

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

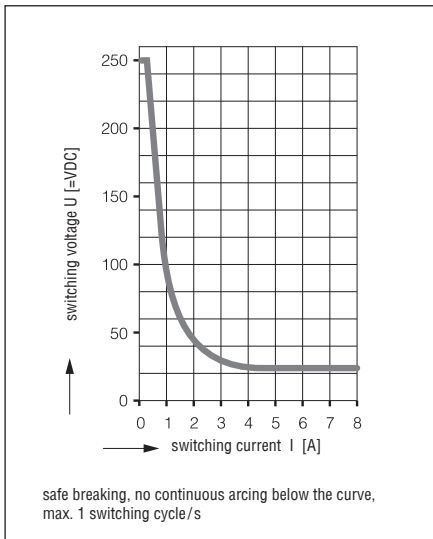
TECHNICAL DATA

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 | |
| | DC: see limit curve for arc-free operation | |
| Switching of low loads | ≥ 100 mV | |
| Thermal current I_{th} | 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 ⁵ 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 ⁶ 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 | |

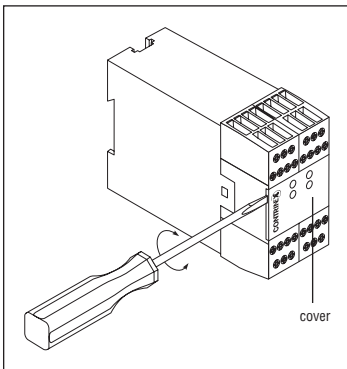
SAFETY RELATED DATA

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

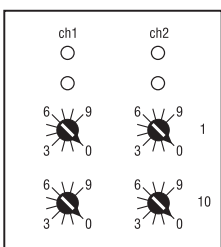
PART REFERENCE

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



Device setting



Inside view

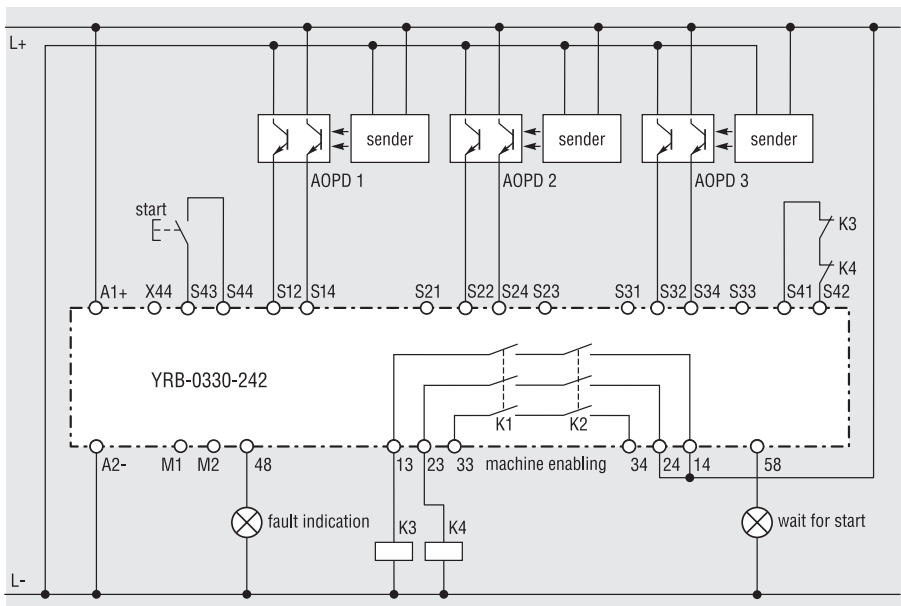


Diagram 1 : Protective operation with 3 AOPDs, manual or automatic start, setting with feedback input

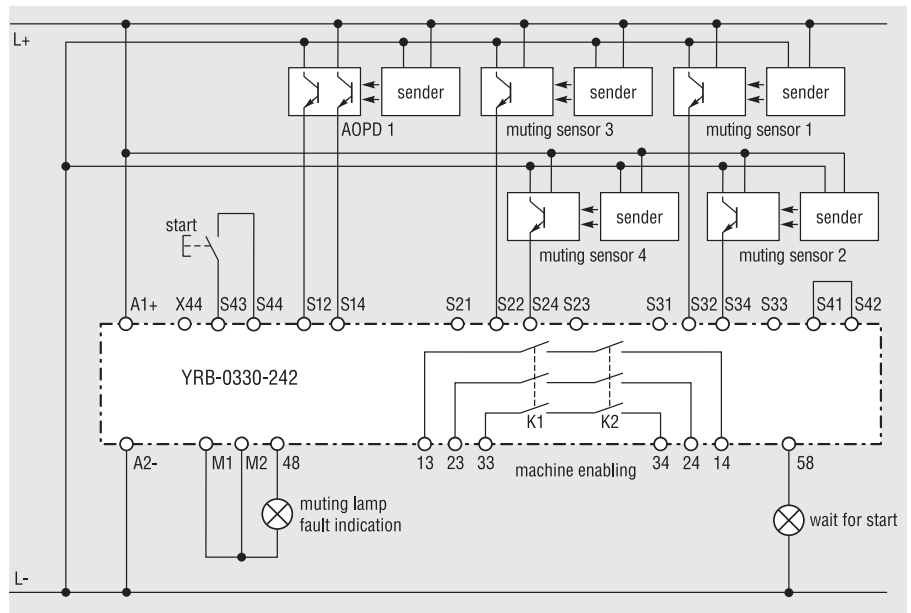


Diagram 2: Protective operation with muting, 4 muting sensors, 1 AOPD

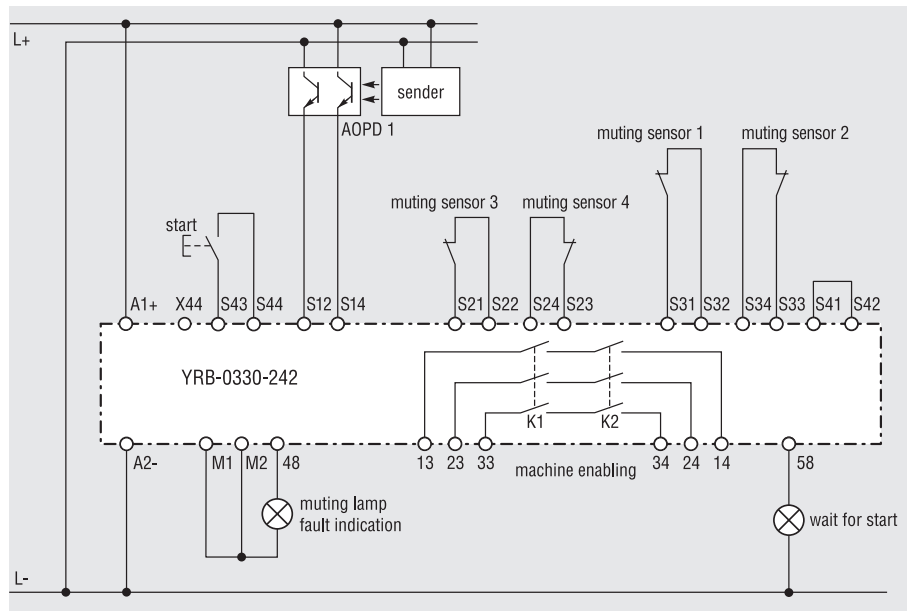


Diagram 3: Protective operation with muting via 4 muting-sensor contacts

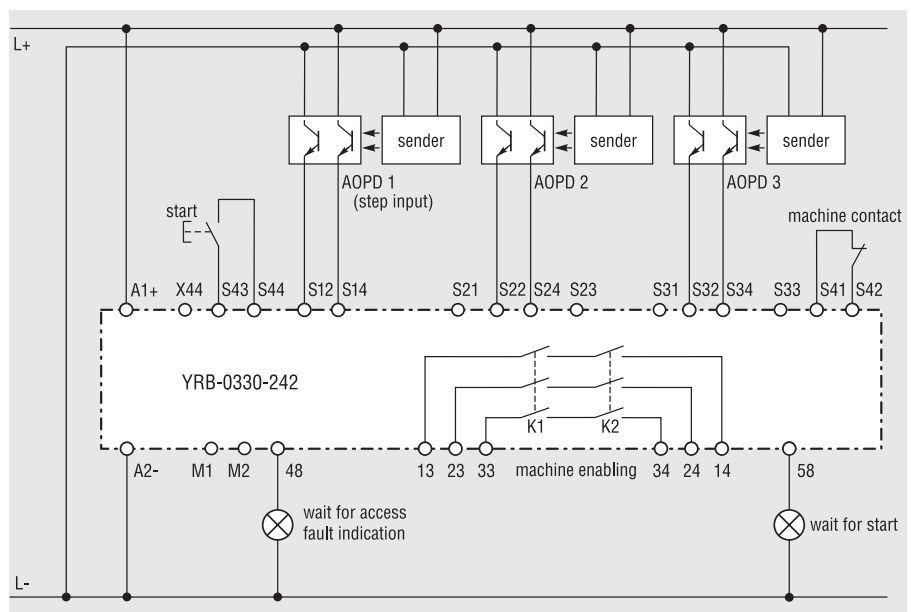


Diagram 4: Stepping operation with 3 AOPDs