



### REDUNDANCY MODULE

- Cost Effective Solution to Build Redundant Systems
- Dual Input with Single Output
- Alarm Relay-contacts for Each Input Path
- Two Diodes (Common Cathode)
- DC 24-48V  $\pm 25\%$  (18-60Vdc) Wide-range Input
- Full Power Between  $-40^{\circ}\text{C}$  and  $+60^{\circ}\text{C}$
- Width only 32mm
- Rugged Metal Housing
- Large Screw Terminals
- Easy Wiring:  
Distribution Terminal for Negative Pole Included
- 3 Year Warranty

### PRODUCT DESCRIPTION

The YRM2.DIODE is a redundancy module, which can be used to build 1+1 and N+1 redundant systems. It is equipped with two input channels, which can be connected to power supplies with up to 10A output current and one output, which can carry nominal currents up to 20A. The module is suitable for power supplies with constant current overload behavior as well as any kind of "Hiccup" overload behavior.

The YRM2.DIODE has a monitoring circuit included and is the perfect solution when the power supply has no DC-OK function. Two LEDs and two relay contacts signal when one of the two DC-input voltages is not in range due to a non-functioning or disconnected power supply.

In addition to the YRM2.DIODE is the YR2.DIODE which has no monitoring circuitry included. This is the perfect fit when the power supply itself is already equipped with a DC-OK signal (e.g.: DIMENSION Q-Series).

Large screw terminals allow an easy installation and a huge international approval package for a variety of applications makes this unit suitable for nearly every situation.

### SHORT-FORM DATA

|                              |   |  |
|------------------------------|---|--|
| Input voltage                | DC 24-48V                                       | $\pm 25\%$   |
| Input voltage range          | 18-60Vdc  |  |
| Input current                | 2x 0-10A<br>2x 0-16A                            | continuous<br>for 5 seconds  |
| Output current               | 0-20A<br>20-32A<br>25A                          | continuous<br>for 5 seconds<br>at cont. overload/<br>short circuit |
| Input to output voltage drop | typ. 0.78V<br>typ. 0.85V<br>typ. 0.85V          | input: 2x5A<br>input: 1x10A<br>input: 2x10A                        |
| Power losses                 | typ. 1.0W<br>typ. 8.8W<br>typ. 9.5W<br>typ. 18W | at no load<br>input: 2x5A<br>input: 1x10A<br>input: 2x10A          |
| Temperature range            | $-40^{\circ}\text{C}$ to $+70^{\circ}\text{C}$  | operational,   |
| Derating                     | 0.5A/ $^{\circ}\text{C}$                        | $+60$ to $+70^{\circ}\text{C}$                                     |
| Dimensions                   | 32x124x117mm                                    | WxHxD  |
| Weight                       | 350g / 0.77lb                                   |  |

### ORDER NUMBERS

|                   |                   |                           |
|-------------------|-------------------|---------------------------|
| Redundancy Module | <b>YRM2.DIODE</b> | DC 12-48V                 |
| Accessory         | ZM1.WALL          | Wall/ panel mount bracket |
|                   | ZM11.SIDE         | Side mount bracket        |

### MAIN APPROVALS

For details and the complete approval list, see chapter 15.



UL 508



ATEX



UL 60950-1



IECEX



Class I Div 2





Marine

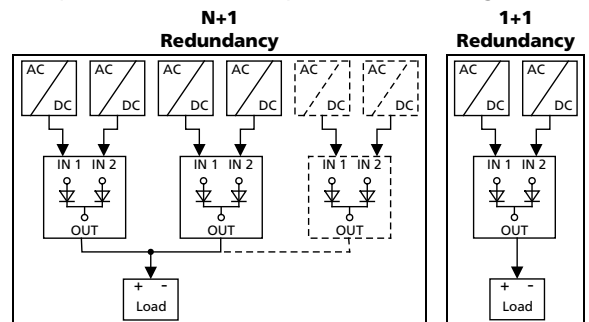
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## TERMINOLOGY AND ABBREVIATIONS

|  |  |
|--|--|
| <b>PE and  symbol</b> | PE is the abbreviation for <b>Protective Earth</b> and has the same meaning as the symbol  .  |
| <b>Earth, Ground</b>   | This document uses the term "earth" which is the same as the U.S. term "ground".   |
| <b>t.b.d.</b>  | To be defined, value or description will follow later.   |
| <b>DC 24V</b>  | A figure displayed with the AC or DC before the value represents a nominal voltage with standard tolerances (usually $\pm 15\%$ ) included.<br>E.g.: DC 12V describes a 12V battery disregarding whether it is full (13.7V) or flat (10V)  |
| <b>24Vdc</b>   | A figure with the unit (Vdc) at the end is a momentary figure without any additional tolerances included.  |
| <b>may</b>   | A key word indicating flexibility of choice with no implied preference   |
| <b>shall</b>   | A key word indicating a mandatory requirement  |
| <b>should</b>  | A key word indicating flexibility of choice with a strongly preferred implementation   |
| <b>1+1 Redundancy</b>  | Use of two identical power supplies in parallel to provide continued operation following most failures in a single power supply. The two power supply outputs should be isolated from each other by utilizing diodes or other switching arrangements.<br>E.g. two 10A power supplies are needed to achieve a 10A redundant system.                                 |
| <b>N+1 Redundancy</b>  | Use of three or more identical power supplies in parallel to provide continued operation following most failures in a single power supply. All power supply outputs should be isolated from each other by utilizing diodes or other switching arrangements. E.g.: To achieve a 40A redundant system, five 10A power supplies are needed in a N+1 redundant system. |



## 1. INTENDED USE

This device is designed for installation in an enclosure and is intended for commercial use, such as in industrial control, process control, monitoring and measurement equipment or the like. Do not use this device in equipment where malfunction may cause severe personal injury or threaten human life.

The redundancy module can be used with any type of power supply as long as the maximum output current ratings are not exceeded. It is suitable for power supplies with continuous overload current as well as any kind of intermittent (Hiccup) overload behavior.

## 2. INSTALLATION INSTRUCTIONS

**⚠ WARNING Risk of electrical shock, fire, personal injury or death.**

- Turn power off before working on the device and protect against inadvertent re-powering.
- Do not open, modify or repair the device.
- Use caution to prevent any foreign objects from entering into the housing.
- Do not use in wet locations or in areas where moisture or condensation can be expected.
- Do not touch during power-on, and immediately after power-off. Hot surface may cause burns.

**Obey the following installation instructions:**

This device may only be installed and put into operation by qualified personnel.

This device does not contain serviceable parts. The tripping of an internal fuse is caused by an internal defect.

If damage or malfunction should occur during installation or operation, immediately turn power off and send unit to the factory for inspection.

Install the device in an enclosure providing protection against electrical, mechanical and fire hazards.

Do not ground or earth the positive output pole which could prevent redundancy in case of a ground failure. Ground the negative output pole, when needed.

Use only power supplies with a negligible output ripple voltage in the low frequency range between 50Hz and 10kHz when used in marine applications according to the GL regulations.

Install the device onto a DIN rail according to EN 60715 with the input terminals on the top of the device. Other mounting orientations require a reduction in output current.

Make sure that the wiring is correct by following all local and national codes. Use appropriate copper cables that are designed for a minimum operating temperature of 60°C for ambient temperatures up to +45°C, 75°C for ambient temperatures up to +60°C and 90°C for ambient temperatures up to +70°C. Ensure that all strands of a stranded wire enter the terminal connection.

Unused screw terminals should be securely tightened.

The device is designed for pollution degree 2 areas in controlled environments. No condensation or frost is allowed.

The enclosure of the device provides a degree of protection of IP20.

The input must be powered from a PELV or SELV source or an "Isolated Secondary Circuit" in order to maintain a SELV or PELV output.

Check correct input polarity. The device will not operate when input voltage is reversed.

The device is designed as "Class of Protection III" equipment according to IEC 61140.

A PE (ground) connection is not required. However, connecting the chassis ground terminal to ground can be beneficial to gain a high EMI immunity.

The device is designed for convection cooling and does not require an external fan. Do not obstruct airflow and do not cover ventilation grid!

The device is designed for altitudes up to 6000m (19685ft). See additional requirements in the product datasheet for use above 2000m (6560ft).

Keep the following minimum installation clearances: 40mm on top, 20mm on the bottom, 5mm left and right side. Increase the 5mm to 15mm in case the adjacent device is a heat source. When the device is permanently loaded with less than 50%, the 5mm can be reduced to zero.

The maximum surrounding air temperature is +70°C (+158°F). The operational temperature is the same as the ambient or surrounding air temperature and is defined 2cm below the device.

The device is designed to operate in areas between 5% and 95% relative humidity.

### Installation Instructions for Hazardous Location Areas

The device is suitable for use in Class I Division 2 Groups A, B, C, D locations and for use in Group II Category 3 (Zone 2) environments.

Hazardous Location classification: ATEX: EPS 11 ATEX 1 312 X, II 3G EX ec nC IIC T4 Gc

### WARNING EXPLOSION HAZARDS!

Substitution of components may impair suitability for this environment.

Do not disconnect the device unless power has been switched off or the area is known to be non-hazardous.

A suitable enclosure must be provided for the end product which has a minimum protection of IP54 and fulfils the requirements of the EN 60079-0.

## 3. INPUT AND OUTPUT CHARACTERISTICS

|                               |          |           |  |
|-------------------------------|----------|-----------|--|
| Number of inputs              | 2        |           |  |
| Number of outputs             | 1        |           |  |
| Input voltage                 | nom.     | DC 24-48V | ±25%<br>The input circuitry must meet the SELV requirements stipulated by IEC/EN/UL 60950-1. |
| Input voltage range           | 18-60Vdc |           |  |
| Voltage drop, input to output | typ.     | 0.78V     | at 2x5A, see Fig. 3-1  |
|                               | typ.     | 0.85V     | at 1x10A, see Fig. 3-2   |
|                               | typ.     | 0.85V     | at 2x10A, see Fig. 3-1   |
| Input current                 | nom.     | 2x 0-10A  | continuous   |
|                               | nom.     | 1x 0-20A  | continuous, see note 1   |
|                               | nom.     | 2x 10-16A | for up to 5 seconds  |
| Peak input current            | max.     | 150A      | for maximal 10ms per input   |
| Output current                | nom.     | 20A       | continuous   |
|                               | nom.     | 20-32A    | for up to 5 seconds  |
|                               | max.     | 25A       | at continuous overload or short circuit, see note 2  |
| Reverse current               | max.     | 2mA       | per input, -40°C to +60°C  |
| Reverse voltage               | max.     | 200Vdc    | voltage applied to the output, continuously allowed  |

Note 1: Each input can be loaded up to 20A. At currents above 10A, the other input should not be loaded. It is preferable to parallel the two inputs in order to minimize the power loss in such cases.

Note 2: Ensure that the continuous output current does not exceed 25A. Check the short-circuit current of the power sources and if the power source can deliver more than 25A together, use an appropriate fuse on the output.

Fig. 3-1 **Input to output voltage drop when both inputs draw current**  
(typical 1+1 redundant case, when the output voltages of the two units are equal or set into "parallel use" mode)

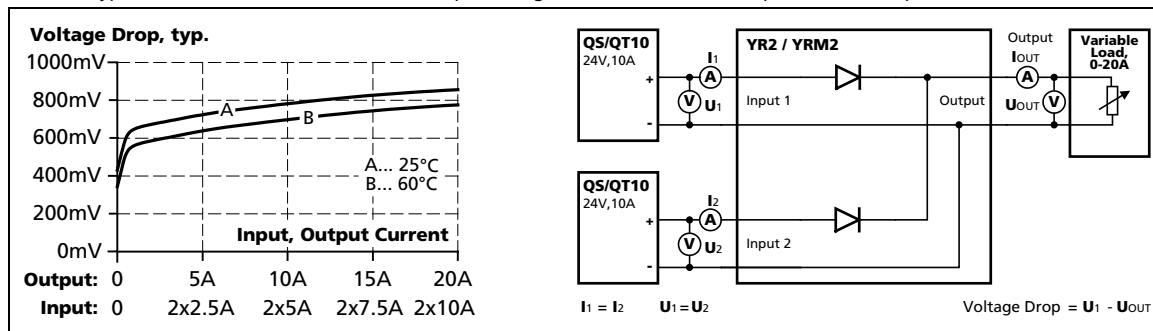
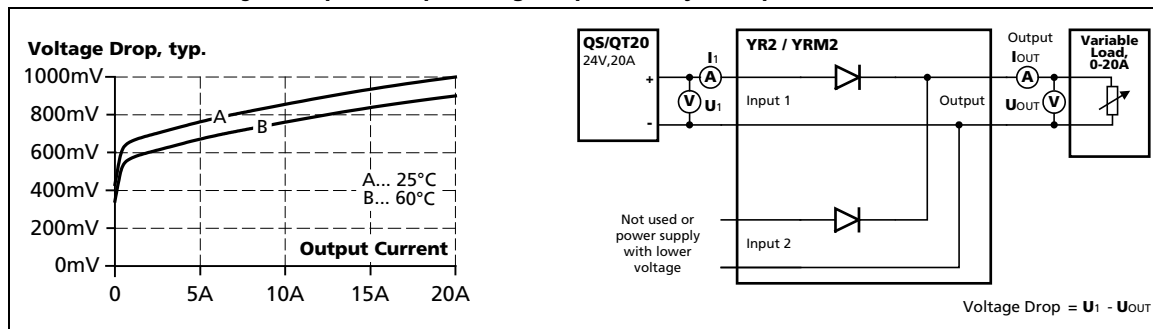


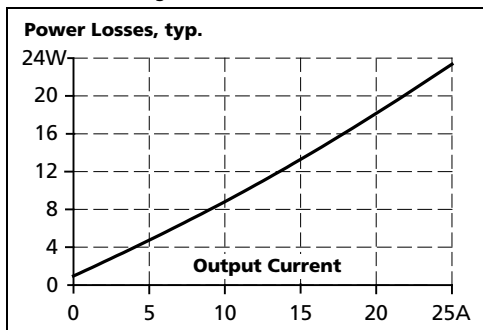
Fig. 3-2 **Input to output voltage drop when only one input draws current**



## 4. POWER LOSSES

| <b>DC 24V</b>        |      |       |                      |
|----------------------|------|-------|----------------------|
| Power losses         | typ. | 8.8W  | input: 2x5A          |
|                      | typ. | 9.5W  | input: 1x10A         |
|                      | typ. | 18.0W | input: 2x10A         |
| Standby power losses | typ. | 1.0W  | at no output current |

Fig. 4-1 Power losses



## 5. ALARM CONTACTS

Both input voltages are monitored individually. If one input voltage is too low or completely lost, it will be indicated by an alarm relay contact.

Each input has its own monitoring circuitry and relay contact.

|                   |  |                                  |   |
|-------------------|--|----------------------------------|---|
| Alarm threshold   | nom.   | 21.5V ( $\pm 0.5V$ )             | Relay contact opens immediately after the input voltage falls below this value. |
| Contact ratings   | min.   | 60Vdc 0.3A, 30Vdc 1A, 30Vac 0.5A | input: 1x10A  |
|                   | max.   | 1mA at 5Vdc                      | input: 2x10A  |
| Isolation voltage | see dielectric strength table in section 14. |                                  |   |

## 6. LIFETIME EXPECTANCY AND MTBF

The redundancy module has two input channels which are completely independent from each other. Each control circuit, auxiliary voltage source, or other circuitry in the module are designed separately for each input. The dual input redundancy module can be considered as two single redundancy modules combined together in one housing. The only common point is the circuit trace that ties the two separate circuits together at the output.

The MTBF figures below are for the entire dual input module. If the MTBF number of only one path is needed, simply double the value from the table.

The redundancy module does not have electrolytic capacitors included. Therefore, the lifetime expectancy is extremely high.

| Input / output current conditions |      | <b>Input: 2x10A<br/>Output: 20A</b> | <b>Input: 2x5A<br/>Output: 10A</b> |                                      |
|-----------------------------------|------|-------------------------------------|------------------------------------|--------------------------------------|
| Lifetime expectancy *)            | min. | 25 years                            | 25 years                           | at 24V and 40°C                      |
|                                   | min. | 25 years                            | 25 years                           | at 24V and 25°C                      |
| MTBF **) SN 29500, IEC 61709      |      | 9 100 000h                          | 10 900 000h                        | at 24V 40°C                          |
|                                   |      | 15 700 000h                         | 18 800 000h                        | at 24V 25°C                          |
| MTBF **) MIL HDBK 217F            |      | 9 200 000h                          | 11 100 000h                        | at 24V and 40°C (Ground Benign GB40) |
|                                   |      | 12 600 000h                         | 15 100 000h                        | at 24V and 25°C (Ground Benign GB25) |
|                                   |      | 3 380 000h                          | 4 060 000h                         | at 24V and 40°C (Ground Fixed GF40)  |
|                                   |      | 4 630 000h                          | 5 570 000h                         | at 24V and 25°C (Ground Fixed GF25)  |

\*) The **Lifetime expectancy** shown in the table indicates the minimum operating hours (service life).

\*\*) **MTBF** stands for **Mean Time Between Failure**, which is calculated according to statistical device failures, and indicates reliability of a device. It is the statistical representation of the likelihood of a unit to fail and does not necessarily represent the life of a product. The MTBF figure is a statistical representation of the likelihood of a device to fail. A MTBF figure of e.g. 1 000 000h means that statistically one unit will fail every 100 hours if 10 000 units are installed in the field. However, it can not be determined if the failed unit has been running for 50 000h or only for 100h.

## 7. TERMINALS AND WIRING

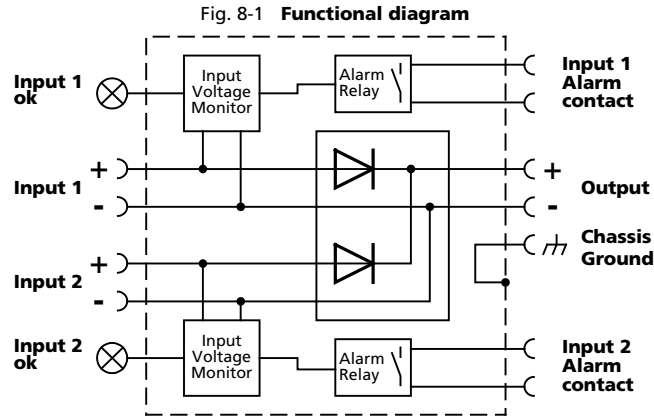
|                               | <b>Input and output terminals</b>   | <b>Alarm-signal terminals</b>  |
|-------------------------------|---|--|
| Type                          | Screw terminals<br>IP20 Finger safe construction.<br>Suitable for field installation. | Screw terminals, pluggable<br>IP20 Finger safe construction.<br>Suitable for field installation. |
| Solid wire                    | 0.5-6mm <sup>2</sup>  | 0.2-1.5mm <sup>2</sup>   |
| Stranded wire                 | 0.5-4mm <sup>2</sup>  | 0.2-1.5mm <sup>2</sup>   |
| American Wire Gauge           | 20-10 AWG   | 22-14 AWG  |
| Max. wire diameter            | 2.8mm (including ferrule)   |  |
| Wire stripping length         | 7mm / 0.28inch  | 6mm / 0.25inch   |
| Screwdriver                   | 3.5mm slotted or Pozidrive No 2   | 3mm slotted  |
| Recommended tightening torque | 0.8Nm / 7lb.in  | 0.4Nm / 3.5lb.in   |

### Instructions:

- a) The external circuitry of all terminals (including signalling contacts) must meet the safety requirements stipulated by IEC/EN/UL 60950-1: SELV.
- b) Use appropriate copper cables that are designed for minimum operating temperatures of:  
60°C for ambient up to 45°C and  
75°C for ambient up to 60°C minimum.
- c) Follow national installation codes and installation regulations!
- d) Ensure that all strands of a stranded wire enter the terminal connection!
- e) Screws of unused terminal compartments should be securely tightened.
- f) Ferrules are allowed.
- g) Do not connect or disconnect the wires from the terminals below -25°C (-13°F).



## 8. FUNCTIONAL DIAGRAM



## 9. FRONT SIDE AND USER ELEMENTS

Fig. 9-1 Front side



### A Output terminals

### B Chassis ground terminal

Connection of the chassis to ground is optional and not required since the unit fulfils the requirements according to protection class III.

### C Input terminals for input 1

### D Input terminals for input 2

### E Alarm-signal terminals for input 1 monitoring (relay contact)

### F Alarm-signal terminals for input 2 monitoring (relay contact)

### G Green LED for input 1 (LED is on, when input voltage is in range)

### H Green LED for input 2 (LED is on, when input voltage is in range)

## 10. EMC

The redundancy module is suitable for applications in industrial environment as well as in residential, commercial and light industry environment without any restrictions. A detailed EMC report is available on request.

| <b>EMC Immunity</b>               | According generic standards: EN 61000-6-1 and EN 61000-6-2 |                                |       |             |
|-----------------------------------|--|--------------------------------|-------|-------------|
| Electrostatic discharge           | EN 61000-4-2   | Contact discharge              | 8kV   | Criterion A |
|                                   |  | Air discharge                  | 15kV  | Criterion A |
| Electromagnetic RF field          | EN 61000-4-3   | 80MHz-2.7GHz                   | 10V/m | Criterion A |
| Fast transients (Burst)           | EN 61000-4-4   | Input lines                    | 2kV   | Criterion A |
|                                   |  | Output lines                   | 2kV   | Criterion A |
|                                   |  | Alarm contacts                 | 2kV   | Criterion A |
| Surge voltage on input lines      | EN 61000-4-5   | +/- → Chassis ground           | 1kV   | Criterion A |
| Surge voltage on output lines     | EN 61000-4-5   | +/- → Chassis ground           | 1kV   | Criterion A |
| Surge voltage on alarm contacts   | EN 61000-4-5   | Alarm contact → Chassis ground | 1kV   | Criterion A |
| Conducted disturbance             | EN 61000-4-6   | 0.15-80MHz                     | 10V   | Criterion A |
| Power-frequency magnetic field *) | EN 61000-4-8   | 50Hz                           | 30A/m | Criterion A |

**Criteria:**

**A:** Redundancy module shows normal operation behavior within the defined limits.

**Notes:**

\*) A test is not applicable according to EN 61000-6-2, since the device does not contain components susceptible to magnetic fields, e.g. hall elements, electrodynamic microphones, etc.

| <b>EMC Emission</b> | According generic standards: EN 61000-6-3 and EN 61000-6-4 |                          |
|---------------------|--|--------------------------|
| Conducted emission  | IEC/CISPR 16-1-2, IEC/CISPR 16-2-1                         | Class B, input lines *)  |
|                     | IEC/CISPR 16-1-2, IEC/CISPR 16-2-1                         | Class B, output lines *) |
| Radiated emission   | EN 55011, EN 55032   | Class B                  |

This device complies with FCC Part 15 rules.

Operation is subjected to following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

\*) Provided, that power sources connected on the inputs fulfill the class B requirements too.

## 11. ENVIRONMENT

|                            |  |   |
|----------------------------|--|---|
| Operational temperature *) | -40°C to +70°C (-40°F to 158°F)                                | Reduce output power above +60°C   |
| Output derating            | 0.5A/°C  | 60-70°C (140°F to 158°F), see   |
| Storage temperature        | -40 to +85°C (-40°F to 185°F)                                  | for storage and transportation  |
| Humidity **)               | 5 to 95% r.H.  | IEC 60068-2-30  |
| Vibration sinusoidal ***)  | 2-17.8Hz: ±1.6mm<br>17.8-500Hz: 2g<br>2 hours / axis           | IEC 60068-2-6   |
| Shock ***)                 | 30g 6ms, 20g 11ms<br>3 bumps / direction<br>18 bumps in total  | IEC 60068-2-27  |
| Altitude                   | 0 to 6000m (0 to 6 560ft)<br>2000 to 6000m (6 560 to 20 000ft) | without any restrictions<br>reduce output power or ambient temperature,<br>see Fig. 11-2  |
| Altitude derating          | 1.25A/1000m or 5°C/1000m                                       | > 2000m (6500ft), see Fig. 11-2   |
| Over-voltage category      | not applicable   | The concept of the overvoltage category is<br>used for equipment energized directly from<br>the low voltage mains (IEC 60664-1 §4.3.3.2.1). |
| Degree of pollution        | 2  | IEC 62103, EN 50178, not conductive   |

\*) Operational temperature is the same as the ambient temperature and is defined as the air temperature 2cm below the unit.

\*\*\*) Do not energize while condensation is present

\*\*\*) Tested in combination with DIN rails according to EN 60715 with a height of 15mm and a thickness of 1.3mm and standard mounting orientation.

Fig. 11-1 Output current vs. ambient temp.

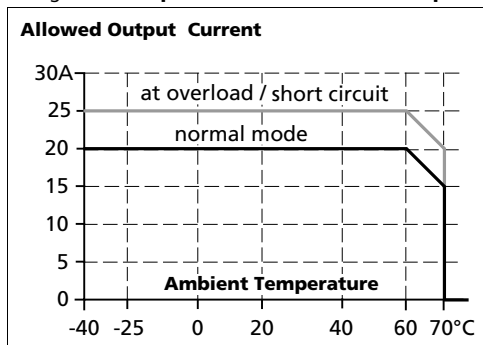
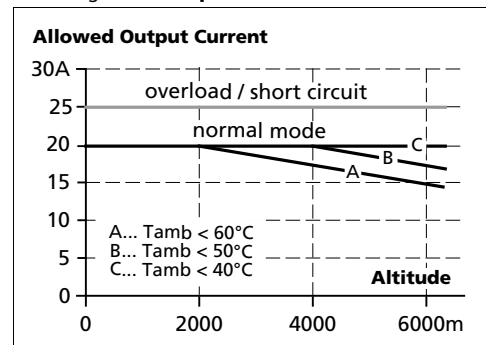


Fig. 11-2 Output current vs. altitude



## 12. PROTECTION FEATURES

|                                   |              |  |
|-----------------------------------|--------------|--|
| Output over-current protection    | not included |  |
| Reverse input polarity protection | included     | unit does not start when input voltage is reversed |
| Degree of protection              | IP 20        | EN/IEC 60529                                       |
| Penetration protection            | > 3.6mm      | e.g. screws, small parts                           |
| Over-temperature protection       | not included |  |
| Input transient protection        | not included |  |
| Output transient protection       | included     | see EMC chapter                                    |
| Internal input fuse               | not included |  |

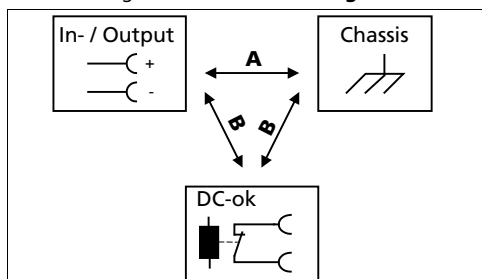
## 13. SAFETY FEATURES

|                                |   |  |
|--------------------------------|---|--|
| Input / output separation      | no galvanic separation  | 200V epitaxial diode between input and output            |
| Safety level of output voltage | The output voltage is regarded to be SELV (EN 60950-1) or PELV (EN 60204-1, EN 50178, IEC 60364-4-41) if the input voltage and the voltage which is applied to the alarm contacts fulfil the requirements for a SELV source or PELV source. |  |
| Class of protection            | III   | PE (Protective Earth) or chassis connection not required |
| PE resistance                  | < 0.10hm  | between housing and chassis-ground terminal              |

## 14. DIELECTRIC STRENGTH

The input and output voltages have the same reference, are floating and have no ohmic connection to ground. Type and factory tests are conducted by the manufacturer. Field tests may be conducted in the field using the appropriate test equipment which applies the voltage with a slow ramp (2s up and 2s down). Connect input/output/signal terminals together before conducting the test. When testing, set the cut-off current settings to the value in the table below.

Fig. 14-1 Dielectric strength



|                         |     | <b>A</b> | <b>B</b> |
|-------------------------|-----|----------|----------|
| Type test               | 60s | 500Vac   | 500Vac   |
| Factory test            | 5s  | 500Vac   | 500Vac   |
| Field test              | 5s  | 500Vac   | 500Vac   |
| Cut-off current setting |     | > 2mA    |          |

## 15. APPROVED, FULFILLED OR TESTED STANDARDS

UL 508



UL Certificate  
Listed equipment for category NMTR - Industrial Control Equipment  
Applicable for US and Canada  
E-File: E198865

IEC 60950-1

**CB Report**

CB Scheme Certificate  
General safety requirements for Information Technology Equipment (ITE)

UL 60950-1



UL Certificate  
Recognized component for category QQQQ - Information Technology Equipment (ITE)  
Applicable for US and Canada  
E-File: E137006

ATEX



Agency Certificate (Bureau Veritas)  
EN 60079-0 Explosive atmospheres - General requirements  
EN 60079-7, EN 60079-15 Equipment protection by type of protection "e" and "n"  
Certificate: EPS 11 ATEX 1 312 X  
Temperature Code: T4  
Type of Protection: ec nC

IECEX

**IECEX**

IECEX Certificate  
IEC 60079-0 Explosive atmospheres - General requirements  
IEC 60079-7, IEC 60079-15 Equipment protection by type of protection "e" and "n"  
Certificate: IECEX EPS 12.0032 X  
Temperature Code: T4  
Type of Protection: ec nC

Class I Div 2



CSA Certificate  
Power Supplies for Hazardous Location  
Applicable for Canada and US  
CSA Class: 5318-01 (Canada), 5318-81 (USA)  
Temperature Code: T4  
Groups: A, B, C and D

Marine (DNV)

**DNV**  
DNV.COM/AF

DNV Certificate  
DNV Type approved product  
Certificate: TAA00001ST  
Temperature: Class D  
Humidity: Class B  
Vibration: Class C  
EMC: Class A  
Enclosure: Class A

Marine (ABS)

**ABS**

ABS Design Assessment Certificate  
ABS (American Bureau of Shipment) assessed product  
Certificate: 17-HG1599236-PD

IEC 60068-2-60

**Corrosion**  
IEC 60068-2-60  
Method 4 ✓

Manufacturer's Declaration (Online Document)  
Environmental Tests, Flowing Mixed Gas Corrosion Test  
Test Ke - Method 4  
H2S: 10ppb  
NO2: 200ppb  
Cl2: 10ppb  
SO2: 200ppb  
Test Duration: 3 weeks, which simulates a service life of 10 years.

ISA-71.04 G3

**Corrosion**  
G3-ISA-71.04 ✓

Manufacturer's Declaration (Online Document)  
Airborne Contaminants Corrosion Test  
Severity Level: G3 Harsh  
H2S: 100ppb  
NOx: 1250ppb  
Cl2: 20ppb  
SO2: 300ppb  
Test Duration: 3 weeks, which simulates a service life of 10 years

VDMA 24364

**LABS**  
VDMA 24364-C1-L/W

Paint Wetting Impairment Substances Test (or LABS-Test)  
Tested for Zone 2 and test class C1 according to VDMA 24364-C1-L/W for solvents and water-based paints

## 16. REGULATORY PRODUCT COMPLIANCE

EU Declaration of Conformity



The CE mark indicates conformance with the  
- EMC directive  
- ATEX directive  
- RoHS directive

REACH Directive

**REACH** ✓

Manufacturer's Statement  
EU-Directive regarding the Registration, Evaluation, Authorization and Restriction of Chemicals

WEEE Directive



Manufacturer's Statement  
EU-Regulation on Waste Electrical and Electronic Equipment  
Registered in Germany as business to business (B2B) products.

KC Korean Certificate



KC Registration  
Korean registration of Broadcasting and Communication Equipment  
Registered under Clause 3, Article 58-2 of Radio Waves Act.

EAC TR Registration



EAC Certificate  
EAC EurAsian Conformity - Registration Russia, Kazakhstan and Belarus  
8504408200, 8504409000

## 17. PHYSICAL DIMENSIONS AND WEIGHT

|                         |  |
|-------------------------|--|
| Weight                  | 350g / 0.77lb  |
| DIN rail                | Use 35mm DIN rails according to EN 60715 or EN 50022 with a height of 7.5 or 15mm.<br>The DIN rail depth must be added to the unit depth (117mm) to calculate the total required installation depth. |
| Installation clearances | See chapter 2  |

Fig. 17-1 Front view

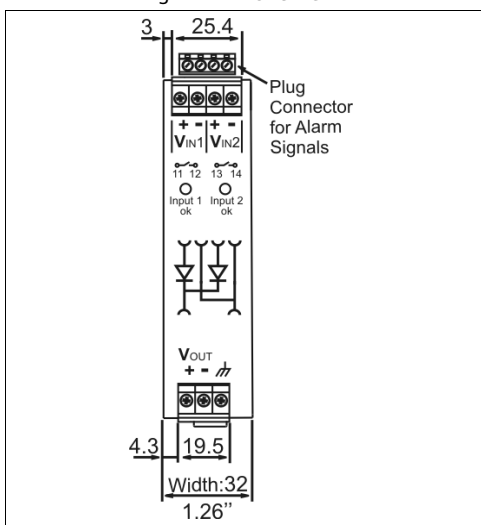
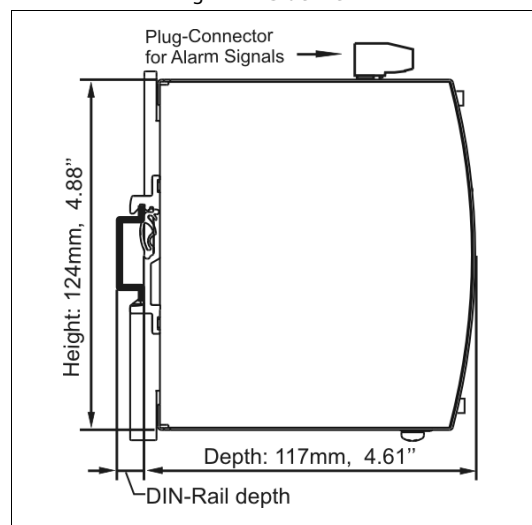


Fig. 17-2 Side view



### 18. ACCESSORIES

#### 18.1. ZM1.WALL - WALL MOUNTING BRACKET

This standard bracket is used to mount the YR40 redundancy module onto a flat surface without utilizing a DIN rail.

Fig. 18-1 **ZM1.WALL Wall mounting bracket**

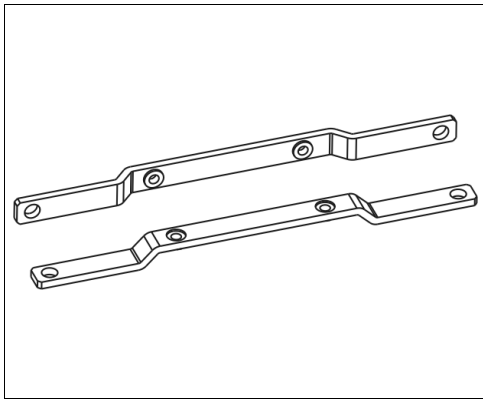
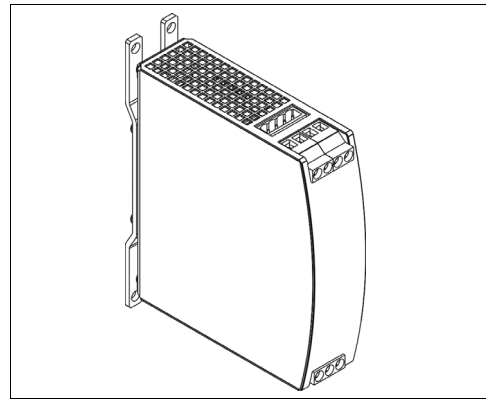


Fig. 18-2 **Assembled wall mounting bracket**



#### 18.2. ZM11.SIDE - SIDE MOUNTING BRACKET

This bracket is used to mount the YR80 redundancy module sideways with or without utilizing a DIN rail.

The two aluminum brackets and the black plastic slider of the unit have to be detached, so that the steel brackets can be mounted.

For sideways DIN rail mounting, the removed aluminum brackets and the black plastic slider need to be mounted on the steel bracket.

Fig. 18-3  
**ZM11.SIDE Side mounting bracket**

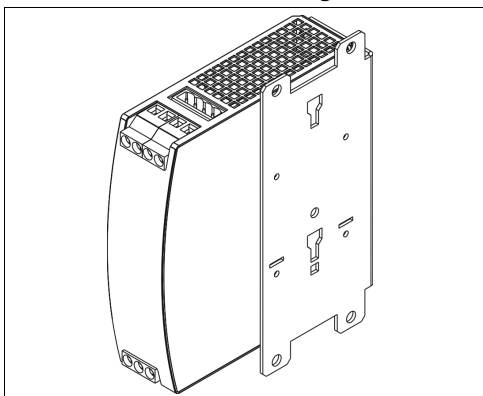
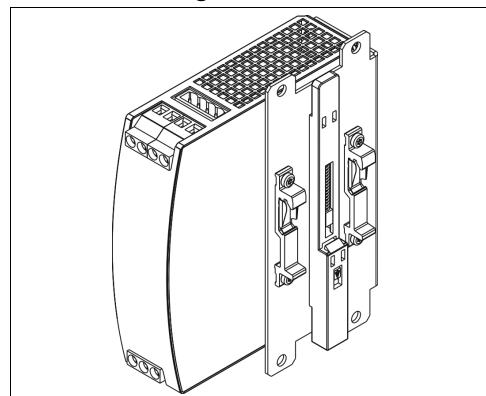


Fig. 18-4  
**Side mounting with DIN rail brackets**





## 19. APPLICATION NOTES

### 19.1. RECOMMENDATIONS FOR REDUNDANCY

Recommendations for the configuration of redundant power systems:

- Use separate input fuses for each power supply.
- Use three-phase power supplies to gain functional safety if one phase fails.
- When single-phase power supplies are utilized connect them to different phases or mains circuits if possible.
- Set the power supply in "Parallel-Use" mode if this feature is available
- It is desirable to set the output voltages of all power supplies to the same value.

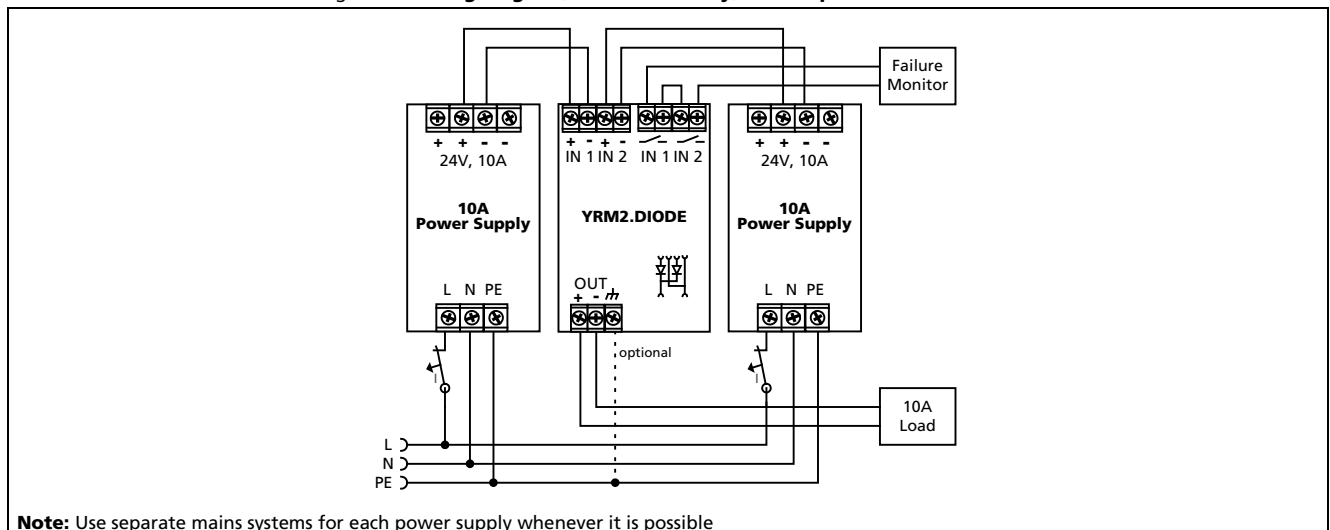
### 19.2. INDUCTIVE AND CAPACITIVE LOADS

The unit is designed to supply any kind of loads, including unlimited capacitive and inductive loads.

### 19.3. EXAMPLE: 1+1 REDUNDANCY UP TO 10A

1+1 Redundancy up to 10A requires two 10A power supplies and one YRM2.DIODE redundancy module.

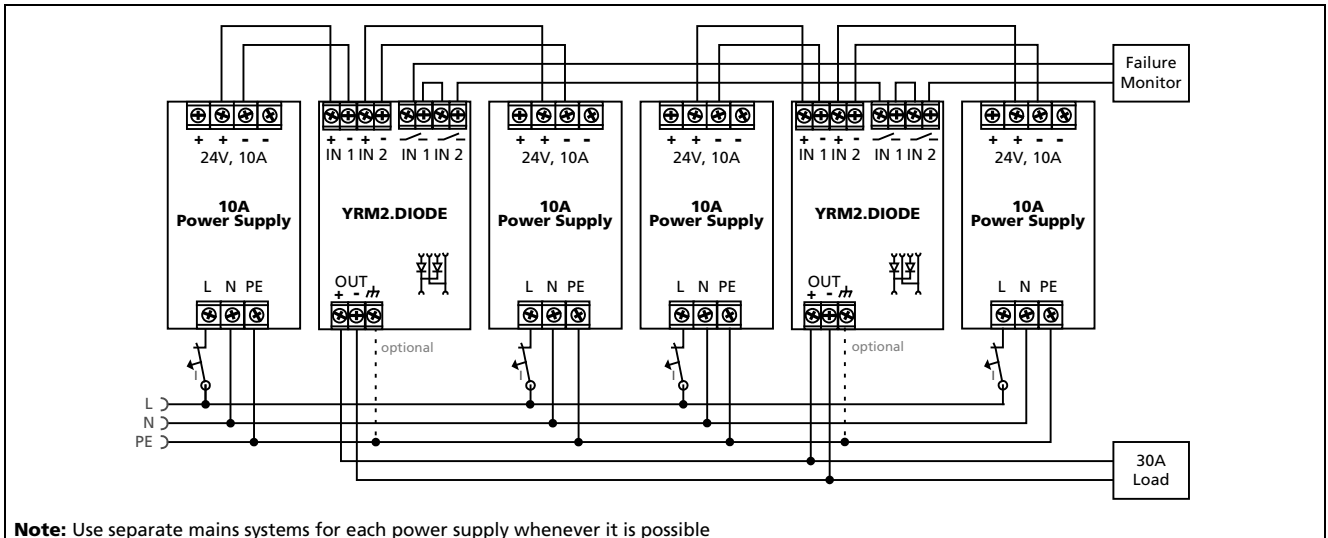
Fig. 19-1 **Wiring diagram, 1+1 Redundancy, 10A output current**



### 19.4. EXAMPLE: N+1 REDUNDANCY UP TO 30A

N+1 Redundancy up to 30A requires four 10A power supplies and two YRM2.DIODE redundancy modules.

Fig. 19-2 **Wiring diagram, n+1 Redundancy, 30A output current**



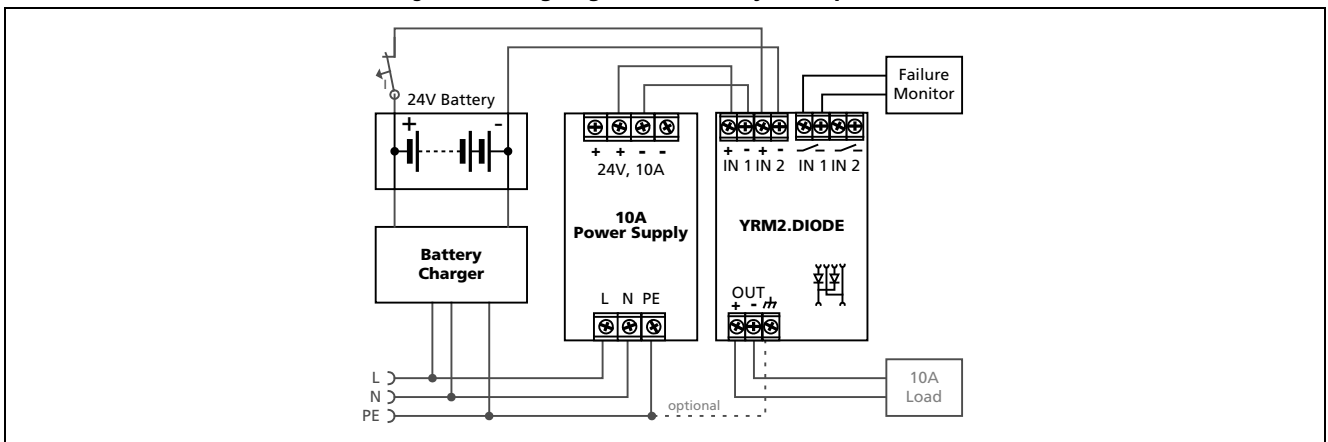
### 19.5. EXAMPLE: BATTERY BACK-UP

A battery back-up with 10A requires one 10A power supply and one YRM2.DIODE redundancy module.

**Please note:**

Set output voltage of power supply to 26.5Vdc minimum to ensure, that the load current is delivered from the power supply and not from charger (battery). Use a fuse between battery and YRM2.DIODE!

Fig. 19-3 **Wiring diagram, 10A Battery back-up**

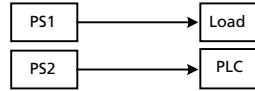


### 19.6. EXAMPLE: REDUNDANCY FOR CONTROLS

The example shows a cost effective solution to get redundant power for a PLC or controller system.

In many cases, two power supplies are used; one for the demanding loads and another one for the controls and sensitive loads. The power supply for the demanding loads can be used as a redundant source to supply the controls.

Traditional approach:



Improved approach:

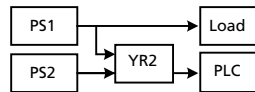
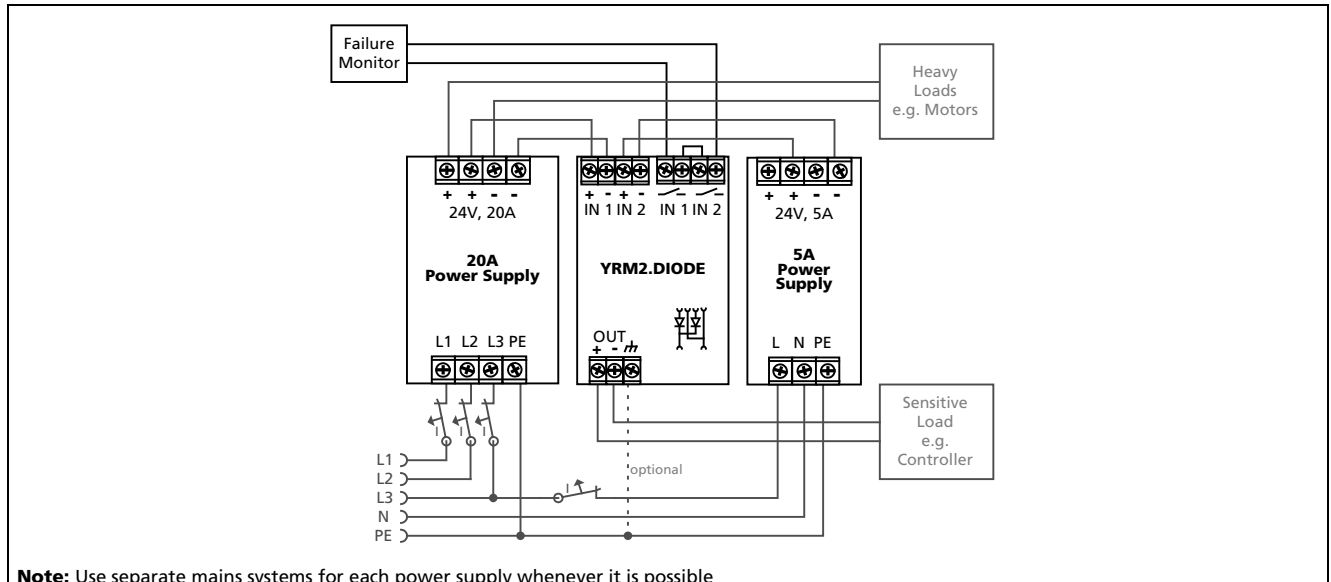


Fig. 19-4 Wiring diagram, redundancy for sensitive loads



**Note:** Use separate mains systems for each power supply whenever it is possible

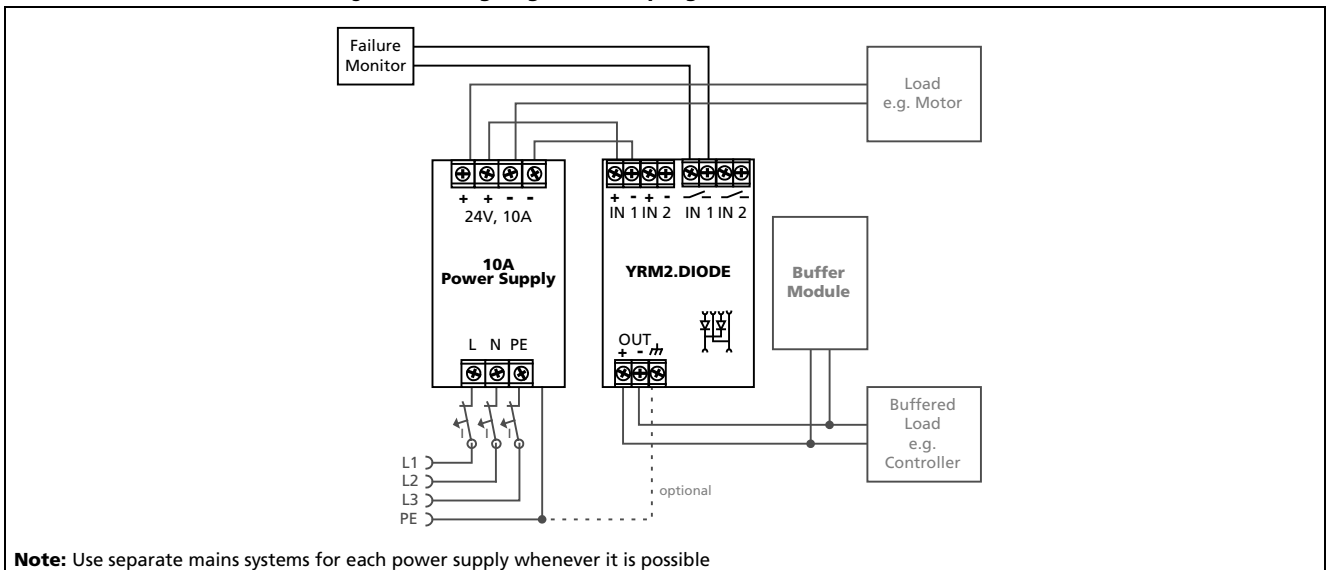
### 19.7. EXAMPLE: DECOUPLING OF BRANCHES

Buffer energy supplied from a DC-UPS or buffer module is not wasted in "power branches".

**Please note:**

Set output voltage of the power supply to a level that the buffer unit or DC-UPS will not start unexpectedly. Take the voltage drop of the YRM2.DIODE into account.

Fig. 19-5 **Wiring diagram, decoupling of buffered branches**



**Note:** Use separate mains systems for each power supply whenever it is possible

### 19.8. USE IN A TIGHTLY SEALED ENCLOSURE

When the redundancy module is installed in a tightly sealed enclosure, the temperature inside the enclosure will be higher than outside. The inside temperature defines the ambient temperature for the redundancy module.

Results from such an installation:

Power supply is placed in the middle of the box, no other heat producer inside the box

Enclosure: Rittal Typ IP66 Box PK 9516 100, plastic, 110x180x165mm

Load: 24V, 16A; (=80%) load is placed outside the box

Input: 24Vdc

Temperature inside enclosure: 58.8°C (in the middle of the right side of the power supply with a distance of 2cm)

Temperature outside enclosure: 24.6°C

Temperature rise: 34.2K

## 19.9. MOUNTING ORIENTATIONS

Mounting orientations other than input terminals on the bottom and output on the top require a reduction in continuous output power or a limitation in the maximum allowed ambient temperature.

Fig. 19-6  
**Mounting Orientation A**  
(Standard orientation)

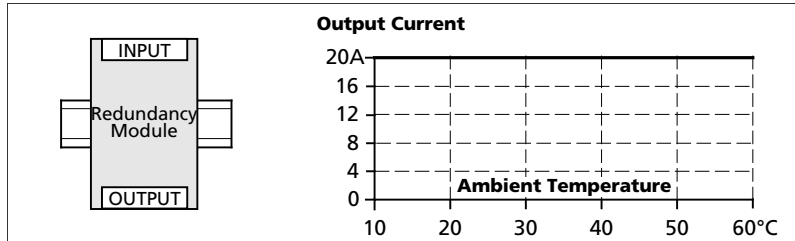


Fig. 19-7  
**Mounting Orientation B**  
(Upside down)

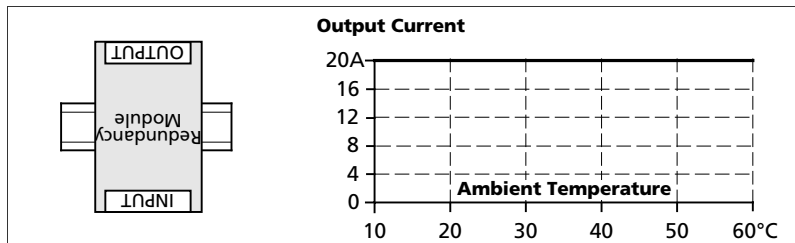


Fig. 19-8  
**Mounting Orientation C**  
(Table-top mounting)

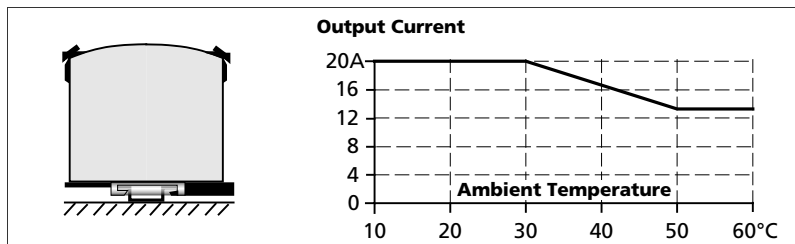


Fig. 19-9  
**Mounting Orientation D**  
(Horizontal cw)

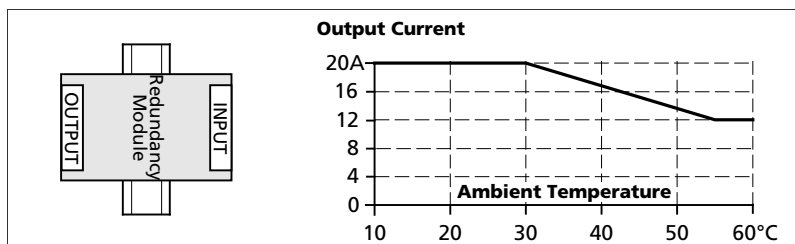


Fig. 19-10  
**Mounting Orientation E**  
(Horizontal ccw)

