

**TYPE 4 SAFETY PROTECTION DEVICE FOR SAFETY LIGHT CURTAINS/BARRIERS**



**MAIN FEATURES**

- Safety Integrity Level (SIL) 3 according to IEC/EN 61508
- Claimed Level (SIL CL) 3 according to IEC/EN 62061
- Performance Level (PL) e and category 4 according to EN/ISO 13849-1
- Safety category 4 according to EN 954-1
- Certified TÜV, CE and UL
- Output: 3 N.O. safety contacts / 2 semiconductor outputs, short-circuit and overload protected
- Wire-break detection on AOPD input
- With under- and overvoltage detection and indication
- Reaction time: max. 30 ms
- LED indicators for RUN operation, channel 1/2
- 45 mm wide, DIN-rail-mountable housing

**APPLICATION AREA**

- The following operation types can be selected by means of a rotary switch:
  - **Protective operation**, e.g. light curtains
  - **Protective operation with muting**, e.g. conveyor belts
    - Setting of various signal cycles of muting sensors
    - Setting of max. permissible muting time
    - Override function by means of start button
  - **Stepping operation**, e.g. presses
    - 1, 2 or 3 cycles
    - Number of cycles can be set by means of key switch
- Suitable for connection of type 4 AOPDs or type 2 AOPDs according to IEC/EN 61496-1, cross-circuit monitoring in AOPDs
- Connection of max.
  - 3 2-channel AOPDs, or
  - 2 2-channel AOPDs and 2 1-channel muting sensors, or
  - 1 2-channel AOPD and 4 1-channel muting sensors, or
  - 2 2-channel AOPDs and key switch for cycle switching
  - additionally: start button and machine contact with line-fault detection

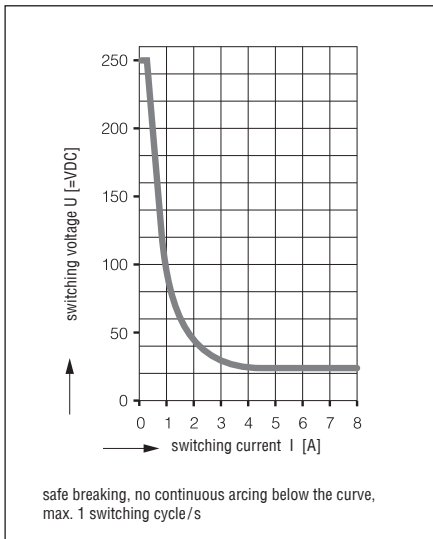
**TECHNICAL DATA**

**INPUT**

Nominal voltage $U_N$	24 VDC
Voltage range at max. 5% ripple content	0.85 ... 1.15 $U_N$
Nominal consumption	max. 170 mA (no load on semiconductor outputs)
Control voltage on	
S21, S23, S31, S33, S41, S43, 48, 58	23 VDC at $U_N$
Control current on	
S12, S14, S22, S24, S32, S34, S42, S44	4.5 mA each at $U_N$
Min. voltage on	
S12, S14, S22, S24, S32, S34, S42, S44	16 VDC
Device protection	Internal by means of PTC
Min. current on M1, M2	25 mA (lamp active)

**OUTPUT**

Contacts	3 x N.O.
Contact type	Relay, positively driven
Operating delay (typ. at $U_N$ ):	
Manual start	max. 50 ms
Automatic start	max. 1.5 s
Automatic restart	max. 55 ms



Limit curve for arc-free operation

Release delay (reaction time)	max. 30 ms (max. 50 ms when error on AOPD and only 1 input channel of AOPD off)	
Nominal output voltage	250 VAC	
Switching of low loads	DC: see limit curve for arc-free operation ≥ 100 mV	
Thermal current I <sub>th</sub>	5 A	
Switching capacity		
to AC 15	3 A / 230 VAC	IEC/EN 60947-5-1
to DC 13 at 0.1 Hz	8 A / 24 VDC	IEC/EN 60947-5-1

### SEMICONDUCTOR OUTPUTS

Output (terminals 48 and 58)	Transistor outputs, plus switching	
Nominal output voltage	24 VDC, max. 100 mA continuous current, max. 400 mA for 0.5 s internal short-circuit, over-temperature and overload protection	

### GENERAL DATA

Electrical life	10 <sup>5</sup> switching cycles	IEC/EN 60947-5-1
to AC 15 at 2 A, AC 230 V		
Permissible operating frequency	max. 1200 switching cycles/h	
Short-circuit strength:		
max. fuse rating	6 A gL	IEC/EN 60947-5-1
line circuit breaker	C 8 A	
Mechanical life	10 x 10 <sup>6</sup> switching cycles	
Temperature range	0 ... +50 °C	
Clearance and creepage distance:		
Nominal impulse voltage / Pollution degree	4 kV / 2	IEC/EN 60664-1
EMC:		
Electrostatic discharge (ESD)	8 kV (contact discharge) IEC/EN 61000-4-2 (according to test degree 3)	
HF irradiation	10 V / m	IEC/EN 61000-4-3
Fast transients:		
- on power supply wires A1 - A2	2 kV	IEC/EN 61000-4-4
- on signal and control wires	2 kV	IEC/EN 61000-4-4
Surge voltage:		
- between power supply wires	1 kV	IEC/EN 61000-4-5
- between wire and ground	2 kV	IEC/EN 61000-4-5
- HF-wire guided	10 V	IEC/EN 61000-4-6
Interference suppression	Limit value class B EN 55011	
Degree of protection:	according to IEC/EN 61496-1 (1997), the device must be installed in a control housing with degree of protection 54.	
Housing	IP 40	IEC/EN 60529
Terminals	IP 20	IEC/EN 60529
Housing	Thermoplastic polymer with V0 behavior acc. to UL Subject 94	
Vibration resistance according to IEC/EN 61496-1	Amplitude 0.35 mm Frequency 10 ... 55 Hz IEC/EN 60068-2-6	
Shock resistance:		
Acceleration	10 g	
Impulse length	16 ms	
Number of shocks	1000 per axis on three axes	
Climatic resistance	0 / 050 / 04	IEC/EN 60068-1
Terminals	EN 50005	
Wire connection	according to DIN 46228-1/-2/-3/-4	
Wire fixing	M3.5 captive plus-minus terminal screws Box terminal with wire protection	

Mounting	DIN rail	IEC/EN 60715
Weight	320 g	
Dimensions (W x H x D)	45 x 84 x 118 mm	

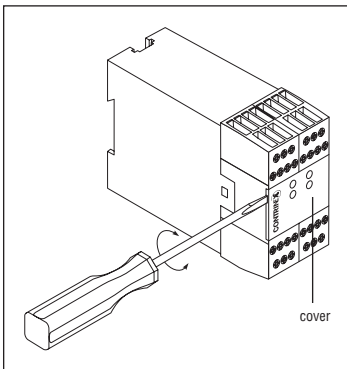
**SAFETY RELATED DATA**

Category	4
PL	e
MTTF <sub>d</sub>	31.5 years
DC <sub>avg</sub>	98.9 %
d <sub>op</sub>	220 days/year
h <sub>op</sub>	12 hours/day
t <sub>cycle</sub>	1.44E+02 s/cycle
SIL CL	3
SIL	3
HFT*	1
DC <sub>avg</sub>	98.9 %
SFF	99.6 %
PFH <sub>d</sub>	7.80E-9 h <sup>-1</sup>

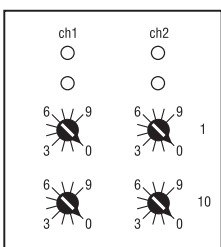
**PART REFERENCE**

Multi-functional safety relay	YRB-0330-242
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**APPLICATION EXAMPLES**



Device setting



Inside view

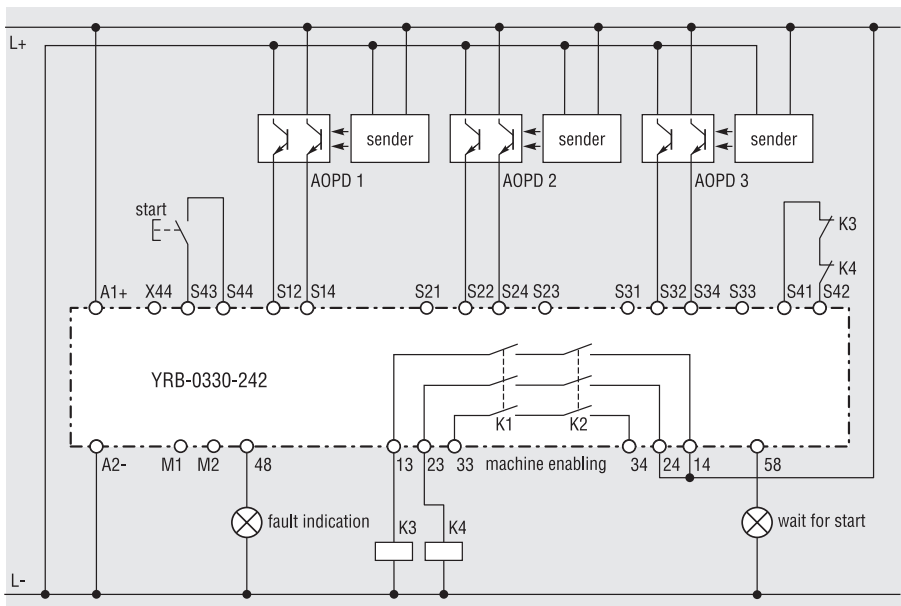


Diagram 1 : Protective operation with 3 AOPDs, manual or automatic start, setting with feedback input

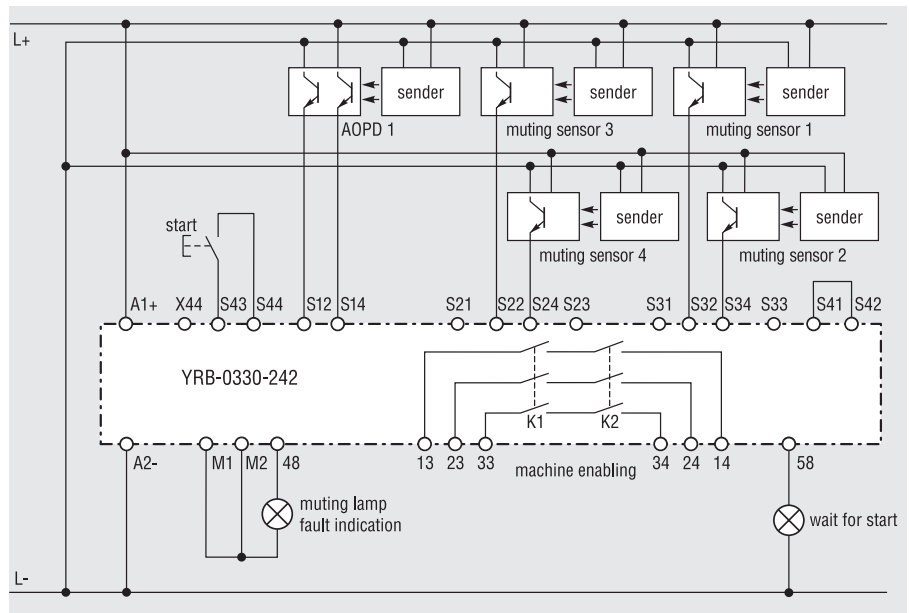


Diagram 2: Protective operation with muting, 4 muting sensors, 1 AOPD

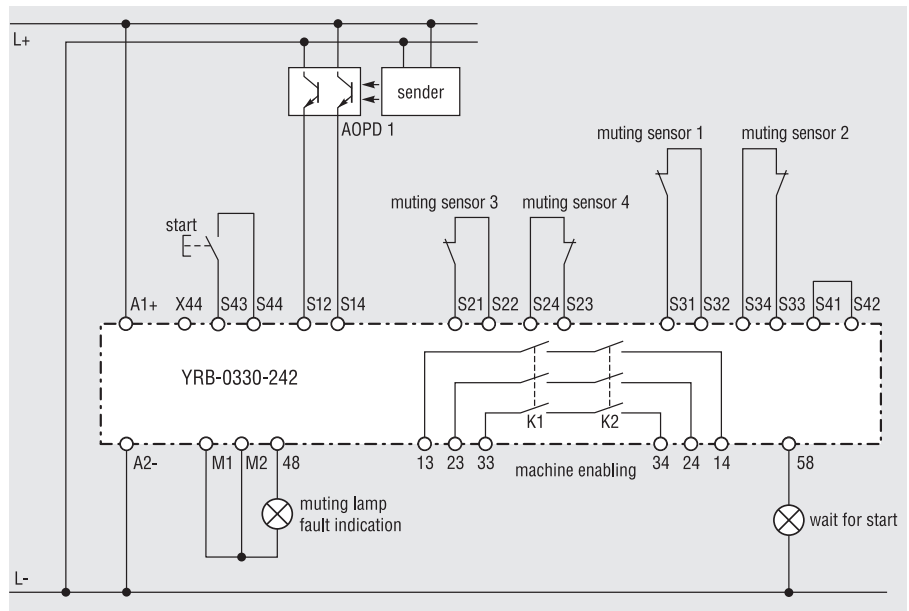


Diagram 3: Protective operation with muting via 4 muting-sensor contacts

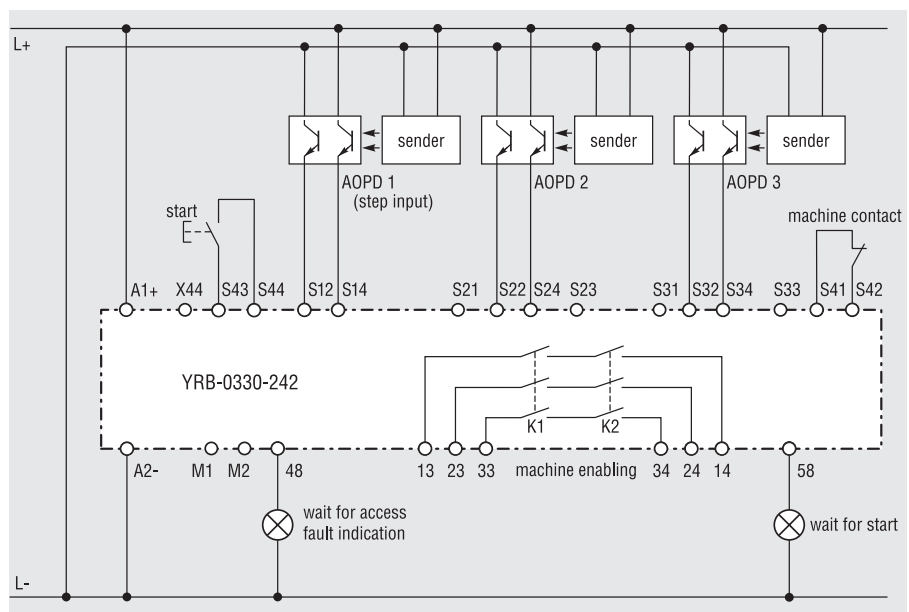


Diagram 4: Stepping operation with 3 AOPDs