CT10.241, CT10.241-C1
3-PHASE, 24V, 10A, 240W

POWER SUPPLY
- 3AC 380-480V Wide-range Input
- 2 or 3-Phase Operation Possible
- Width only 62mm
- Efficiency up to 92.9% Due to Synchronous Rectifier
- Excellent Partial Load Efficiency
- 20% Output Power Reserves
- Easy Fuse Tripping Due to High Overload Current
- Input -Transient Blanking Circuit Included
- Minimal Inrush Current Surge
- Three Input Fuses Included
- Current Sharing Feature for Parallel Use
- Full Power Between -25°C and +60°C
- 3 Year Warranty

PRODUCT DESCRIPTION
The Dimension C-Series are cost optimized power supplies without compromising quality, reliability and performance. The C-Series is part of the DIMENSION power supply family. The most outstanding features of CT10.241 are the high efficiency, electronic inrush current limitation, active input transient filter and wide operational temperature range. The small size is achieved by a synchronous rectification and further technological design details.

The CT10.241-C1 is equipped with conformal coating preferred for applications in harsh areas.

The C-Series includes all the essential basic functions. The devices have a power reserve of 20% included, which may even be used continuously at temperatures up to +45°C. Additionally, the CT10.241 can deliver 3 times the nominal output current for 10ms which helps to trip fuses on faulty output branches.

SHORT-FORM DATA

<table>
<thead>
<tr>
<th>Output voltage</th>
<th>DC 24V</th>
<th>Nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment range</td>
<td>24 - 28V</td>
<td>Factory setting 24.1V</td>
</tr>
<tr>
<td>Output current</td>
<td>12.0 - 10.3A</td>
<td>Below +45°C ambient</td>
</tr>
<tr>
<td></td>
<td>10.0 - 8.6A</td>
<td>At +60°C ambient</td>
</tr>
<tr>
<td></td>
<td>7.5 - 6.5A</td>
<td>At +70°C ambient</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Derate between +45°C and +70°C</td>
</tr>
<tr>
<td>Input voltage AC</td>
<td>3AC 380-480V</td>
<td>-15%+20%</td>
</tr>
<tr>
<td>Mains frequency</td>
<td>50-60Hz</td>
<td>±6%</td>
</tr>
<tr>
<td>Input current AC</td>
<td>0.7 / 0.6A</td>
<td>At 3x400 / 480Vac</td>
</tr>
<tr>
<td>Power factor</td>
<td>0.53 / 0.52</td>
<td>At 3x400 / 480Vac</td>
</tr>
<tr>
<td>AC Inrush current</td>
<td>4 / 4Apk</td>
<td>At 3x400 / 480Vac</td>
</tr>
<tr>
<td>Efficiency</td>
<td>92.8 / 92.9%</td>
<td>At 3x400 / 480Vac</td>
</tr>
<tr>
<td>Losses</td>
<td>18.6 / 18.3W</td>
<td>At 3x400 / 480Vac</td>
</tr>
<tr>
<td>Hold-up time</td>
<td>34 / 54ms</td>
<td>At 3x400 / 480Vac</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-25°C to +70°C</td>
<td></td>
</tr>
<tr>
<td>Size (WxHxD)</td>
<td>62x124x117mm</td>
<td>Without DIN rail</td>
</tr>
<tr>
<td>Weight</td>
<td>750g / 1.65lb</td>
<td></td>
</tr>
</tbody>
</table>

ORDER NUMBERS

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>CT10.241</th>
<th>CT10.241-C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessory</td>
<td>ZM1.WALL</td>
<td>Wall/panel mount bracket</td>
</tr>
<tr>
<td></td>
<td>ZM13.SIDE</td>
<td>Side mount bracket</td>
</tr>
<tr>
<td>Conformal coating</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MAIN APPROVALS
For details and the complete approval list, see chapter18.

UL 508 | UL 60950-1 | Class I Div 2

SEMI F47 | DNV | ABS

Marine | Marine

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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.

AC 400V

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)

400Vac

A figure with the unit (Vac) at the end is a momentary figure without any additional tolerances included.

50Hz vs. 60Hz

As long as not otherwise stated, AC 380V and AC 400V parameters are valid at 50Hz and AC 480V parameters are valid at 60Hz mains frequency.

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.

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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 malfunctioning may cause severe personal injury or threaten human life without additional appropriate safety devices, that are suited for the end-application.

If this device is used in a manner outside of its specification, the protection provided by the device may be impaired.

2. INSTALLATION INSTRUCTIONS

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

- Turn power off before working on the device. Protect against inadvertent re-powering.
- Do not open, modify or repair the device.
- 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.

**Obey the following 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. The tripping of an internal fuse is caused by an internal defect.

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

Install the device onto a DIN rail according to EN 60715 with the input terminals on the bottom 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. Use ferrules for wires on the input terminals. 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 housing does not provide protection against spilled liquids.

The device is designed for overvoltage category II zones. Below 2000m altitude the device is tested for impulse withstand voltages up to 4kV, which corresponds to OVC III according to IEC 60664-1 (except for corner grounded delta systems).

The device is designed as “Class of Protection I” equipment according to IEC 61140. Do not use without a proper PE (Protective Earth) connection.

The device is suitable to be supplied from TN, TT or IT mains networks. The continuous voltage between the input terminals and the PE potential must not exceed 500Vac. Corner grounded delta systems are allowed.

A disconnecting means shall be provided for the input of the device.

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 5000m (16400ft). Above 2000m (6560ft) a reduction in output current is required. 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.

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The device is designed, tested and approved for branch circuits up to 32A (IEC) and 30A (UL) without additional protection device. If an external fuse is utilized, do not use circuit breakers smaller than 6A B- or C-Characteristic to avoid a nuisance tripping of the circuit breaker.

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.

The device can also operate on only 2 phases of three-phase mains systems. Use L1 and L2 in such cases. The rated input current will be 1.5A for 380Vac and 1.3A for 480Vac mains voltages.

**Installation Instructions for Hazardous Location Areas**

The device is suitable for use in Class I Division 2 Groups A, B, C, D locations.

**WARNING EXPLOSION HAZARDS!**

Substitution of components may impair suitability for this environment.

Do not disconnect the device or operate the voltage adjustment unless power has been switched off or the area is known to be non-hazardous.
3. AC-INPUT

The device is suitable to be supplied from TN-, TT- and IT mains networks with AC voltage. Grounding of one phase is allowed except for UL508 applications.

The device can also operate on only two legs of the three-phase system. See chapter 22.7 for more information.

<table>
<thead>
<tr>
<th>AC input</th>
<th>Nom.</th>
<th>3AC 380-480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC input range</td>
<td>3x 323-576Va</td>
<td>Continuous operation</td>
</tr>
<tr>
<td></td>
<td>3x 576-700Vac</td>
<td>For maximal 1s (occasional)</td>
</tr>
<tr>
<td>Allowed voltage L or N to earth</td>
<td>Max.</td>
<td>500Vac</td>
</tr>
<tr>
<td>Input frequency</td>
<td>Nom.</td>
<td>50–60Hz</td>
</tr>
<tr>
<td>Turn-on voltage</td>
<td>Typ.</td>
<td>3x 260Vac</td>
</tr>
<tr>
<td>Shut-down voltage</td>
<td>Typ.</td>
<td>3x 185Vac</td>
</tr>
<tr>
<td>External input protection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3AC 400V 3AC 480V

<table>
<thead>
<tr>
<th>Input current</th>
<th>Typ.</th>
<th>0.7A</th>
<th>0.6A</th>
<th>At 24V, 10A, per phase, see Fig. 3-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power factor</td>
<td>Typ.</td>
<td>0.53</td>
<td>0.52</td>
<td>At 24V, 10A, see Fig. 3-4</td>
</tr>
<tr>
<td>Start-up delay</td>
<td>Typ.</td>
<td>90ms</td>
<td>90ms</td>
<td>See Fig. 3-2</td>
</tr>
<tr>
<td>Rise time</td>
<td>Typ.</td>
<td>40ms</td>
<td>40ms</td>
<td>At 24V, 10A const. current load, 0mF load capacitance, see Fig. 3-2</td>
</tr>
<tr>
<td></td>
<td>Typ.</td>
<td>85ms</td>
<td>85ms</td>
<td>At 24V, 10A const. current load, 10mF load capacitance, see Fig. 3-2</td>
</tr>
<tr>
<td>Turn-on overshoot</td>
<td>Max.</td>
<td>200mV</td>
<td>200mV</td>
<td>See Fig. 3-2</td>
</tr>
</tbody>
</table>

![Input voltage range](image1)

![Turn-on behavior, definitions](image2)

![Input current vs. output load at 24V](image3)

![Power factor vs. output load](image4)

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4. DC-INPUT

Do not use the power supply with DC-input voltages.

5. INPUT INRUSH CURRENT

An active inrush limitation circuit limits the input inrush current after turn-on of the input voltage and after short input voltage interruptions.

The charging current into EMI suppression capacitors is disregarded in the first microseconds after switch-on.

<table>
<thead>
<tr>
<th></th>
<th>3AC 400V</th>
<th>3AC 480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inrush current Max.</td>
<td>10\text{A}\text{peak}</td>
<td>10\text{A}\text{peak}</td>
</tr>
<tr>
<td>Inrush current Typ.</td>
<td>4\text{A}\text{peak}</td>
<td>4\text{A}\text{peak}</td>
</tr>
<tr>
<td>Inrush energy Max.</td>
<td>0.5\text{A}s</td>
<td>0.5\text{A}s</td>
</tr>
</tbody>
</table>

Temperature independent

Fig. 5-1 Typical input inrush current behaviour at nominal load and 25°C ambient
6. DC OUTPUT

The output provides a SELV/PELV rated voltage, which is galvanically isolated from the input voltage. The device is designed to supply any kind of loads, including unlimited capacitive and inductive loads. The output is electronically protected against overload, no-load and short-circuits. In case of a protection event, audible noise may occur.

<table>
<thead>
<tr>
<th>Output voltage</th>
<th>Nom. 24V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment range</td>
<td>24-28V</td>
</tr>
<tr>
<td>Max.</td>
<td>30V</td>
</tr>
<tr>
<td>Guaranteed value</td>
<td>This is the maximum output voltage which can occur at the clockwise end position of the potentiometer due to tolerances. It is not a guaranteed value which can be achieved.</td>
</tr>
<tr>
<td>Factory setting output voltage</td>
<td>Typ. 24.1V</td>
</tr>
<tr>
<td>Typ. 24.1V</td>
<td></td>
</tr>
<tr>
<td>±0.2% in “single use” mode at full load, cold unit</td>
<td></td>
</tr>
<tr>
<td>±0.2% in “parallel use” mode at 10A, cold unit (results to 23.9V ±0.7% at 12A and 25.0V ±0.2% at no load)</td>
<td></td>
</tr>
<tr>
<td>Line regulation</td>
<td>Max. 10mV</td>
</tr>
<tr>
<td>Load regulation</td>
<td>Max. 100mV</td>
</tr>
<tr>
<td>Typ. 1000mV</td>
<td></td>
</tr>
<tr>
<td>Between 0 and 10A in “single use” mode, static value</td>
<td></td>
</tr>
<tr>
<td>Between 0 and 10A in “parallel use” mode, static value, see Fig. 6-2</td>
<td></td>
</tr>
<tr>
<td>Ripple and noise voltage</td>
<td>Max. 50mVpp</td>
</tr>
<tr>
<td>Bandwidth 20Hz to 20MHz, 50Ohm</td>
<td></td>
</tr>
<tr>
<td>Output current</td>
<td>Nom. 12A(1)</td>
</tr>
<tr>
<td>Nom. 10A</td>
<td></td>
</tr>
<tr>
<td>Nom. 7.5A</td>
<td></td>
</tr>
<tr>
<td>Nom. 10.3A(1)</td>
<td></td>
</tr>
<tr>
<td>Nom. 8.6A</td>
<td></td>
</tr>
<tr>
<td>Nom. 6.5A</td>
<td></td>
</tr>
<tr>
<td>At 24V and an ambient temperature below 45°C</td>
<td></td>
</tr>
<tr>
<td>At 24V and 60°C ambient temperature</td>
<td></td>
</tr>
<tr>
<td>At 24V and 70°C ambient temperature</td>
<td></td>
</tr>
<tr>
<td>At 28V and an ambient temperature below 45°C</td>
<td></td>
</tr>
<tr>
<td>At 28V and 60°C ambient temperature</td>
<td></td>
</tr>
<tr>
<td>At 28V and 70°C ambient temperature</td>
<td></td>
</tr>
<tr>
<td>Reduce output current linearly between +45°C and +70°C</td>
<td></td>
</tr>
<tr>
<td>Fuse breaking current</td>
<td>Typ. 23A</td>
</tr>
<tr>
<td>Up to 20ms once every five seconds, see Fig. 6-1. The fuse braking current is an enhanced transient current which helps to trip fuses on faulty output branches. The output voltage stays above 40V.</td>
<td></td>
</tr>
<tr>
<td>Overload behavior</td>
<td>Continuous current</td>
</tr>
<tr>
<td>See Fig. 6-1</td>
<td></td>
</tr>
<tr>
<td>Overload/ short-circuit current</td>
<td>Max. 23A</td>
</tr>
<tr>
<td>Continuous current, see Fig. 6-1</td>
<td></td>
</tr>
<tr>
<td>Output capacitance</td>
<td>Typ. 6 500µF</td>
</tr>
<tr>
<td>Included inside the power supply</td>
<td></td>
</tr>
<tr>
<td>Back-feeding loads</td>
<td>Max. 35V</td>
</tr>
<tr>
<td>The unit is resistant and does not show malfunctioning when a load feeds back voltage to the power supply. It does not matter whether the power supply is on or off. The absorbing energy can be calculated according to the built-in large sized output capacitor.</td>
<td></td>
</tr>
</tbody>
</table>

(1) This current is also available for temperatures up to +70°C with a duty cycle of 10% and/ or not longer than 1 minute every 10 minutes.

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7. **Hold-up Time**

### 3AC 400V  

| Hold-up Time   | Typ. 34ms | 54ms At 24V, 10A, see Fig. 7-1 |  
|                | Typ. 68ms | 108ms At 24V, 5A, see Fig. 7-1 |  
| Min. 28ms      | 44ms      | At 24V, 10A, see Fig. 7-1      |  
| Min. 56ms      | 87ms      | At 24V, 5A, see Fig. 7-1       |  

### 3AC 480V  

| Hold-up Time   | Typ. 34ms | 54ms At 24V, 10A, see Fig. 7-1 |  
|                | Typ. 68ms | 108ms At 24V, 5A, see Fig. 7-1 |  
| Min. 28ms      | 44ms      | At 24V, 10A, see Fig. 7-1      |  
| Min. 56ms      | 87ms      | At 24V, 5A, see Fig. 7-1       |  

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**Hold-up Time vs. Input Voltage**

**Shut-down Behavior, Definitions**

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8. Efficiency and Power Losses

<table>
<thead>
<tr>
<th></th>
<th>3AC 400V</th>
<th>3AC 480V</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Efficiency</strong></td>
<td>Typ.</td>
<td>92.8%</td>
<td>92.9%</td>
</tr>
<tr>
<td></td>
<td>Typ.</td>
<td>92.4%</td>
<td>92.6%</td>
</tr>
<tr>
<td>*<em>Average efficiency <em>)</em></em></td>
<td>Typ.</td>
<td>92.2%</td>
<td>92.0%</td>
</tr>
<tr>
<td><strong>Power losses</strong></td>
<td>Typ.</td>
<td>2.3W</td>
<td>2.6W</td>
</tr>
<tr>
<td></td>
<td>Typ.</td>
<td>11.8W</td>
<td>11.8W</td>
</tr>
<tr>
<td></td>
<td>Typ.</td>
<td>18.6W</td>
<td>18.3W</td>
</tr>
<tr>
<td></td>
<td>Typ.</td>
<td>23.5W</td>
<td>22.8W</td>
</tr>
</tbody>
</table>

*) The average efficiency is an assumption for a typical application where the power supply is loaded with 25% of the nominal load for 25% of the time, 50% of the nominal load for another 25% of the time, 75% of the nominal load for another 25% of the time and with 100% of the nominal load for the rest of the time.

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Fig. 8-1  Efficiency vs. output current at 24V, typ., 3-phase operation

Fig. 8-2  Losses vs. output current at 24V, typ., 3-phase operation

Fig. 8-3  Efficiency vs. input voltage at 24V, 10A, typ., 3-phase operation

Fig. 8-4  Losses vs. input voltage at 24V, 10A, typ., 3-phase operation

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9. Functional Diagram

Fig. 9-1  Functional diagram

10. Front Side and User Elements

Fig. 10-1  Front side

A Output Terminals
+  Positive output (two identical + poles)
-  Negative/return output (two identical - poles)

B Input Terminals
L1, L2, L3  Line input
PE (Protective Earth) input

C Output voltage potentiometer
Open the flap to adjust the output voltage. The factory setting is 24.1V

D Jumper for “Parallel Use” “Single Use”
Set the jumper to “Parallel Use” when devices are connected in parallel to increase the output power. In order to achieve a sharing of the load current between the individual power supplies, the “Parallel Use” regulates the output voltage in such a manner that the voltage at no load is approx. 4% higher than at nominal load.
A missing jumper equals “Single Use” mode, which is also the factory setting.

E DC-OK LED (green)
On, when the output voltage is above 21V.
11. CONNECTION TERMINALS

The terminals are IP20 Finger safe constructed and suitable for field- and factory wiring.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid wire</td>
<td>Screw termination</td>
<td>Screw termination</td>
</tr>
<tr>
<td>Max. 6mm²</td>
<td></td>
<td>Max. 6mm²</td>
</tr>
<tr>
<td>Stranded wire</td>
<td>Max. 4mm²</td>
<td>Max. 4mm²</td>
</tr>
<tr>
<td>American Wire Gauge</td>
<td>AWG 20-10</td>
<td>AWG 20-10</td>
</tr>
<tr>
<td>Max. wire diameter (including ferrules)</td>
<td>2.8mm</td>
<td>2.8mm</td>
</tr>
<tr>
<td>Recommended tightening torque</td>
<td>1Nm, 9lb-in</td>
<td>1Nm, 9lb-in</td>
</tr>
<tr>
<td>Wire stripping length</td>
<td>7mm / 0.28inch</td>
<td>7mm / 0.28inch</td>
</tr>
<tr>
<td>Screwdriver</td>
<td>3.5mm slotted or Phillips No 1</td>
<td>3.5mm slotted or Phillips No 1</td>
</tr>
</tbody>
</table>

**Daisy chaining:**

Daisy chaining (jumping from one power supply output to the next) is allowed as long as the average output current through one terminal pin does not exceed 25A. If the current is higher, use a separate distribution terminal block as shown in Fig. 11-2.

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12. LIFETIME EXPECTANCY

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.

<table>
<thead>
<tr>
<th>3AC 400V</th>
<th>3AC 480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifetime expectancy</td>
<td>54 000h</td>
</tr>
<tr>
<td>133 000h</td>
<td>134 000h</td>
</tr>
<tr>
<td>41 000h</td>
<td>47 000h</td>
</tr>
<tr>
<td>151 000h</td>
<td>176 000h</td>
</tr>
<tr>
<td>376 000h</td>
<td>379 000h</td>
</tr>
<tr>
<td>116 000h</td>
<td>133 000h</td>
</tr>
<tr>
<td>Lifetime expectancy</td>
<td>48 000h</td>
</tr>
<tr>
<td>134 000h</td>
<td>145 000h</td>
</tr>
<tr>
<td>36 000h</td>
<td>42 000h</td>
</tr>
<tr>
<td>135 000h</td>
<td>164 000h</td>
</tr>
<tr>
<td>379 000h</td>
<td>410 000h</td>
</tr>
<tr>
<td>102 000h</td>
<td>119 000h</td>
</tr>
</tbody>
</table>

13. MTBF

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.

For these types of units the MTTF (Mean Time To Failure) value is the same value as the MTBF value.

<table>
<thead>
<tr>
<th>3AC 400V</th>
<th>3AC 480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTBF SN 29500, IEC 61709</td>
<td>975 000h</td>
</tr>
<tr>
<td>1 706 000h</td>
<td>1 723 000h</td>
</tr>
<tr>
<td>925 000h</td>
<td>939 000h</td>
</tr>
<tr>
<td>1 633 000h</td>
<td>1 656 000h</td>
</tr>
<tr>
<td>MTBF MIL HDBK 217F</td>
<td>444 000h</td>
</tr>
<tr>
<td>584 000h</td>
<td>563 000h</td>
</tr>
<tr>
<td>100 000h</td>
<td>100 000h</td>
</tr>
<tr>
<td>132 000h</td>
<td>132 000h</td>
</tr>
<tr>
<td>436 000h</td>
<td>423 000h</td>
</tr>
<tr>
<td>555 000h</td>
<td>572 000h</td>
</tr>
<tr>
<td>98 000h</td>
<td>98 000h</td>
</tr>
<tr>
<td>129 000h</td>
<td>129 000h</td>
</tr>
</tbody>
</table>
14. EMC

The EMC behavior of the device is designed for applications in industrial environment as well as in residential, commercial and light industry environments. The output is allowed to be grounded or floating.

The device is investigated according to the generic standards EN 61000-6-1, EN 61000-6-2, EN 61000-6-3 and EN 61000-6-4.

Without additional measures to reduce the conducted emissions on the output (e.g. by using a filter), the device is not suited to supply a local DC power network in residential, commercial and light-industrial environments. No restrictions apply for local DC power networks in industrial environments.

EMC Immunity

Electrostatic discharge
- EN 61000-4-2
- Contact discharge: 8kV
- Air discharge: 15kV

Electromagnetic RF field
- EN 61000-4-3
- 80MHz-2.7GHz: 10V/m

Fast transients (Burst)
- EN 61000-4-4
- Input lines: 4kV
- Output lines: 2kV

Surge voltage on input
- EN 61000-4-5
- L1 → L2, L2 → L3, L1 → L3: 2kV
- L1 / L2 / L3 → PE: 4kV

Surge voltage on output
- EN 61000-4-5
- + → -: 500V
- + / - → PE: 1kV

Conducted disturbance
- EN 61000-4-6
- 0.15-80MHz: 10V

Mains voltage dips (Dips on three phases)
- EN 61000-4-11
- 0% of 380Vac: 0Vac, 20ms
- 0% of 480Vac: 0Vac, 20ms

Mains voltage dips (Dips on two phases)
- EN 61000-4-11
- 40% of 380Vac: 200ms
- 40% of 480Vac: 200ms
- 70% of 380Vac: 500ms
- 70% of 480Vac: 500ms

Voltage interruptions
- EN 61000-4-11
- 5s

Powerful transients
- VDE 0160
- Over entire load range: 1550V, 1.3ms

Criterions:
- A: The device shows normal operation behavior within the defined limits.
- C: Temporary loss of function is possible. The device may shut down and restarts by itself. No damage or hazards for the device will occur.

EMC Emission

Conducted emission input lines
- EN 55011, EN 55032, FCC Part 15, CISPR 11, CISPR 32
- Class B

Radiated emission
- EN 55011, EN 55032
- Class B

Harmonic input current
- EN 61000-3-2
- Fulfilled for Class A equipment

Voltage fluctuations, flicker
- EN 61000-3-3
- Fulfilled, tested with constant current loads, non pulsing

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.

Switching Frequency

Main converter
- 60kHz to 140kHz
- Output load and input voltage dependent

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15. Environment

Operational temperature  -25°C to +70°C (-13°F to 158°F)
The operational temperature is the ambient or surrounding temperature and is defined as the air temperature 2cm below the device.

Storage temperature  -40°C to +85°C (-40°F to 185°F)
For storage and transportation

Output derating  3.2W/°C
Between +45°C and +60°C (113°F to 140°F)
Between +60°C and +70°C (140°F to 158°F)
For altitudes >2000m (6560ft), see Fig. 15-2
For atmospheric pressures <80kPa, see Fig. 15-2
The derating is not hardware controlled. The customer has to take care by himself to stay below the derated current limits in order not to overload the unit.

Output rating  3.2W/°C
6W/°C
15W/1000m or 5°C/1000m
9W/-5kPa or 3°C/-5kPa
Between +45°C and +60°C (113°F to 140°F)
Between +60°C and +70°C (140°F to 158°F)
For altitudes >2000m (6560ft), see Fig. 15-2
For atmospheric pressures <80kPa, see Fig. 15-2

Humidity  5 to 95% r.h.
According to IEC 60068-2-30

Atmospheric pressure  110-47kPa
See Fig. 15-2 for details

Altitude  Up to 6000m (20 000ft)
See Fig. 15-2 for details

Over-voltage category  III
According to IEC 60664-1 for altitudes up to 2000m

II
According to IEC 60664-1 for altitudes from 2000 to 6000m and atmospheric pressures from 80 to 47kPa

Degree of pollution  2
According to IEC 62477-1, not conductive

Vibration sinusoidal  2-17.8Hz: ±1.6mm; 17.8-500Hz: 2g
According to IEC 60068-2-6

Shock  30g 6ms, 20g 11ms
3 bumps / direction, 18 bumps in total
According to IEC 60068-2-27
Shock and vibration is tested in combination with DIN rails according to EN 60715 with a height of 15mm and a thickness of 1.3mm and standard orientation.

Audible noise  Some audible noise may be emitted from the power supply during no load, overload or short circuit.

Fig. 15-1  Output current vs. ambient temp.
Fig. 15-2  Output current vs. altitude at 24V

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## 16. Safety and Protection Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation resistance</td>
<td>Min. 500MOhm</td>
</tr>
<tr>
<td></td>
<td>Min. 500MOhm</td>
</tr>
<tr>
<td></td>
<td>Min. 500MOhm</td>
</tr>
<tr>
<td></td>
<td>Min. 500MOhm</td>
</tr>
<tr>
<td>PE resistance</td>
<td>Max. 0.1Ohm</td>
</tr>
<tr>
<td>Output over-voltage protection</td>
<td>Typ. 30.5Vdc</td>
</tr>
<tr>
<td></td>
<td>Max. 32Vdc</td>
</tr>
<tr>
<td>Class of protection</td>
<td>I</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 20</td>
</tr>
<tr>
<td>Over-temperature protection</td>
<td>Included</td>
</tr>
<tr>
<td>Input transient protection</td>
<td>MOV (Metal Oxide Varistor)</td>
</tr>
<tr>
<td>Internal input fuse</td>
<td>Included</td>
</tr>
<tr>
<td>Touch current (leakage current)</td>
<td>Typ. 0.17mA</td>
</tr>
<tr>
<td></td>
<td>Typ. 0.24mA</td>
</tr>
<tr>
<td></td>
<td>Max. 0.22mA</td>
</tr>
<tr>
<td></td>
<td>Max. 0.31mA</td>
</tr>
</tbody>
</table>
17. **Dielectric Strength**

The output voltage is floating and has no ohmic connection to the ground. The output is insulated to the input by a double or reinforced insulation.

Type and routine 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 all input-terminals together as well as all output poles before conducting the test. When testing, set the cut-off current settings to the value in the table below.

![Dielectric strength diagram](Fig. 17-1)

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type test</strong></td>
<td>60s</td>
<td>2500Vac</td>
<td>3000Vac</td>
</tr>
<tr>
<td><strong>Routine test</strong></td>
<td>5s</td>
<td>2500Vac</td>
<td>2500Vac</td>
</tr>
<tr>
<td><strong>Field test</strong></td>
<td>5s</td>
<td>2000Vac</td>
<td>2000Vac</td>
</tr>
<tr>
<td><strong>Cut-off current setting for field test</strong></td>
<td>&gt; 10mA</td>
<td>&gt; 10mA</td>
<td>&gt; 30mA</td>
</tr>
</tbody>
</table>

It is recommended that either the + pole, the – pole or any other part of the output circuit shall be connected to the earth/ground system. This helps to avoid situations in which a load starts unexpectedly or can not be switched off when unnoticed earth faults occur.
## 18. Approved, Fulfilled or Tested Standards

<table>
<thead>
<tr>
<th>Certificate/Standard</th>
<th>Description</th>
</tr>
</thead>
</table>
| UL 508               | UL Certificate  
Listed equipment for category NMTR - Industrial Control Equipment  
Applicable for US and Canada  
E-File: E198865 |
| IEC 61010-2-201      | Manufacturer's Declaration  
Electrical Equipment for Measurement, Control and Laboratory Use - Particular requirements for control equipment |
| IEC 60950-1          | CB Scheme Certificate  
General safety requirements for Information Technology Equipment (ITE) |
| UL 60950-1          | UL Certificate  
Recognized component for category QGQQ - Information Technology Equipment (ITE)  
Applicable for US and Canada  
E-File: E137006 |
| Class I Div 2 (CT10.241) | CSA Certificate  
Power Supplies for Hazardous Location  
Applicable for Canada and US  
CSA Class: 5318-01 (Canada), 5318-81 (USA)  
Temperature Code: T3  
Groups: A, B, C and D |
| Marine (DNV)         | DNV Certificate  
DNV Type approved product  
Certificate: TAA00002XY  
Temperature: Class D  
Humidity: Class B  
Vibration: Class C  
EMC: Class B  
Enclosure: Class A |
| Marine (ABS)         | ABS Design Assessment Certificate  
ABS (American Bureau of Shipment) assessed product  
Certificate: 17-HG1599236-PD |
| SEMI F47             | Test Report  
Voltage Sag Immunity for Semiconductor Processing Equipment  
Tested for AC 208V L-L or L-N mains voltages, nominal output voltage and nominal output load |
| VDMA 24364           | LABS Certificate  
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 |
## 19. Regulatory Product Compliance

<table>
<thead>
<tr>
<th>Declaration/Directive</th>
<th>Details</th>
</tr>
</thead>
</table>
| EU Declaration of Conformity | The CE mark indicates conformance with the 
- EMC directive  
- Low-voltage directive  
- RoHS directive |
| REACH Directive | 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 Koran Certificate (CT10.241) | KC Registration  
Korean registration of Broadcasting and Communication Equipment  
| EAC TR Registration | EAC Certificate  
EAC EurAsian Conformity - Registration Russia, Kazakhstan and Belarus  
8504408200, 8504409000 |
## 20. Physical Dimensions and Weight

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>62 mm / 2.44&quot;</td>
</tr>
<tr>
<td>Height</td>
<td>124 mm / 4.88&quot;</td>
</tr>
<tr>
<td>Depth</td>
<td>117 mm / 4.61&quot;</td>
</tr>
</tbody>
</table>

The DIN rail depth must be added to the unit depth to calculate the total required installation depth.

**Weight**
- 750g / 1.65lb

**DIN rail**
- Use 35mm DIN rails according to EN 60715 or EN 50022 with a height of 7.5 or 15mm.

**Housing material**
- Body: Aluminium alloy
- Cover: Zinc-plated steel

**Installation clearances**
- See chapter 2

**Penetration protection**
- Small parts like screws, nuts, etc. with a diameter larger than 3.5mm

---

![Front view](image1.png)

![Side view](image2.png)

---

All values are typical figures specified at 3x 400Vac, 50Hz input voltage, symmetrical phase voltages, 24V, 10A output load, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

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21. ACCESSORIES

21.1. ZM1.WALL - WALL/PANEL MOUNT BRACKET

These brackets are used to mount the device on a flat surface or panel 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 in the holes of the aluminum brackets.

The order number ZM1.WALL contains two brackets needed for one device.

Fig. 21-1 ZM1.Wall

Fig. 21-2 Hole pattern

Fig. 21-3 Side view

Fig. 21-4 Isometric view

Fig. 21-5 Isometric view

Fig. 21-6 Isometric view
21.2. ZM13.SIDE - SIDE MOUNT BRACKET

This ZM13.SIDE bracket is used to mount the device sideways with or without utilizing a DIN rail to save installation depth.

The two aluminum brackets and the black plastic slider of the unit have to be detached, so that the ZM13.SIDE steel bracket can be mounted.

For sideway DIN rail mounting, the removed aluminum brackets and the black plastic slider need to be mounted on the ZM13.SIDE steel bracket.
21.3. **YRM2.DIODE - REDUNDANCY MODULES**

The YRM2.DIODE is a dual redundancy module, which can be used to build 1+1 or N+1 redundant systems.

- The device is equipped with two input channels each 10A nominal, which are individually decoupled by utilizing diode technology. The output can be loaded with nominal 20A.
- The device does not require an additional auxiliary voltage and is self-powered even in case of a short circuit across the output.
- The device has a monitoring circuit included and is the perfect choice when the power supply has no DC-OK function. Two LEDs and two relay contacts signal when one of the two input voltages is not in range due to a non-functioning or disconnected power supply.

The unit is very slender and only requires 32mm width on the DIN rail.

See chapter 22.6 for wiring information.
22. APPLICATION NOTES

22.1. PEAK CURRENT CAPABILITY

The unit can deliver peak currents (up to several milliseconds) which are higher than the specified short term currents. This helps to start current demanding loads. Solenoids, contactors and pneumatic modules often have a steady state coil and a pick-up coil. The inrush current demand of the pick-up coil is several times higher than the steady-state current and usually exceeds the nominal output current (including the PowerBoost). The same situation applies when starting a capacitive load.

The peak current capability also ensures the safe operation of subsequent circuit breakers of load circuits. The load branches are often individually protected with circuit breakers or fuses. In case of a short or an overload in one branch circuit, the fuse or circuit breaker need a certain amount of over-current to open in a timely manner. This avoids voltage loss in adjacent circuits.

The extra current (peak current) is supplied by the power converter and the built-in large sized output capacitors of the power supply. The capacitors get discharged during such an event, which causes a voltage dip on the output. The following examples show typical voltage dips for resistive loads:

<table>
<thead>
<tr>
<th>Peak current voltage dips</th>
<th>Typ. from 24V to 6V</th>
<th>At 20A for 50ms, resistive load</th>
</tr>
</thead>
<tbody>
<tr>
<td>20A peak current for 50ms, typ. (2x the nominal current)</td>
<td>50A peak current for 5ms, typ. (5x the nominal current)</td>
<td></td>
</tr>
</tbody>
</table>

![Fig. 22-1 20A peak current for 50ms, typ. (2x the nominal current)](image1)

- 20A peak current for 50ms, typ. (2x the nominal current)
  - Output Voltage
  - Output Current

![Fig. 22-2 50A peak current for 5ms, typ. (5x the nominal current)](image2)

- 50A peak current for 5ms, typ. (5x the nominal current)
  - Output Voltage
  - Output Current

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22.2. OUTPUT CIRCUIT BREAKERS

Standard miniature circuit breakers (MCB’s or UL 1077 circuit breakers) are commonly used for AC-supply systems and may also be used on 24V branches.

MCB’s are designed to protect wires and circuits. If the ampere value and the characteristics of the MCB are adapted to the wire size that is used, the wiring is considered as thermally safe regardless of whether the MCB opens or not.

To avoid voltage dips and under-voltage situations in adjacent 24V branches which are supplied by the same source, a fast (magnetic) tripping of the MCB is desired. A quick shutdown within 10ms is necessary corresponding roughly to the ride-through time of PLC’s. This requires power supplies with high current reserves and large output capacitors. Furthermore, the impedance of the faulty branch must be sufficiently small in order for the current to actually flow. The best current reserve in the power supply does not help if Ohm’s law does not permit current flow. The following table has typical test results showing which B- and C-Characteristic MCBs magnetically trip depending on the wire cross section and wire length.

The following test results indicate the maximal wire length for a magnetic (fast) tripping. The wire length is always two times the distance to the load (+ and – wire).

Fig. 22-3 Test circuit for maximum wire length

Test results for maximum wire length:

<table>
<thead>
<tr>
<th>MCB</th>
<th>0.75mm²</th>
<th>1.0mm²</th>
<th>1.5mm²</th>
<th>2.5mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-2A</td>
<td>23m</td>
<td>28m</td>
<td>43m</td>
<td>69m</td>
</tr>
<tr>
<td>C-3A</td>
<td>18m</td>
<td>23m</td>
<td>34m</td>
<td>54m</td>
</tr>
<tr>
<td>C-4A</td>
<td>6m</td>
<td>12m</td>
<td>18m</td>
<td>28m</td>
</tr>
<tr>
<td>C-6A</td>
<td>3m</td>
<td>4m</td>
<td>6m</td>
<td>7m</td>
</tr>
<tr>
<td>C-8A</td>
<td>2m</td>
<td>3m</td>
<td>4m</td>
<td>5m</td>
</tr>
<tr>
<td>C-10A</td>
<td>1m</td>
<td>2m</td>
<td>3m</td>
<td>4m</td>
</tr>
<tr>
<td>B-6A</td>
<td>9m</td>
<td>14m</td>
<td>19m</td>
<td>33m</td>
</tr>
<tr>
<td>B-10A</td>
<td>4m</td>
<td>5m</td>
<td>6m</td>
<td>9m</td>
</tr>
<tr>
<td>B-13A</td>
<td>3m</td>
<td>4m</td>
<td>5m</td>
<td>8m</td>
</tr>
</tbody>
</table>

22.3. CHARGING OF BATTERIES

The power supply can be used to charge lead-acid or maintenance free batteries. Two 12V SLA or VRLA batteries are needed in series connection.

Instructions for charging batteries:

a) Ensure that the ambient temperature of the power supply stays below 45°C.

b) Set the output voltage, measured at no load and at the battery end of the cable, very precisely to the end-of-charge voltage.

<table>
<thead>
<tr>
<th>End-of-charge voltage</th>
<th>27.8V</th>
<th>27.5V</th>
<th>27.15V</th>
<th>26.8V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery temperature</td>
<td>10°C</td>
<td>20°C</td>
<td>30°C</td>
<td>40°C</td>
</tr>
</tbody>
</table>

c) Use a 16A circuit breaker or a blocking diode between the power supply and the battery.

d) Ensure that the output current of the power supply is below the allowed charging current of the battery.

e) Use only matched batteries when putting 12V types in series.

f) The return current to the power supply is typically 8mA. This return current can discharge the battery when the power supply is switched off except in case a blocking diode is utilized.
22.4. Series Operation

Devices of the same type can be connected in series for higher output voltages. It is possible to connect as many units in series as needed, providing the sum of the output voltage does not exceed 150Vdc. Voltages with a potential above 60Vdc must be installed with a protection against touching.

Avoid return voltage (e.g. from a decelerating motor or battery) which is applied to the output terminals.

Keep an installation clearance of 15mm (left / right) between two power supplies and avoid installing the power supplies on top of each other. Do not use power supplies in series in mounting orientations other than the standard mounting orientation.

Pay attention that leakage current, EMI, inrush current, harmonics will increase when using multiple devices.

22.5. Parallel Use to Increase Output Power

Devices can be paralleled to increase the output power. The output voltage of all devices shall be adjusted to the same value (±100mV) in “Single Use” mode with the same load conditions on all units, or the units can be left with the factory settings. After the adjustments, set the unit to “Parallel Use” mode, in order to achieve load sharing. The “Parallel Use” mode regulates the output voltage in such a manner that the voltage at no load is approx. 4% higher than at nominal load.

The ambient temperature is not allowed to exceed +60°C.

If more than three units are connected in parallel, a fuse or circuit breaker with a rating of 15A or 16A is required on each output. Alternatively, a diode or redundancy module can also be utilized.

Keep an installation clearance of 15mm (left / right) between two devices and avoid installing devices on top of each other. Do not use devices in parallel in mounting orientations other than the standard mounting orientation or in any other condition where a reduction of the output current is required (e.g. altitude).

Pay attention that leakage current, EMI, inrush current, harmonics will increase when using multiple devices.
22.6. **Parallel Use for Redundancy**

1+1 Redundancy:
Devices can be paralleled for redundancy to gain higher system availability. Redundant systems require a certain amount of extra power to support the load in case one device fails. The simplest way is to put two devices in parallel. This is called a 1+1 redundancy. In case one device fails, the other one is automatically able to support the load current without any interruption. It is essential to use a redundancy module to decouple devices from each other. This prevents that the defective unit becomes a load for the other device and the output voltage cannot be maintained any more.

For 1+1 redundancy the ambient temperature is not allowed to exceed +70°C.

Recommendations for building redundant power systems:
- Use separate input fuses for each device.
- Use separate mains systems for each device whenever it is possible.
- Monitor the outputs of the individual devices. Use the DC-ok contact, which is included in the redundancy module.
- It is desirable to set the output voltages of all devices to the same value (± 100mV) or leave it at the factory setting.
- Set the devices into “Parallel Use” mode.

Pay attention that leakage current, EMI, inrush current, harmonics will increase when using multiple devices.

N+1 Redundancy:
Redundant systems for a higher power demand are usually built in a N+1 method. E.g. four devices, each rated for 10A are paralleled to build a 30A redundant system.

Pay attention that leakage current, EMI, inrush current, harmonics will increase when using multiple devices.

Keep an installation clearance of 15mm (left / right) between two devices and avoid installing the devices on top of each other.

Do not use devices in parallel in mounting orientations other than the standard mounting orientation or in any other condition, where a reduction of the output current is required.

For 1+1 redundancy the ambient temperature is not allowed to exceed +60°C.

Wiring examples for 1+1 and n+1 redundancy:

![Fig. 22-4 1+1 Redundant configuration for 10A load current and redundancy modules](image1)

![Fig. 22-5 N+1 Redundant configuration for 30A load current with multiple power supplies and redundancy modules](image2)
22.7. **Operation on Two Phases**

No external protection device is required to protect against a phase-loss failure.

The power supply is allowed to run permanently on only two legs of a 3-phase system, when the output power is reduced according to the curves below. A long-term exceeding of these limits will result in a thermal shut-down of the device.

Pay attention that EMC performance, hold-up time and losses differ from a three phase operation. Therefore, check suitability of your individual application.

Using only two legs of a 3-phase system is only included in the IEC/UL 60950-1 approval.

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**Fig. 22-6** Allowed output current for use on only two legs of a 3-phase system

**Fig. 22-7** Hold-up time for use on only two legs of a 3-phase system

**Fig. 22-8** Efficiency vs. output current at 24V for use on only two legs of a 3-phase system

**Fig. 22-9** Losses vs. output current at 24V for use on only two legs of a 3-phase system

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22.8. **Use in a Tightly Sealed Enclosure**

When the device is installed in a tightly sealed enclosure, the temperature inside the enclosure will be higher than outside. In such situations, the inside temperature defines the ambient temperature for the device.

In the following test setup, the device is placed in the middle of the box, no other heat producing items are inside the box. The load is placed outside the box.

The temperature sensor inside the box is placed in the middle of the right side of the power supply with a distance of 1cm.

The following measurement results can be used as a reference to estimate the temperature rise inside the enclosure.

<table>
<thead>
<tr>
<th>Case</th>
<th>Enclosure size</th>
<th>Input voltage</th>
<th>Load</th>
<th>Temperature inside the box</th>
<th>Temperature outside the box</th>
<th>Temperature rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>180x180x165mm Rittal Typ IP66 Box PK 9519 100, plastic</td>
<td>3x 400Vac</td>
<td>24V, 8A; (≈80%)</td>
<td>48.4°C</td>
<td>24.5°C</td>
<td>23.9K</td>
</tr>
<tr>
<td>B</td>
<td>180x180x165mm Rittal Typ IP66 Box PK 9519 100, plastic</td>
<td>3x 400Vac</td>
<td>24V, 10A; (≈100%)</td>
<td>54.7°C</td>
<td>24.9°C</td>
<td>29.8K</td>
</tr>
</tbody>
</table>
22.9. 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.

The listed lifetime and MTBF values from this datasheet apply only for the standard mounting orientation. The following curves give an indication for allowed output currents for altitudes up to 2000m (6560ft).

Fig. 22-10
Mounting Orientation A
(Standard orientation)

Fig. 22-11
Mounting Orientation B
(Upside down)

Fig. 22-12
Mounting Orientation C
(Table-top mounting)

Fig. 22-13
Mounting Orientation D
(Horizontal cw)

Fig. 22-14
Mounting Orientation E
(Horizontal ccw)

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