clamp terminals	2.2-73
787 059	PNOZ X7P C	24 VAC/DC			Cage clamp terminals	2.2-73
787 080	PNOZ X11P C	24 VAC/DC			Cage clamp terminals	2.2-104
787 083	PNOZ X11P C	110 - 120 VAC	24 VDC		Cage clamp terminals	2.2-104
787 086	PNOZ X11P C	230 - 240 VAC	24 VDC		Cage clamp terminals	2.2-104
787 100	PNOZ X1P C		24 VDC		Cage clamp terminals	2.2-2
787 140	PZE 9P C	24 VAC/DC			Cage clamp terminals	2.2-231
787 148	PZE 9P C	24 VAC/DC, 100 - 240 VAC/DC			Cage clamp terminals	2.2-231
787 150	PZE X5P C		24 VDC		Cage clamp terminals	2.2-224
787 300	PNOZ X2.9P C		24 VDC		Cage clamp terminals	2.2-49
787 301	PNOZ X2.8P C	24 VAC	24 VDC		Cage clamp terminals	2.2-41
787 302	PNOZ X2.8P C	24 - 240 VAC	24 - 240 VDC		Cage clamp terminals	2.2-41
787 303	PNOZ X2P C	24 VAC	24 VDC		Cage clamp terminals	2.2-9
787 304	PNOZ X2.3P C	24 VAC/DC			Cage clamp terminals	2.2-25
787 305	PNOZ X2.7P C	24 VAC	24 VDC		Cage clamp terminals	2.2-33

Safety relays, compact

Numerically by order number

3.1

Order no.	Type	Features		Terminals	Page
787 306	PNOZ X2.7P C	24 - 240 VAC	24 - 240 VDC	Cage clamp terminals	2.2-33
787 307	PNOZ X2P C	48 - 240 VAC	48 - 240 VDC	Cage clamp terminals	2.2-9
787 310	PNOZ X3P C	24 VAC/DC		Cage clamp terminals	2.2-57
787 313	PNOZ X3P C	24 - 240 VAC/DC		Cage clamp terminals	2.2-57
787 314	PNOZ X3.10P C	24 VAC/DC		Cage clamp terminals	2.2-65
787 330	P2HZ X1P C	24 VAC		Cage clamp terminals	2.2-163
787 331	P2HZ X1P C	42 VAC		Cage clamp terminals	2.2-163
787 332	P2HZ X1P C	48 VAC		Cage clamp terminals	2.2-163
787 340	P2HZ X1P C		24 VDC	Cage clamp terminals	2.2-163
787 341	P2HZ X1.10P C		24 VDC	Cage clamp terminals	2.2-170
787 354	P2HZ X4P C	24 VAC		Cage clamp terminals	2.2-177
787 355	P2HZ X4P C		24 VDC	Cage clamp terminals	2.2-177
787 434	P2HZ X1P C	110 VAC		Cage clamp terminals	2.2-163
787 435	P2HZ X1P C	115 VAC		Cage clamp terminals	2.2-163
787 436	P2HZ X1P C	120 VAC		Cage clamp terminals	2.2-163
787 438	P2HZ X1P C	230 VAC		Cage clamp terminals	2.2-163
787 439	P2HZ X1P C	240 VAC		Cage clamp terminals	2.2-163
787 500	PNOZ XV2P C		24 VDC	30 s selectable	Cage clamp terminals 2.2-120
787 502	PNOZ XV2P C		24 VDC	3 s selectable	Cage clamp terminals 2.2-120
787 503	PNOZ XV2P C		24 VDC	1 s fixed	Cage clamp terminals 2.2-120
787 504	PNOZ XV2P C		24 VDC	0.5 s fixed	Cage clamp terminals 2.2-120
787 510	PNOZ XV3P C		24 VDC	30 s selectable	Cage clamp terminals 2.2-137
787 512	PNOZ XV3P C		24 VDC	3 s selectable	Cage clamp terminals 2.2-137
787 518	PNOZ XV3P C		24 VDC	300 s selectable	Cage clamp terminals 2.2-137
787 520	PNOZ XV3.1P C		24 VDC	30 s selectable	Cage clamp terminals 2.2-145
787 522	PNOZ XV3.1P C		24 VDC	3 s selectable	Cage clamp terminals 2.2-145
787 530	PNOZ XV3.1P C	24 - 240 VAC/DC		30 s selectable	Cage clamp terminals 2.2-145
787 532	PNOZ XV3.1P C	24 - 240 VAC/DC		3 s selectable	Cage clamp terminals 2.2-145
787 538	PNOZ XV3.1P C	24 - 240 VAC/DC		300 s selectable	Cage clamp terminals 2.2-145
787 540	PNOZ XV2.1P C	24 - 240 VAC/DC		30 s selectable	Cage clamp terminals 2.2-128
787 542	PNOZ XV2.1P C	24 - 240 VAC/DC		3 s selectable	Cage clamp terminals 2.2-128
787 548	PNOZ XV2.1P C	24 - 240 VAC/DC		300 s selectable	Cage clamp terminals 2.2-128
787 580	PZE X4VP C		24 VDC	0.5 s fixed	Cage clamp terminals 2.2-203
787 581	PZE X4VP C		24 VDC	1 s fixed	Cage clamp terminals 2.2-203
787 582	PZE X4VP C		24 VDC	2 s fixed	Cage clamp terminals 2.2-203
787 583	PZE X4VP C		24 VDC	3 s fixed	Cage clamp terminals 2.2-203
787 584	PZE X4VP8 C		24 VDC	8 s selectable	Cage clamp terminals 2.2-217
787 585	PZE X4P C		24 VDC		Cage clamp terminals 2.2-191
787 586	PZE X4VP4 C		24 VDC	4 s selectable	Cage clamp terminals 2.2-210
787 587	PZE X4.1P C		24 VDC		Cage clamp terminals 2.2-197
787 600	PNOZ X2.1VP C		24 VDC		Cage clamp terminals 2.2-17
787 601	PNOZ XV1P C		24 VDC	3 s selectable	Cage clamp terminals 2.2-112
787 602	PNOZ XV1P C		24 VDC	30 s selectable	Cage clamp terminals 2.2-112
787 606	PNOZ X9P C	110 - 240 VAC	24 VDC		Cage clamp terminals 2.2-88
787 609	PNOZ X9P C		24 VDC		Cage clamp terminals 2.2-88
787 750	PNOZ X10.11P C		24 VDC		Cage clamp terminals 2.2-96
787 760	PNOZ X8P C		24 VDC		Cage clamp terminals 2.2-80
787 764	PNOZ X8P C	110 VAC			Cage clamp terminals 2.2-80
787 765	PNOZ X8P C	115 VAC			Cage clamp terminals 2.2-80
787 766	PNOZ X8P C	120 VAC			Cage clamp terminals 2.2-80
787 768	PNOZ X8P C	230 VAC			Cage clamp terminals 2.2-80
787 770	PNOZ X8P C	24 VAC			Cage clamp terminals 2.2-80
787 949	PSWZ X1P C	24 - 240 VAC/DC		0.5 V	Cage clamp terminals 2.2-184
787 950	PSWZ X1P C	24 - 240 VAC/DC		3 V	Cage clamp terminals 2.2-184
788 010	PMUT X1P C		24 VDC		Cage clamp terminals 2.2-155

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European directives and position of the standards in Europe

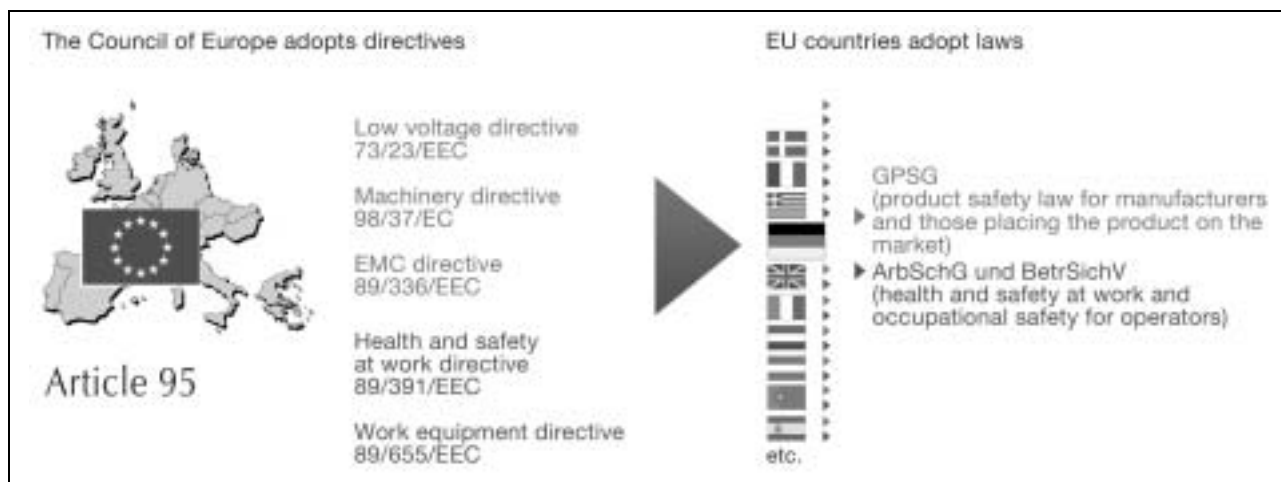


Fig. 1: Incorporation of the directives into domestic law (using Germany as an example)

European directives

The concept of a single European internal market in terms of the “New Approach” can be traced right back to the start of the 70s: The low voltage directive is the first piece of European legislation to take into account the approach towards harmonisation of a common single market.

Products that are covered by one or more of the following directives have to apply a CE-mark, i.e. the product must be accompanied by a declaration of conformity. With a declaration of conformity the manufacturer confirms that his product meets all the requirements of the European directives that relate to his product. This means he can launch and sell his product within the scope of the EU without consideration of any national regulations.

- } Lifts 95/16/EC
- } Construction products 89/106/EEC
- } Pressure equipment directive 97/23/EC
- } EMC directive 89/336/EEC
- } ATEX 94/9/EC
- } Appliances burning gaseous fuels 90/396/EEC

- } Machinery directive 98/37/EC
- } Medical device directive 93/42/EEC
- } Low voltage directive 73/23/EEC
- } Personal protective equipment 89/686/EEC
- } Safety of toys directive 88/378/EEC

The directives are addressed to member states, who are obliged to incorporate the European directives into domestic law. In Germany this is normally achieved through the device safety law.

Position of the standards in Europe

The legal position of standards is discussed again and again. Inside Europe, i.e. within the scope of the European directives that are subject to the CE-marking obligation, a manufacturer is not bound by standards or other specifications. He simply needs to comply with the health and safety requirements of the directive(s). The associated benefits of a division between standards and legislation are obvious: It is easier for legislators to agree on the essential requirements than on technical details. Also, the directives do not regularly have to be adapted to the state of technology;

member states can use their own legal system for incorporation and manufacturers are free to select the ways in which they implement the requirements of the directive.

European directives and position of the standards in Europe

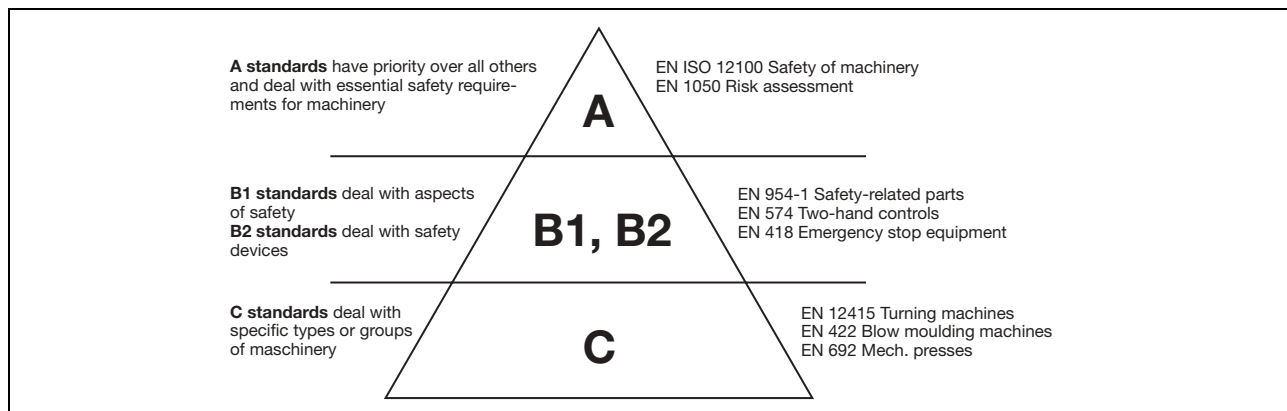


Fig. 2: Standards pyramid

So what are the benefits of applying the standards? With so-called harmonised standards with presumption of conformity, there is a shifting of the burden of proof, i.e. if manufacturers apply these standards, it is presumed that they will also comply with the specific requirements of the European directives. The regulatory authorities would therefore need to prove that a

manufacturer did not meet the legal requirements.

However, should a manufacturer deviate from the harmonised standards, he himself must prove how he has met the essential safety requirements. This is generally done via a hazard analysis. In practice one would endeavour to apply the harmonised standards, un-

less the products concerned are highly innovative and no harmonised standards yet exist. The standards for which this “presumption effect” applies can be researched in the Official Journal of the EU (e.g. on the Internet). Standards in Europe are subdivided into what are termed A, B, and C standards.

Legal regulations outside Europe, and standards for functional safety

Legal regulations outside Europe

The situation is somewhat different in the USA: people there are mainly familiar with two types of standards: ANSI (American National Standards Institute) and OSHA (Occupational Safety and Health Administration).

OSHA standards are published by the state and compliance is mandatory. ANSI standards, on the other hand, are developed by private organisations and their application is generally not absolutely essential. However, ANSI standards can still be found included as part of a contract. Beyond that ANSI standards are being taken over by OSHA. You can also still come across the NFPA (National Fire Protection Association), which developed NFPA 79 as a counterpart to EN 60204-1, for example. OSHA standards can be compared with the European directives. Unlike the European directives, OSHA standards are more involved with formulating technical specifications than abstract requirements.

The legal basis in the USA can be seen as a mix of product standards, fire codes (NFPA), electrical codes (NEC) and national laws. Local government bodies have the authority to monitor that these codes are being enforced and implemented.

Russia and the CIS states have implemented GOST-R certification for some years now, in other words, technical devices that fall within a specific product area must undergo a certain certification process. Machinery and any corresponding technical accessories undergo a type approval test through a European notified body, for example. This test is generally recognised by a Russian-based approvals body. From the point of view of safety, the same requirements apply as in Europe.

China, on the other hand, has introduced CCC certification. Similar to the position in Russia, technical products are subject to mandatory certification through a national approvals body in China. In addition, production sites are

inspected. If a technical device falls with the scope of the product list, which is subdivided into 19 categories, certification is mandatory, otherwise it will be necessary to supply a type of “declaration of no objection” from a national notified body.

Japan is currently in a transition period: The plan is for Japan to adopt the European “new approach” – in other words, to keep standards and legislation separate. At the moment the international ISO and IEC standards are being directly incorporated into national legislation, which is why people are currently confronted with frequent amendments to laws and lengthy implementation periods.

Standards for functional safety

Different standards may be called upon to observe functional safety on control systems, depending on the application. In the area of machine safety, EN 954-1 is the main standard named for safety-related control systems. Irrespective of the technology, this applies for the whole chain from the sensor to the actuator. The risk graphs and corresponding risk parameters can be used to estimate the potential risk for danger zones on machinery. The category is then established without the use of risk-reducing measures.

Risk parameters and categories in accordance with EN 954-1

Risk parameters

S = Severity of injury:

- 1 = Slight (normally reversible) injury
- 2 = Serious (normally irreversible) injury including death

F = Frequency and/or exposure time to the hazard

- 1 = Seldom to quite often and/or the exposure time is short
- 2 = Frequent to continuous and/or the exposure time is long

P = Possibility of avoiding the hazard

- 1 = Possible under specific conditions
- 2 = Scarcely possible

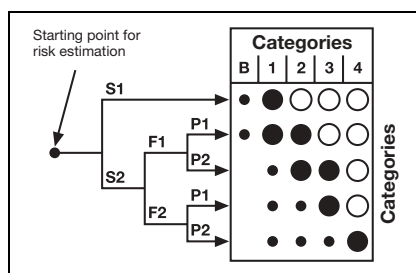


Fig. 3: Risk graph from EN 954

Categories in accordance with EN 954-1

The control system requirements derived from the risk graph are specified as follows:

Category B

Basic category with no special requirements = "good industrial standard"

Category 1

Safety-related parts must be designed and constructed using well-tried components and well-tried safety principles.

Well-tried means: the components have been widely used in the past with successful results in similar applications, or they have been manufactured using principles that demonstrate its suitability and reliability for safety-related applications.

Example: safety switch with forced-opening contacts.

Well-tried safety principles are circuits that are constructed in such a way that certain faults can be avoided by the appropriate arrangement or layout of components.

Example: avoiding a short circuit through appropriate separation, avoiding component failures that result from over-dimensioning, using the failsafe principle (on switching off).

Note: The occurrence of a fault can lead to the loss of the safety function.

Category 2

Safety-related parts of control systems must be designed so that their safety function(s) are checked at suitable intervals by the machine control system. The safety function(s) must be checked: at the machine start-up and prior to the initiation of any hazardous situation; periodically during operation, if the risk assessment and the kind of operation show that it is necessary.

This check may be initiated automatically or manually. Automatically, for example, the check may be initiated by a signal generated from a control system at suitable intervals. The automatic test should be provided by preference. The decision about the type of test depends on the risk assessment and the judgement of the end user or machine builder. If no fault is detected, operation may be approved as a result of the test. If a fault is detected, an output must be generated to initiate appropriate control action. A second, independent shutdown route is required for this.

Notes: In some cases Category 2 is not applicable because the checking of the safety function cannot be applied to all components and devices. Moreover, the cost involved in implementing Category 2 correctly may be considerable, so that it may make better economic sense to implement a different category.

In general Category 2 can be realised with electronic techniques. The system behaviour allows the occurrence of a fault to lead to the loss of the safety function between checks; the loss of the safety function is detected by the check.

Category 3

Safety-related parts of control systems must be designed so that a single fault in any of these parts does not lead to the loss of the safety function. Whenever reasonably practicable, the single fault shall be detected at or before the next demand upon the safety function.

This does not mean that all faults will be detected. The accumulation of undetected faults can lead to an unintended output signal and a hazardous situation at the machine.

Category 4

Safety-related parts of control systems must be designed so that a single fault in any of these parts does not lead to a loss of the safety function; the single fault must be detected at or before the next demand upon the safety functions (e.g. immediately at switch on, at the end of a machine operating cycle). If this detection is not possible, then an accumulation of faults shall not lead to a loss of the safety function.

Functional safety and legal position of EN/IEC 61508

Functional safety with EN/IEC 61508?

EN/IEC 61508 is regarded as a generic safety standard, which deals with the functional safety of electrical, electronic and programmable electronic systems, irrespective of the application. One of the main tasks of EN/IEC 61508 is to serve as a basis for the development of application-oriented standards. Standards' committees are currently busy in the areas of machine

safety with EN/IEC 62061, and process safety with EN/IEC 61511. Also under revision is EN 954, the standard harmonised under the scope of the machinery directive, which in future will be listed as EN/ISO 13849.

These sector-specific standards are intended to continue the principle approaches of EN/IEC 61508 and to implement the requirements for the relevant application area in a suitably practical manner.

What is the legal status of EN/IEC 61508?

As EN/IEC 61508 is not listed in the Official Journal of the European Communities for implementation as a European directive, it lacks the so-called "presumption effect": so if the standard is used on its own, a control system designer cannot presume that the relevant requirements of the specific European directive have been met.

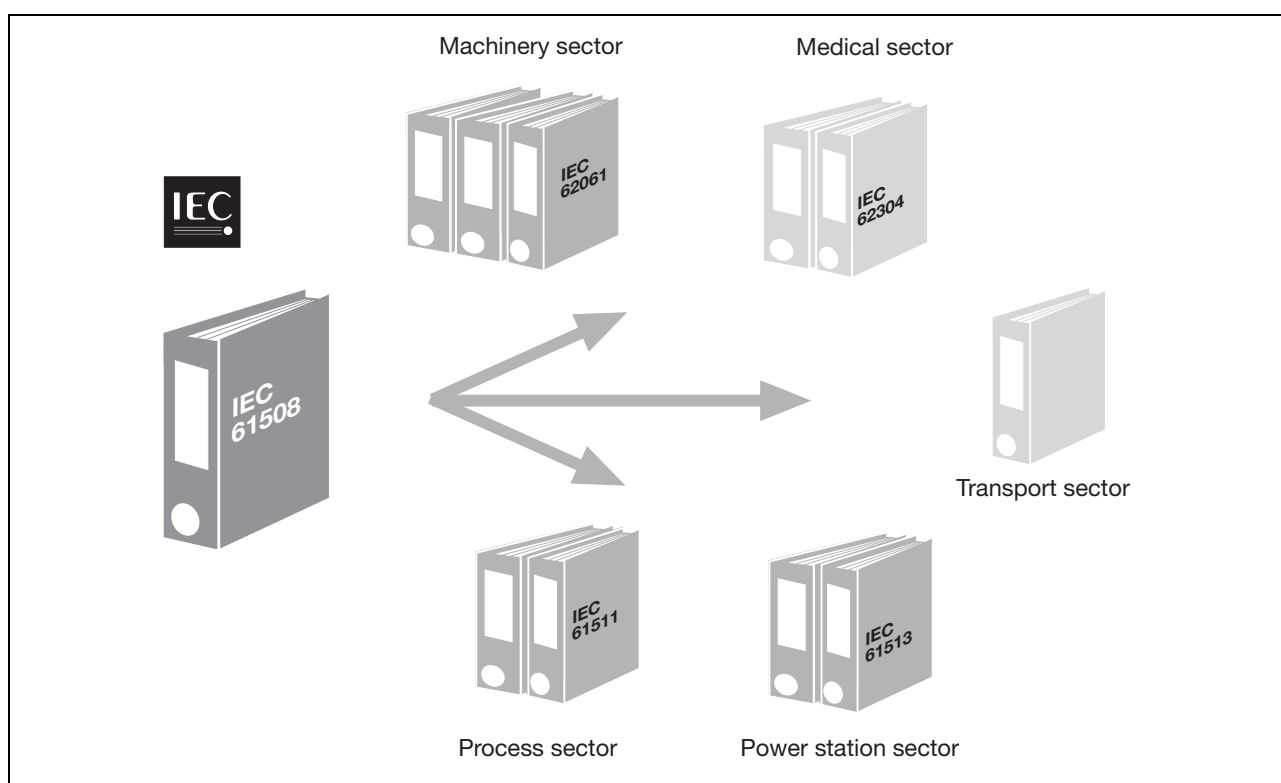


Fig. 4: Sector standards from IEC 61508

Risk analysis

Risk analysis

Under the terms of the machinery directive, a machine manufacturer must assess the hazards in order to identify all the hazards that apply to his machine. He must then design and construct the machine to take account of his assessment. This requirement also applies to operators who act as manufacturers under the terms of the machinery directive. For example, this

may occur with machines that are interlinked or for machinery that has been upgraded and substantially modified.

EN 1050 contains "Principles for risk assessment" on machinery. These approaches can be called upon as part of a comprehensive analysis. EN 954-1 expands on

EN 1050 with regard to the assessment of safety-related parts of control systems.

The hazards emanating from a machine may be many and varied, so for example, it is necessary to consider not just mechanical hazards through crushing and shearing, but also thermal and electrical hazards and hazards from radiation. Risk reduction is therefore an iterative process, i.e. it is carried out before and during the planning phase and after completion of the plant or machine.

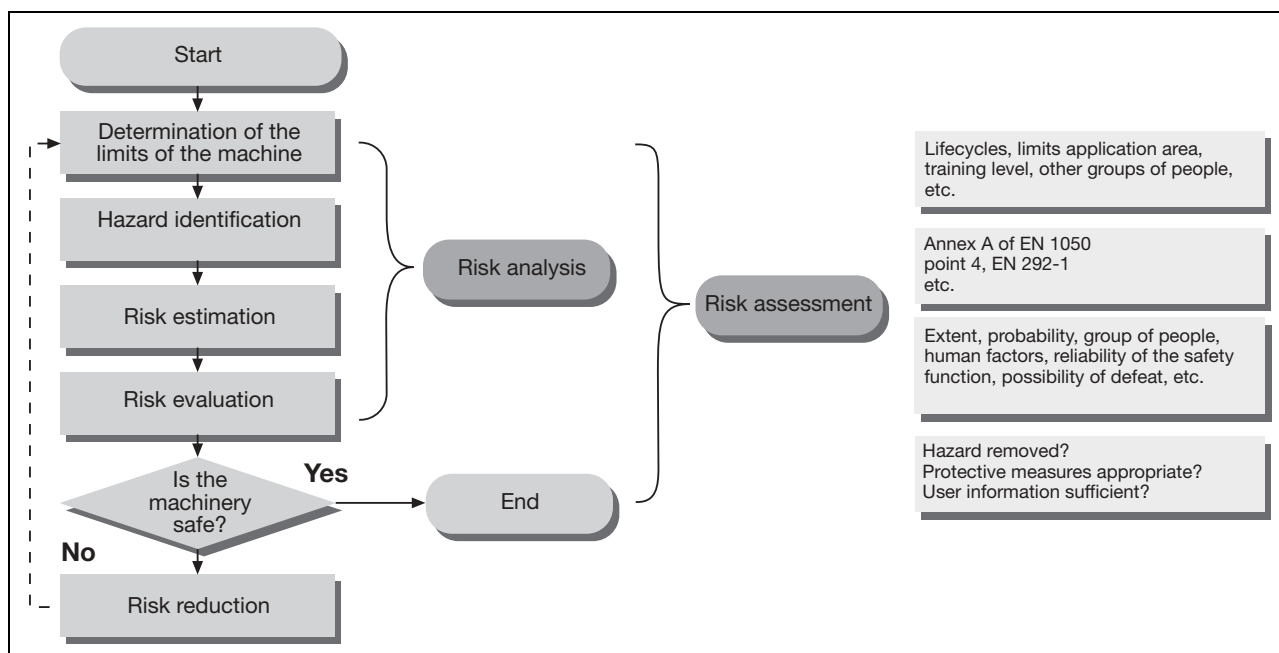


Fig. 5: Iterative process in accordance with EN 1050

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All the relevant safety-related documents are examined, check lists are created and the plant and machinery checked.



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Business terms and conditions

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The terms of delivery and of payment of the respective Pilz company with whom a sales contract is closed are applied. As a rule this is the Pilz company that places the order. Please select the legal contract partner from the order confirmation.

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