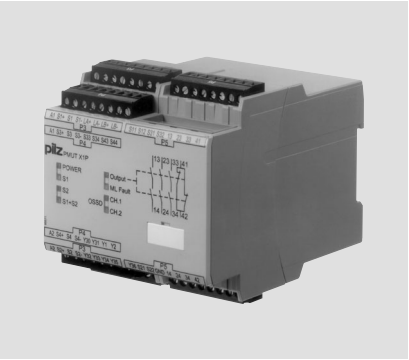
Up to Category 4, EN 954-1
PMUT X1P



Unit for the temporary suspension of safety functions (muting)

Approvals

	PMUT X1P
c UL us LISTED	◆
	◆
	◆

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 spring-loaded terminal or screw terminal)
- See order reference for unit types

Unit description

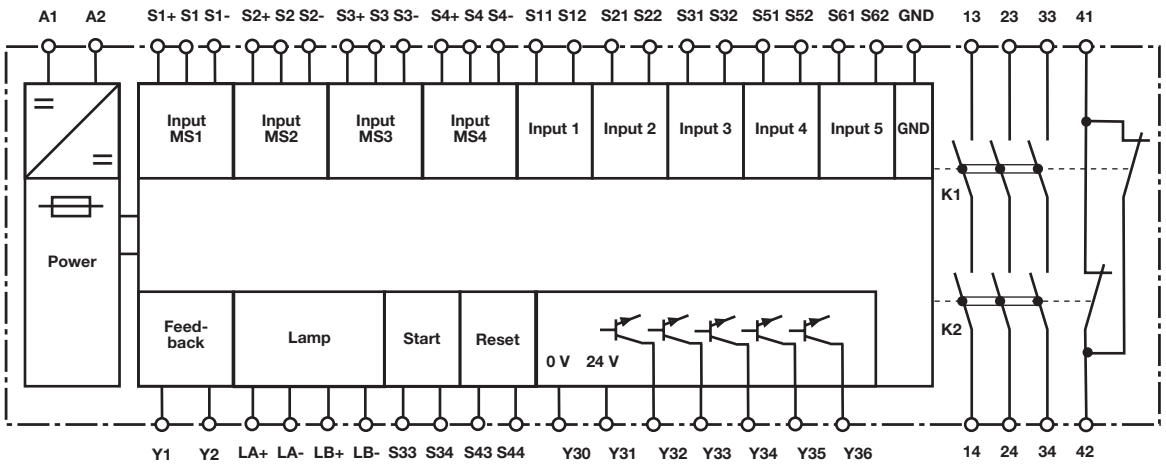
The muting controller meets the requirements of EN 60204-1.
It may be used in safety circuits which temporarily suspend safety functions (muting), in accordance with EN 61496-1.

Safety features

The relay 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 correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Block diagram



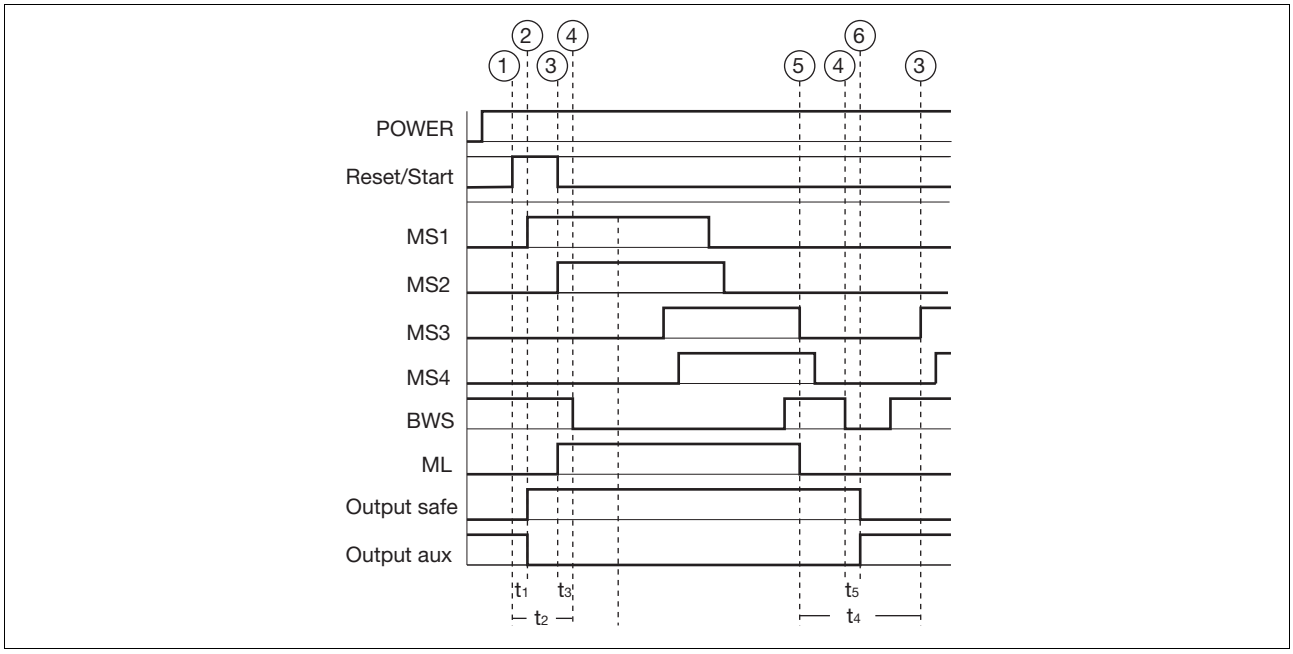
Pilz GmbH & Co. KG, Felix-Wankel-Straße 2, 73760 Ostfildern, Germany
Telephone: +49 711 3409-0, Telefax: +49 711 3409-133, E-Mail: pilz.gmbh@pilz.de

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
- ①: Operate reset button
- ②: Close safety contacts
- ③: Muting on
- ④: Light barrier interrupted
- ⑤: Muting off
- ⑥: Open safety contacts
- t_1: Switch-on delay of safety contacts
- t_2: Minimum start pulse duration
- t_3: Minimum period before light barrier may be interrupted
- t_4: Recovery time after muting off
- t_5: 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

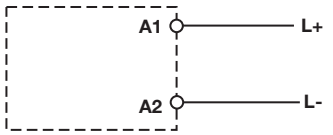
- Use copper wire that can withstand 60/75 °C.
- Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.
- Mechanical and optoelectronic sensors (safety light barriers, safety light guards) are suitable for use.
- The safety contacts can be used to shutdown 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.

Pilz GmbH & Co. KG, Felix-Wankel-Straße 2, 73760 Ostfildern, Germany
Telephone: +49 711 3409-0, Telefax: +49 711 3409-133, E-Mail: pilz.gmbh@pilz.de

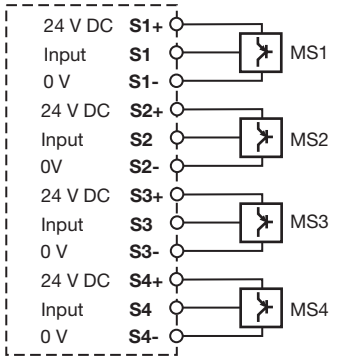
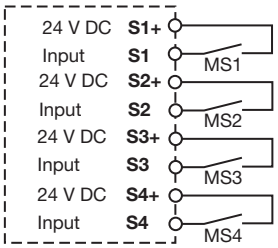
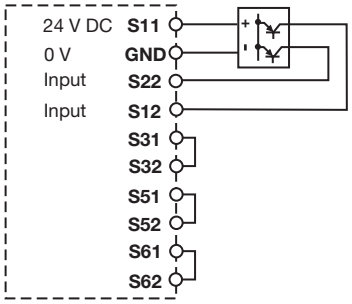
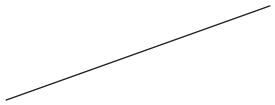
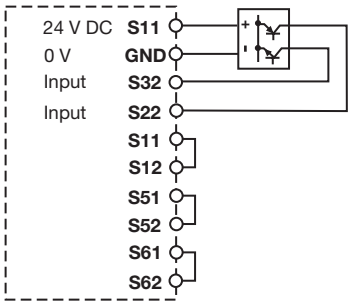
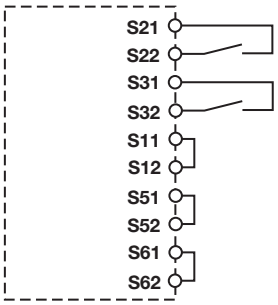
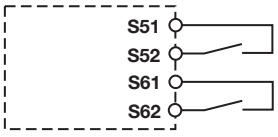
Up to Category 4, EN 954-1
PMUT X1P

Preparing for operation

- Supply voltage

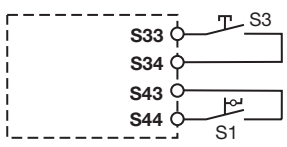
Supply voltage	AC	DC
		

- Input circuit

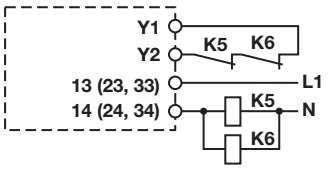
Input circuit	Semiconductor	Contacts
Muting sensors		
Light beam device (ESPE) Semiconductor output 2 x PNP Light beam device detects shorts across contacts		
Light beam device (ESPE) Semiconductor output PNP/NPN Detection of shorts across contacts; - Semiconductor: via light beam device - Contacts: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

Up to Category 4, EN 954-1
PMUT X1P

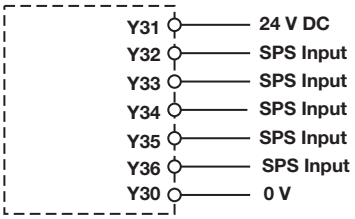
▸ Reset circuit

S1: Key switch S3: Reset button	

▸ Feedback circuit

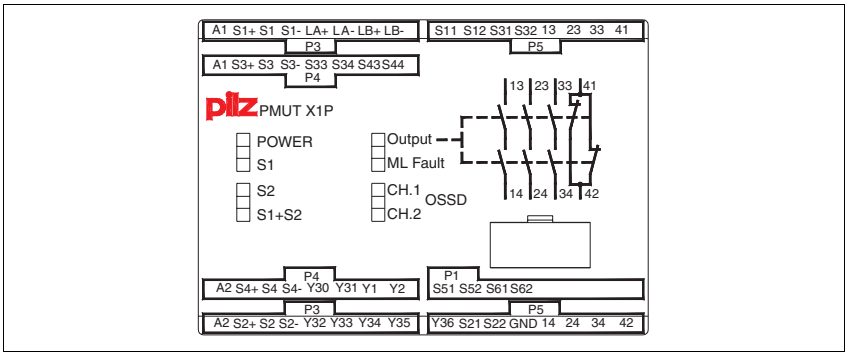
Feedback circuit	Link	Contacts in series to feedback loop
		

▸ Semiconductor output

Y32: Light beam device active Y33: Muting active Y34: Muting lamp warning Y35: Both muting lamps defective Y36: Safety contacts closed	

Up to Category 4, EN 954-1
PMUT X1P

Terminal configuration

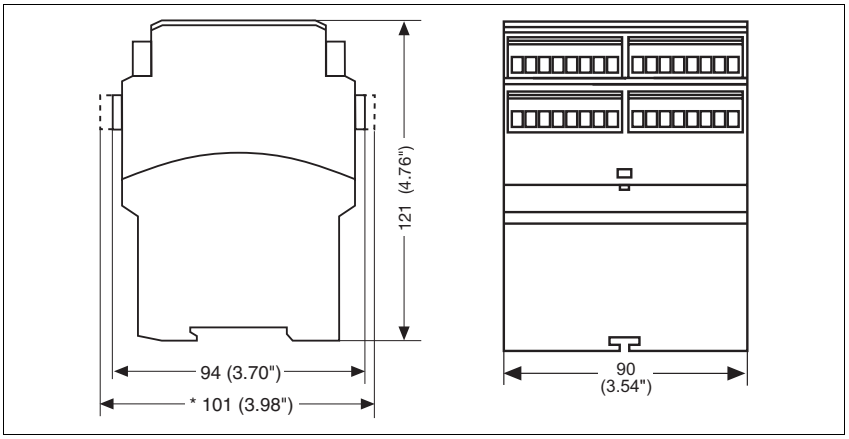


Installation

- 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 spring-loaded terminals

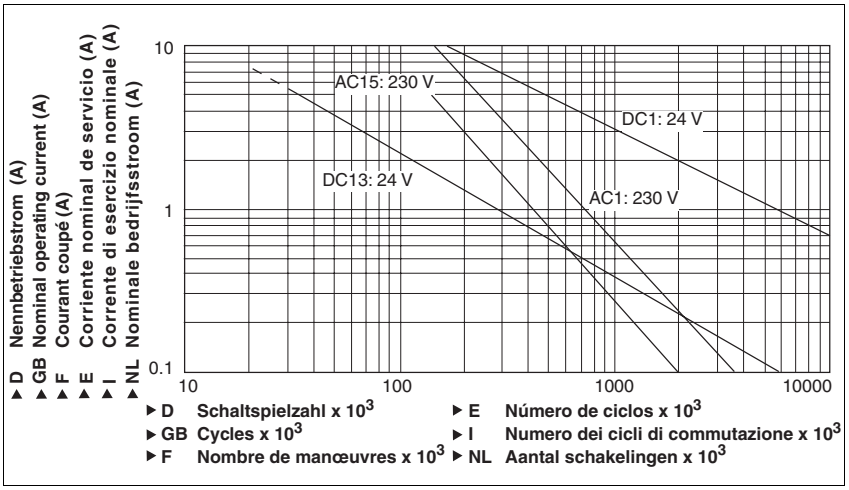


Up to Category 4, EN 954-1
PMUT X1P

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**
Number of output contacts	
Safety contacts (S) instantaneous:	**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 **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**
Contact material	**AgSnO2 + 0.2 µm Au**

Up to Category 4, EN 954-1
PMUT X1P

Electrical data	
External contact fuse protection (I_K = 1 kA) 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	
on monitored reset with rising edge typ.	**40 ms**
on monitored reset with rising edge 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	**720 ms**
after muting sensors off	**300 ms**
Waiting period with a monitored reset	
with rising edge	**300 ms**
Min. start pulse duration with a monitored reset	
with rising edge	**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 to **EN 60068-2-6**	
Frequency	**10 - 55 Hz**
Amplitude	**0.35 mm**
Climatic suitability	**EN 60068-2-78**
Airgap creepage in accordance with **EN 60947-1**	
Pollution degree	**2**
Overvoltage category	**III**
Ambient temperature	**-10 - 55 °C**
Storage temperature	**-40 - 85 °C**
Protection type	
Mounting (e.g. cabinet)	**IP54**
Housing	**IP40**
Terminals	**IP20**

Pilz GmbH & Co. KG, Felix-Wankel-Straße 2, 73760 Ostfildern, Germany
Telephone: +49 711 3409-0, Telefax: +49 711 3409-133, E-Mail: pilz.gmbh@pilz.de

Up to Category 4, EN 954-1
PMUT X1P

Mechanical data	
Housing material	
Housing	**PPO UL 94 V0**
Front	**ABS UL 94 V0**
Cross section of external conductors with screw terminals	
1 core flexible	**0.20 - 2.50 mm² , 24 - 12 AWG** Order no.: 778010
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	**0.20 - 1.00 mm² , 24 - 16 AWG** Order no.: 778010
without crimp connectors or with TWIN crimp connectors	**0.20 - 1.50 mm² , 24 - 16 AWG** Order no.: 778010
Torque setting with screw terminals	**0.50 Nm** Order no.: 778010
Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors	**0.20 - 1.50 mm² , 24 - 16 AWG** Order no.: 788010
Spring-loaded terminals: Terminal points per connection	**2** Order no.: 788010
Stripping length	**8 mm** Order no.: 788010
Dimensions	
Height	**101.0 mm** Order no.: 788010 **94.0 mm** Order no.: 778010
Width	**90.0 mm**
Depth	**121.0 mm**
Weight	**550 g** Order no.: 788010 **560 g** Order no.: 778010

The standards current on **2007-01** apply.

Conventional thermal current	
I_{th} (A) at U_B DC	
1 contact	**8.00 A**
2 contacts	**6.00 A**
3 contacts	**5.00 A**

Order reference

Type	Features		Terminals	Order no.
PMUT X1P C		24 VDC	Spring-loaded terminals	788 010
PMUT X1P		24 VDC	Screw terminals	778 010