YR40.242
12-28V, 40A, DUAL REDUNDANCY MODULE

MOSFET REDUNDANCY MODULE
- For N+1 and 1+1 Redundant Systems
- Dual Input with Single Output
- Suitable for all DIMENSION Power Supplies
  Except QT20 and QTD20 Series
- Only 72mV Voltage Drop at 20A Output Current
- Only 1.7W Loss at 20A and 5.9W at 40A Output Current
- 160% (65A) Peak Load Capability
- Reverse Input Polarity Protection
- Full Power Between -40°C and +60°C
- Width only 36mm
- Rugged Metal Housing
- Easy Wiring:
  Distribution Terminal for Negative Pole Included
- 3 Year Warranty

GENERAL DESCRIPTION
The YR40.242 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 20A output current and one output, which can carry nominal currents up to 40A. In addition to the YR40.242, the YR40.241 is also available. This unit has an additional circuit included, which generates a supply voltage for the internal mosfets even when the output of the unit is in a short circuit condition. This makes the unit suitable for any power supplies.

The novelty of this redundancy module is the utilization of mosfets instead of diodes for the decoupling of the two input channels. This reduces the heat generation and the voltage drop between input and output. The redundancy module does not require an additional auxiliary voltage.

Due to the low power losses, the unit is very slender and only requires 36mm width on the DIN-rail. Large connection terminals allow for a safe and fast installation. The large international approval package makes this unit suitable for nearly every application.

SHORT-FORM DATA

<table>
<thead>
<tr>
<th>Input voltage</th>
<th>DC 12-28V ±30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage range</td>
<td>8.4-36.4Vdc</td>
</tr>
<tr>
<td>Input current</td>
<td>2x 0-20A continuous</td>
</tr>
<tr>
<td></td>
<td>2x 20-32.5A for 5 seconds</td>
</tr>
<tr>
<td>Output current</td>
<td>0-40A continuous</td>
</tr>
<tr>
<td></td>
<td>40-65A max. 26A in overload mode</td>
</tr>
<tr>
<td>Input to output voltage drop</td>
<td>typ. 72mV</td>
</tr>
<tr>
<td></td>
<td>typ. 112mV</td>
</tr>
<tr>
<td></td>
<td>typ. 140mV input: 2x10A</td>
</tr>
<tr>
<td>Power losses</td>
<td>typ. 230mW input: 1x20A</td>
</tr>
<tr>
<td></td>
<td>typ. 1.7W input: 2x20A</td>
</tr>
<tr>
<td></td>
<td>typ. 2.4W input: 1x20A</td>
</tr>
<tr>
<td></td>
<td>typ. 5.9W input: 2x20A</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-40°C to +70°C operational</td>
</tr>
<tr>
<td>Derating</td>
<td>1A/C (output) +60 to +70°C</td>
</tr>
<tr>
<td>Dimensions</td>
<td>36x124x127mm WxHxD</td>
</tr>
<tr>
<td>Weight</td>
<td>280g, 0.62lb</td>
</tr>
</tbody>
</table>

*) Currents at voltages below 6V
**) Plus 4mm in depth for the screw terminal

ORDER NUMBERS
Redundancy Module
- YR40.242 12-28V Standard unit
- ZM2.WALL Wall/panel mount bracket
- ZM11.SIDE Side mount bracket

MARKINGS
- UL US List
- UL 508
- UL 60950-1
- Class I Div 2
- IECEx
- ATEX
- GL Marine
- EMC, LVD

Apr. 2014 / Rev. 1.1 DS-YR40.242-EN
All parameters are specified at 24V, 40A output current, 25°C ambient and after a 5 minutes run-in time unless otherwise noted
YR40.242
Y-Series
12-28V, 40A, Dual Redundancy Module

INDEX

1. Intended Use .......................................................3
2. Installation Requirements...................................3
3. Input and Output Characteristics .......................4
4. Power Losses........................................................5
5. Lifetime Expectancy and MTBF...........................6
6. Terminals and Wiring..........................................7
7. Functional Diagram.............................................8
8. Front Side and User Elements.............................8
9. EMC......................................................................9
10. Environment......................................................10
11. Protection Features ...........................................11
12. Safety Features..................................................11
13. Dielectric Strength............................................ 11
14. Approvals .......................................................... 12
15. Physical Dimensions and Weight ..................... 13
16. Accessories .......................................................14
17. Application Notes ............................................. 15
17.1. Recommendations for Redundancy...............15
17.2. Inductive and Capacitive Loads ..................15
17.3. Sideways Installation Clearances..............15
17.4. 1+1 Redundancy up to 20A......................16
17.5. N+1 Redundancy, Example with 60A ......16
17.6. Mounting Orientations .........................17

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TERMINOLOGY AND ABBREVIATIONS

PE and symbol PE is the abbreviation for Protective Earth and has the same meaning as the symbol ⬈.
Earth, Ground This document uses the term “earth” which is the same as the U.S. term “ground”.
T.b.d. To be defined, value or description will follow later.
DC 24V A figure displayed with the AC or DC before the value represents a nominal voltage with standard tolerances (usually ±15%) included.
E.g.: DC 12V describes a 12V battery disregarding whether it is full (13.7V) or flat (10V)
24Vdc A figure with the unit (Vdc) at the end is a momentary figure without any additional tolerances included.
may A key word indicating flexibility of choice with no implied preference
shall A key word indicating a mandatory requirement
should A key word indicating flexibility of choice with a strongly preferred implementation
1+1 Redundancy 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. E.g. two 10A power supplies are needed to achieve a 10A redundant system.
N+1 Redundancy 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.

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1. INTENDED USE
This redundancy module is designed for installation in an enclosure and is intended for the general use such as in industrial control, office, communication, and instrument equipment.
This redundancy module can be used with any DIMENSION power supplies except the QT20 series and the QTD20 series.
Do not use this redundancy module in equipment, where malfunction may cause severe personal injury or threaten human life.
This device is designed for use in hazardous, non-hazardous, ordinary or unclassified locations.

2. INSTALLATION REQUIREMENTS
This device may only be installed and put into operation by qualified personnel.
This device does not contain serviceable parts.
If damage or malfunction should occur during installation or operation, immediately turn power off and send unit to the factory for inspection.
Mount the unit on a DIN-rail so that the input terminals are located on the bottom and the output terminals on the top of the unit. For other mounting orientations see de-rating requirements of chapter 17.6 in this document.
This device is designed for convection cooling and does not require an external fan. Do not obstruct airflow and do not cover the ventilation grid (e.g. cable conduits) by more than 30%!
Keep the following installation clearances:
40mm on top,
20mm on the bottom,
5mm on the left and right sides are recommended when the device is loaded permanently with more than 50% of the rated output current. Increase the side clearance to 15mm in case the adjacent device is a heat source (e.g. another power supply). See chapter 17.3 for other allowed clearances when used with the PULS DIMENSION series in a 1+1 redundant configuration.
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.

WARNING
Risk of electrical shock, fire, personal injury or death.
- Turn power off before working on the device. Protect against inadvertent re-powering.
- Make sure that the wiring is correct by following all local and national codes.
- Do not open, modify or repair the unit.
- Use caution to prevent any foreign objects from entering 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 surfaces may cause burns.

Notes for use in hazardous location areas:
The redundancy module 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 and is evaluated according to EN 60079-0:2009 and EN 60079-15:2010.

WARNING EXPLOSION HAZARDS!
Substitution of components may impair suitability for this environment. Do not disconnect the unit 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 60079-15:2010.

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All parameters are specified at 24V, 40A output current, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.
3. Input and Output Characteristics

Number of inputs - 2
Suitable power supplies - QS20, CPS20, ... Use only power supplies which are featured with the HiccupPLUS overload behavior

Number of outputs - 1
Input voltage nom. DC 12-28V ±30% The input circuitry must meet the SELV requirements stipulated by IEC/EN/UL 60950-1.

Input voltage range - 8.4-36.4V dc
Voltage drop, input to output typ. 140mV at 2x20A, see Fig. 3-1
typ. 72mV at 2x10A, see Fig. 3-1
typ. 112mV at 1x20A, see Fig. 3-2
Input current nom. 2x 0-20A continuous
nom. 2x 20-32.5A for 5 seconds
max 2x 13A in overload (voltage < 6V) or short circuit mode
Peak input current max. 1000A for max. 1ms per input
Output current nom. 40A continuous
nom. 40-65A for 5 seconds
max. 26A in overload (voltage < 6V) or short circuit mode
Reverse current max. 1mA at 24V, per input, -40°C to +70°C
Reverse voltage max. 40Vdc voltage applied to the output, continuously allowed
Output capacitance typ. 320μF

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)

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

All parameters are specified at 24V, 40A output current, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

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4. POWER LOSSES

<table>
<thead>
<tr>
<th></th>
<th>DC 12V</th>
<th>DC 24V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power losses typ.</td>
<td>1.6W</td>
<td>1.7W</td>
</tr>
<tr>
<td>typ.</td>
<td>5.8W</td>
<td>5.9W</td>
</tr>
<tr>
<td>typ.</td>
<td>2.3W</td>
<td>2.4W</td>
</tr>
</tbody>
</table>

Input: 2x10A, input: 2x20A, (only one input is connected to input voltage)

Standby power losses typ. | 0.07W | 0.15W |
| typ.        | 0.12W | 0.23W |

at no output current, (only one input is connected to input voltage)
at no output current, (both inputs are connected to input voltages)

Fig. 4-1 Power losses when both inputs draw equal current

Fig. 4-2 Power losses when only one input is used

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5. 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.

<table>
<thead>
<tr>
<th>Input / output current conditions</th>
<th>Input: 2x10A Output: 20A</th>
<th>Input: 2x20A Output: 40A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lifetime expectancy</strong>)**</td>
<td>672 000h *)</td>
<td>255 000h *)</td>
</tr>
<tr>
<td></td>
<td>1 900 000h *)</td>
<td>720 000h *)</td>
</tr>
<tr>
<td><strong>MTBF</strong>) SN 29500, IEC 61709</td>
<td>7 234 000h</td>
<td>4 533 000h</td>
</tr>
<tr>
<td></td>
<td>12 445 000h</td>
<td>8 218 000h</td>
</tr>
<tr>
<td><strong>MTBF</strong>) MIL HDBK 217F</td>
<td>325 000h</td>
<td>294 000h</td>
</tr>
<tr>
<td></td>
<td>438 000h</td>
<td>392 000h</td>
</tr>
<tr>
<td></td>
<td>1 588 000h</td>
<td>1 457 000h</td>
</tr>
<tr>
<td></td>
<td>2 159 000h</td>
<td>1 964 000h</td>
</tr>
</tbody>
</table>

*) The Lifetime expectancy shown in the table indicates the minimum operating hours (service life) and is determined by the lifetime expectancy of the built-in electrolytic capacitors. Lifetime expectancy is specified in operational hours and is calculated according to the capacitor's manufacturer specification. The manufacturer of the electrolytic capacitors only guarantees a maximum life of up to 15 years (131 400h). Any number exceeding this value is a calculated theoretical lifetime which can be used to compare devices.

**) 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.
## 6. Terminals and Wiring

<table>
<thead>
<tr>
<th></th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Screw termination</td>
<td>Screw termination</td>
</tr>
<tr>
<td></td>
<td>IP20 Finger safe construction.</td>
<td>IP20 Finger safe construction.</td>
</tr>
<tr>
<td></td>
<td>Suitable for field installation.</td>
<td>Suitable for field installation.</td>
</tr>
<tr>
<td><strong>Solid wire</strong></td>
<td>0.5-6mm²</td>
<td>0.5-16mm²</td>
</tr>
<tr>
<td><strong>Stranded wire</strong></td>
<td>0.5-4mm²</td>
<td>0.5-10mm²</td>
</tr>
<tr>
<td><strong>American Wire Gauge</strong></td>
<td>20-10 AWG</td>
<td>22-8 AWG</td>
</tr>
<tr>
<td><strong>Max. wire diameter</strong></td>
<td>2.8mm (including ferrule)</td>
<td>5.2mm (including ferrule)</td>
</tr>
<tr>
<td><strong>Wire stripping length</strong></td>
<td>7mm / 0.275inch</td>
<td>12mm / 0.5inch</td>
</tr>
<tr>
<td><strong>Screwdriver</strong></td>
<td>3.5mm slotted or Pozidrive No 2</td>
<td>3.5mm slotted or Pozidrive No 2</td>
</tr>
<tr>
<td><strong>Recommended tightening torque</strong></td>
<td>0.8Nm, 7lb.in</td>
<td>1.2Nm, 10.6lb.in</td>
</tr>
</tbody>
</table>

To connect the chassis to ground, use a ring-type terminal (ring cable lug) which is suitable for a M4 screw and connect it to the chassis ground terminal on top of the unit.

**Instructions:**

a) The external circuitry of all terminals 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 and
   - 90°C for ambient up to 70°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).
7. FUNCTIONAL DIAGRAM

Fig. 7-1  Functional diagram

8. FRONT SIDE AND USER ELEMENTS

A  Output Terminals (screw terminals)

B  Chassis Ground Terminals
   To be connected on the top side of the housing with a ring-type terminal (ring cable lug) which is suitable for a M4 screw.
   Connection of the chassis is optional and not required since the unit fulfils the requirements according to protection class III.

C  Input Terminals for Input 1 (screw terminals)

D  Input Terminals for Input 2 (screw terminals)
9. 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.

### EMC Immunity

<table>
<thead>
<tr>
<th>Source Type</th>
<th>Standard</th>
<th>Voltage Level</th>
<th>Criterion</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge</td>
<td>EN 61000-4-2</td>
<td>8kV</td>
<td>Criterion A</td>
<td></td>
</tr>
<tr>
<td>Contact discharge</td>
<td></td>
<td>15kV</td>
<td>Criterion A</td>
<td></td>
</tr>
<tr>
<td>Electromagnetic RF field</td>
<td>EN 61000-4-3</td>
<td>80MHz-2.7GHz</td>
<td>Criterion A</td>
<td></td>
</tr>
<tr>
<td>Fast transients (Burst)</td>
<td>EN 61000-4-4</td>
<td>Input lines</td>
<td>2kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Output lines</td>
<td>2kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Surge voltage on input lines</td>
<td>EN 61000-4-5</td>
<td>+ → -</td>
<td>500V</td>
<td>Criterion A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+/- → Chassis ground</td>
<td>1kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Surge voltage on output lines</td>
<td>EN 61000-4-5</td>
<td>+ → -</td>
<td>500V</td>
<td>Criterion A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+/- → Chassis ground</td>
<td>1kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Conducted disturbance</td>
<td>EN 61000-4-6</td>
<td>0.15-80MHz</td>
<td>20V</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Power-frequency magnetic field</td>
<td>EN 61000-4-8</td>
<td>50Hz</td>
<td>30A/m</td>
<td>Criterion A</td>
</tr>
</tbody>
</table>

### Criterions:
- **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.

### EMC Emission

<table>
<thead>
<tr>
<th>Source Type</th>
<th>Standard</th>
<th>Limits for DC power ports</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducted emission</td>
<td>IEC/CISPR 16-1-2, IEC/CISPR 16-2-1</td>
<td>EN 61000-6-3 fulfilled *)</td>
<td></td>
</tr>
<tr>
<td>Radiated emission</td>
<td>EN 55011, EN 55022</td>
<td>Class B</td>
<td></td>
</tr>
</tbody>
</table>

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.

*) For information only, not mandatory for EN 61000-6-3. Provided, that power sources connected on the inputs fulfill the requirements too.

### Switching frequency

The internal auxiliary supply is generated with a boost converter.

The switching frequency varies from 140kHz to 500kHz depending on the input voltage.
10. ENVIRONMENT

Operational temperature *) -40°C to +70°C (-40°F to 158°F)
Storage temperature -40 to +85°C (-40°F to 185°F) for storage and transportation
Output de-rating 1A / °C 60-70°C (140°F to 158°F)
Humidity **) 5 to 95% r.H. IEC 60068-2-30
Vibration sinusoidal***) 2-17.8Hz: ±1.6mm; 17.8-500Hz: 2g 2 hours / axis IEC 60068-2-6
Shock***) 30g 6ms, 20g 11ms 3 bumps / direction, 18 bumps in total IEC 60068-2-27
Altitude 0 to 2000m (0 to 6560ft) without any restrictions
Altitude de-rating 2.5A/1000m or 5°C/1000m > 2000m (6500ft), see Fig. 10-2
Over-voltage category not applicable The concept of the overvoltage category is used for equipment energized directly from the low voltage mains (IEC 60664-1 §4.3.3.2.1).
Degree of pollution 2 IEC 62103, EN 50178, not conductive
LABS compatibility The unit does not release any silicone or other LABS-critical substances and is suitable for use in paint shops.

*) 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. 10-1 Output current vs. ambient temp.  Fig. 10-2 Output current vs. altitude

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11. PROTECTION FEATURES

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output over-current protection</td>
<td>not included</td>
</tr>
<tr>
<td>Reverse input polarity protection</td>
<td>included</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 20</td>
</tr>
<tr>
<td>Penetration protection</td>
<td>&gt; 3.6mm</td>
</tr>
<tr>
<td>Over-temperature protection</td>
<td>not included</td>
</tr>
<tr>
<td>Input transient protection</td>
<td>not included</td>
</tr>
<tr>
<td>Output transient protection</td>
<td>included</td>
</tr>
<tr>
<td>Internal input fuse</td>
<td>not included</td>
</tr>
</tbody>
</table>

Reverse input polarity protection included unit does not start when input voltage is reversed.

Degree of protection: IP 20 (EN/IEC 60529) e.g. screws, small parts

12. SAFETY FEATURES

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input / output separation</td>
<td>no galvanic separation</td>
</tr>
<tr>
<td>Class of protection</td>
<td>III PE (Protective Earth) or chassis connection not required</td>
</tr>
<tr>
<td>PE resistance</td>
<td>&lt; 0.1Ohm</td>
</tr>
</tbody>
</table>

13. 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 terminals together before conducting the test.

When testing, set the cut-off current settings to the value in the table below.

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Time</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type test</td>
<td>60s</td>
<td>500Vac</td>
</tr>
<tr>
<td>Factory test</td>
<td>5s</td>
<td>500Vac</td>
</tr>
<tr>
<td>Field test</td>
<td>5s</td>
<td>500Vac</td>
</tr>
</tbody>
</table>

Cut-off current setting > 2mA
14. APPROVALS

EC Declaration of Conformity

The CE mark indicates conformance with the
- EMC directive 2004/108/EC,
- Low-voltage directive (LVD) 2006/95/EC and
- RoHS directive 2011/65/EU.

EC Declaration of Conformity ATEX

The CE mark indicates conformance with the
- ATEX directive 94/9/EC (Equipment and protection systems intended for use in potentially explosive atmospheres)

IEC 60950-1

IECEE CB Scheme, Information Technology Equipment

UL 508

Listed for use as Industrial Control Equipment; U.S.A. (UL 508) and Canada (C22.2 No. 107-1-01); E-File: E198865

UL 60950-1

Recognized for use as Information Technology Equipment, Level 5; U.S.A. (UL 60950-1) and Canada (C22.2 No. 60950); E-File: E137006

HazLoc (Class 1 Div 2)

ANSI / ISA 12.12.01-2007

LISTED for use in Hazardous Location Class I Div 2 T4 Groups A,B,C,D systems; U.S.A. (ANSI / ISA 12.12.01-2007) and Canada (C22.2 No. 213-M1987)

ATEX

EN 60079-0, EN 60079-15

Suitable for use in Category 3 Zone 2 locations. Number of ATEX certificate: EPS 11 ATEX 1 312 X. The redundancy module must be built-in in an IP54 enclosure.

IECEX

IEC 60079-0, IEC 60079-15

Suitable for use in Category 3 Zone 2 locations. Number of IECEx certificate: IECEx EPS 12.0032X

Marine

GL (Germanischer Lloyd) classified
Environmental category: C, EMC1
Marine and offshore applications

GOST R

Certificate of Conformity for Russia and other GUS countries

All parameters are specified at 24V, 40A output current, 25°C ambient and after a 5 minutes run-in time unless otherwise noted
## 15. Physical Dimensions and Weight

<table>
<thead>
<tr>
<th>Weight</th>
<th>280g / 0.62lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN-Rail</td>
<td>Use 35mm DIN-rails according to EN 60715 or EN 50022 with a height of 7.5 or 15mm. The DIN-rail height must be added to the unit depth (127mm) to calculate the total required installation depth.</td>
</tr>
<tr>
<td>Installation clearances</td>
<td>See chapter 2</td>
</tr>
</tbody>
</table>

![Fig. 15-1 Front view](image1.png)

![Fig. 15-2 Side view](image2.png)

All parameters are specified at 24V, 40A output current, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.
16. ACCESSORIES

**ZM2.WALL  Wall mounting bracket**
This standard bracket is used to mount the YR40.242 redundancy module onto a flat surface without utilizing a DIN-Rail.

![Fig. 16-1 ZM2.WALL  Wall mounting bracket](image1)
![Fig. 16-2 Assembled wall mounting bracket](image2)

**ZM11.SIDE  Side mounting bracket**
This bracket is used to mount the YR40.242 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 sideway DIN-rail mounting, the removed aluminum brackets and the black plastic slider need to be mounted on the steel bracket.

![Fig. 16-3 ZM11.SIDE  Side mounting bracket](image3)
![Fig. 16-4 Side mounting with DIN-rail brackets](image4)
17. APPLICATION NOTES

17.1. 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.

17.2. INDUCTIVE AND CAPACITIVE LOADS

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

17.3. SIDEWARDS INSTALLATION CLEARANCES

The minimum clearance recommendations are defined in chapter 2.
 Normally, the following installation clearance are recommended: 40mm on top, 20mm on the bottom, 5mm on the left and right sides when the device is loaded permanently with more than 50% of the rated power. Increase this clearance to 15mm in case the adjacent device is a heat source (e.g. another power supply).

The clearance between the power supplies and the redundancy module can be reduced to zero under the following conditions:
- 1+1 redundancy application with maximum 20A output current.
- The power supplies are from the PULS DIMENSION series.
- The redundancy module is placed between the two power supplies.
- The output voltage is set to the same level on both power supplies.
17.4. 1+1 REDUNDANCY UP TO 20A

1+1 Redundancy up to 20A requires two 20A power supplies and one YR40.242 redundancy module.

Fig. 17-1  Wiring diagram, 1+1 Redundancy, 20A output current

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

17.5. N+1 REDUNDANCY, EXAMPLE WITH 60A

N+1 Redundancy up to 60A requires four 20A power supplies and two YR40.242 redundancy modules.

Fig. 17-2  Wiring diagram, n+1 Redundancy, 60A output current

Note: Use separate mains systems for each power supply whenever it is possible
17.6. 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. The amount of reduction influences the lifetime expectancy of the power supply. Therefore, two different derating curves for continuous operation can be found below:

**Curve A1**  Recommended output current.
**Curve A2**  Max allowed output current (results in approximately half the lifetime expectancy of A1).

![Fig. 17-3](mounting_orientation_A.png)

**Mounting Orientation A** (Standard orientation)

![Fig. 17-4](mounting_orientation_B.png)

**Mounting Orientation B** (Upside down)

![Fig. 17-5](mounting_orientation_C.png)

**Mounting Orientation C** (Table-top mounting)

![Fig. 17-6](mounting_orientation_D.png)

**Mounting Orientation D** (Horizontal cw)

![Fig. 17-7](mounting_orientation_E.png)

**Mounting Orientation E** (Horizontal ccw)

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