The **FPT300** is an industrial grade power supply for the single-phase mains system incorporated in a rugged wall-mount housing with a degree of protection IP54.

It provides one floating, stabilized SELV/PELV output, which is galvanically separated from the input. In case of an overload or load failure, the output offers hiccup-mode.

The most outstanding features of the FPT series are the compact size, the wide operational temperature range, the low input inrush current and the extremely high efficiencies, which are achieved by various technological design technologies.

Various connector options support the different needs of individual applications. Please contact PULS for possible options.

High immunity to transients and power surges as well as low electromagnetic emission and an international approval package makes usage in nearly every environment possible.

---

**ORDER NUMBERS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Power supply FPT300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order Number</td>
<td>Input</td>
</tr>
<tr>
<td>FPT300.242-008-102</td>
<td>HanQ4/2</td>
</tr>
</tbody>
</table>

**MAIN APPROVALS**

For details or an complete approval (pending) list, see chapter 19.

---

**POWER SUPPLY**

3AC 24V 300W

- **IP54 degree of protection**
- **450W continuously for 60s**
- **600W\(_{\text{peak}}\) 1s**
- **3AC 380-480V wide-range input**
- **95.2% full load and excellent partial load efficiencies**
- **DIN rail mounting possible, option “D”**
- **Output connected to PE (PELV)**
- **Version without connection to PE on request**
- **Large output capacitors**
- **Not potted**
- **Negligible low input inrush current surge**
- **Full power between -25°C and +55°C**
- **DC-OK relay contact**
- **3 Years Warranty**

---

**SHORT-FORM DATA**

<table>
<thead>
<tr>
<th>Output voltage</th>
<th>DC 24V</th>
<th>0%/+6%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment range</td>
<td>-</td>
<td>Not adjustable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output power</th>
<th>Continuous:</th>
<th>Up to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>300 / 150W</td>
<td>+55 / +70°C</td>
</tr>
<tr>
<td>Short term up to</td>
<td>450W / 60s</td>
<td>+55°C</td>
</tr>
<tr>
<td></td>
<td>600W / 1s</td>
<td>+55°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input voltage AC</th>
<th>3AC 380-480V</th>
<th>±15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power factor</td>
<td>0.9 / 0.9</td>
<td>At 3x400 / 480Vac</td>
</tr>
<tr>
<td>AC Inrush current</td>
<td>1.5 / 1.5A(_{\text{peak}})</td>
<td>At 3x400 / 480Vac</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>95.2 / 95.0%</th>
<th>At 3x400 / 480Vac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Losses</td>
<td>15.1 / 15.8 W</td>
<td>At 3x400 / 480Vac</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hold-up time</th>
<th>25 / 25ms</th>
<th>At 120 / 230Vac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>-25°C to +70°C</td>
<td>Derate linearly from +55°C to +70°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size (wxhxd)</th>
<th>182x272x70mm</th>
<th>Without connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>1550g / 3.4lb</td>
<td></td>
</tr>
</tbody>
</table>

---

All parameters are specified at 24V, 12.5A, 230Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.
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2. Installation Instructions ............................................. 3
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The information given in this document is correct to the best of our knowledge and experience at the time of publication. If not expressly
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Packaging and packaging aids can and should always be recycled. The product itself may not be disposed of as domestic refuse.

TERMINOLOGY AND ABBREVIATIONS

PE and Earth, Ground PE is the abbreviation for Protective Earth and has the same meaning as the symbol .
Symbol 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.
3AC 400V A figure displayed with the AC or DC before the value represents a nominal voltage with tolerances (usually
±15%) included.
E.g.: DC 12V describes a 12V battery disregarding whether it is full (13.7V) or flat (10V)
3x 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, 3AC 400V parameters are valid at 50Hz 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.

All parameters are specified at 24V, 12.5A, 230Vac, 25°C ambient and after a 5 minutes run in time unless otherwise noted.

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1. **Intended Use**

This device is designed for indoor use and is intended for commercial applications, 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. If this device is used in a manner outside of its specification, the protection provided by the device may be impaired.

2. **Installation Instructions**

**DANGER**  
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.
- 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.
- Install the device on a large enough flat surface. Sharp edges on the back may cause injury.
- If damages or malfunctioning occur during installation or operation, immediately turn power off and send unit to the factory for inspection.
- The device is designed as “Class of Protection I” equipment according to IEC 61140. Do not use without a proper PE (Protective Earth) connection.

**WARNING**  
Risk of damages on the device

- Keep the following minimum installation clearances: 0mm on top, 30mm on the bottom, 15mm on the front and 10 left and right side.
- 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.
- Clean only with a damp cloth.

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. Install the device onto a flat surface with the terminals on the bottom of the device. Other mounting orientations require a reduction in output power, chapter 23.6.

For wall mounting use 4 screws. Two on top and 2 on bottom mounting holes. Recommended screw size is M4 (UNC 8-32). The enclosure of the device provides a degree of protection of IP54 when installed with all mating connectors firmly connected. The device is designed for pollution degree 2 areas in controlled environments.

The negative potential of the outputs is permanently connected to PE within the unit. Do not connect the negative potential of any output to PE outside the unit.

For TN, TT mains systems with earthed neutral and IT star mains systems with insulation monitoring the device is designed for overvoltage category III zones up to 2000m (6560ft) and for overvoltage category II zones up to 5000m (16400ft).

For TN, TT, IT delta mains systems or IT star mains systems without insulation monitoring the device is intended for overvoltage category II zones up to 2000m (6560ft). The device is designed to be safe in case of a single phase loss and does not require an external protection. Functionality is limited see chapter 23.4.

The device is designed for altitudes up to 5000m (16400ft). Above 2000m (6560ft) a reduction in output current is required and the operation is limited according mains systems described above. The device is designed, tested and approved for branch circuits up to 20A (UL) and 32A (IEC) 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 trip. A disconnecting means shall be provided for the input of the device. This must be suitably located and easily accessible. The disconnecting means must be marked as the such for the device.
3. AC-Input

The device is suitable to be supplied from TN, TT or IT mains networks. For more details, please review chapter 2.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Nom.</th>
<th>3AC 380-480V</th>
<th>3AC 400V</th>
<th>3AC 480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC input voltage rated range</td>
<td>3AC 380-480V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC input operating range</td>
<td>3x 323-552Vac</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input frequency</td>
<td>50–60Hz</td>
<td>±6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-on voltage</td>
<td>3x 320Vac</td>
<td>Steady-state value, see Fig. 3-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shut-down voltage</td>
<td>3x 300Vac</td>
<td>Steady-state value, see Fig. 3-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of one phase</td>
<td></td>
<td>will continue to operate without interruption if loaded below limits in figure see Fig. 23-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External input protection</td>
<td></td>
<td>See recommendations in chapter 2.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**3AC 400V**

- Input current typ. 0.5A 0.42A At 300W, symmetrical phase voltages, see Fig. 3-3 Power
- Power factor typ. 0.90 0.90 At 300W, see Fig. 3-4
- Start-up delay typ. 1s 1s At 300W symmetrical phase voltages, see Fig. 3-2
- Rise time typ. 10ms 10ms At 300W constant current load, 0mF load, see Fig. 3-2
  typ. 12ms 12ms At 300W constant current load, 12.5mF, see Fig. 3-2
- Turn-on overshoot Max. 500mV 500mV See Fig. 3-2

![Fig. 3-1: Input voltage range](image1)

![Fig. 3-2: Turn-on behavior, definitions](image2)

![Fig. 3-3: Input current vs. output Power at 24V output voltage](image3)

![Fig. 3-4: Power factor vs. output power at 24V output voltage](image4)
4. DC-Input

Do not operate this power supply with DC-input voltage.

5. Input Inrush Current

The power supply is equipped with an active inrush current limitation circuit, which limits the input inrush current after turn-on to an extremely low value. The inrush current is usually smaller than the steady state input current.

<table>
<thead>
<tr>
<th></th>
<th>3AC 400V</th>
<th>3AC 480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inrush current *)</td>
<td>max. 2A&lt;sub&gt;peak&lt;/sub&gt;</td>
<td>2A&lt;sub&gt;peak&lt;/sub&gt;</td>
</tr>
<tr>
<td></td>
<td>typ. 1.5A&lt;sub&gt;peak&lt;/sub&gt;</td>
<td>1.5A&lt;sub&gt;peak&lt;/sub&gt;</td>
</tr>
<tr>
<td>Inrush energy</td>
<td>max. 0.1A²s</td>
<td>0.1A²s</td>
</tr>
</tbody>
</table>

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

Fig. 5-1: Typical turn-on behavior at nominal load and 25°C ambient temperature
6. Output

The output provide a (PELV/ES1) rated voltage, which is galvanically isolated from the input voltage. The negative potential of the output is permanently connected to PE within the unit.

The device is designed to supply any kind of loads, including capacitive and inductive loads. If capacitors with a capacitance >100mF are connected to the output, the unit might charge the capacitor in hiccup mode.

The output is electronically protected against overload, no-load and short-circuits. In case of a protection event, audible noise may occur.

The device is featured with a "soft output regulation characteristic" in order to achieve current share between multiple devices when they are connected in parallel. The "soft output regulation characteristic" regulates the output voltage in such a manner that the voltage at no load is approx. 4% higher than at nominal load.

### Output voltage

<table>
<thead>
<tr>
<th>Adjustment range</th>
<th>nom.</th>
<th>24V</th>
<th>23.8 - 25.2V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory setting</td>
<td>typ.</td>
<td>24.5V</td>
<td>Not adjustable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>±0.2%, at 12.5A (results to 25V±0.2% at no load)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Above 12.5A the output voltage stays stable at 24V</td>
<td></td>
</tr>
</tbody>
</table>

### Line regulation

<table>
<thead>
<tr>
<th>nom.</th>
<th>max.</th>
<th>10mV</th>
<th>Between 3x323 and 576Vac input voltage change</th>
</tr>
</thead>
<tbody>
<tr>
<td>typ.</td>
<td>1000mV</td>
<td>50mV</td>
<td>Between 0 and 12.5A output load, static value</td>
</tr>
<tr>
<td>typ.</td>
<td></td>
<td></td>
<td>Between 12.5 and 25A output load, static value</td>
</tr>
</tbody>
</table>

### Ripple and noise voltage

<table>
<thead>
<tr>
<th>nom.</th>
<th>max.</th>
<th>100mVpp</th>
<th>Bandwidth 20Hz to 20MHz, 50Ohm</th>
</tr>
</thead>
</table>

### Total output power

<table>
<thead>
<tr>
<th>nom.</th>
<th>300W1)</th>
<th>Up to +55°C at ambient temperatures, see Fig. 6-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom.</td>
<td>150W</td>
<td>At +70°C at ambient temperatures</td>
</tr>
<tr>
<td>nom.</td>
<td>450W</td>
<td>Up to +55°C at ambient temperatures, see Fig. 6-1</td>
</tr>
<tr>
<td>nom.</td>
<td>600W</td>
<td>Up to +70°C at ambient temperatures</td>
</tr>
<tr>
<td>nom.</td>
<td></td>
<td>Derate linearly between +55°C and +70°C</td>
</tr>
</tbody>
</table>

### Overload/ short-circuit current

<table>
<thead>
<tr>
<th>nom.</th>
<th>max.</th>
<th>15A</th>
<th>Continuous current, see Fig. 6 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom.</td>
<td>typ.</td>
<td>27A / 22A</td>
<td>At heavy overloads (when output voltage falls below 13V), the power supply delivers continuous output current for 2s. After this, the output is switched off for approx. 18s before a new start attempt is automatically performed. This cycle is repeated as long as the overload exists. If the overload has been cleared, the device will operate normally, see Fig. 6-2. Load impedance 10mOhm. Discharge current of output capacitors is not included. Intermitted current average value (R.M.S.) Load impedance 10mOhm, see Fig. 6 3</td>
</tr>
<tr>
<td></td>
<td>max.</td>
<td>7.8A</td>
<td>Derate linearly between +55°C and +70°C</td>
</tr>
</tbody>
</table>

### Output capacitance

| typ. | 18 000µF | Included inside the power supply |

### Parallel Use

| typ. | Do not parallel units for higher output currents |

### Back-feeding loads

<table>
<thead>
<tr>
<th>nom.</th>
<th>35V / 4.3J</th>
<th>32V / 2.8J</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom.</td>
<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) Power Boost This power/ current is continuously allowed up to an ambient temperature of 45°C. Above 45°C, do not use this power or current longer than a duty cycle of 10% and/ or not longer than 1 minute every 10 minutes.
All parameters are specified at 24V, 12.5A, 230Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

Fig. 6-1: Output voltage vs. output current, for continuous load, typ.

Fig. 6-2: Short term output current capability, typ.

Fig. 6-3: Short-circuit on output, HiccupPLUS mode, typ.
7. **Hold-up Time**

The hold-up time is the time during which a power supply’s output voltage remains within specification following the loss of input power. The hold-up time is output load dependent. At no load, the hold-up time can be up to several seconds. The green DC-OK LED is also on during this time.

<table>
<thead>
<tr>
<th></th>
<th>3AC 400V</th>
<th>3AC 480V</th>
<th>At 150W output load, see Fig. 7-1</th>
<th>At 150W output load, see Fig. 7-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold-up Time</td>
<td>typ.</td>
<td>50ms</td>
<td>50ms</td>
<td>At 300W output load, see Fig. 7-1</td>
</tr>
<tr>
<td></td>
<td>min.</td>
<td>40ms</td>
<td>40ms</td>
<td>At 300W output load, see Fig. 7-1</td>
</tr>
<tr>
<td></td>
<td>typ.</td>
<td>25ms</td>
<td>25ms</td>
<td>At 300W output load, see Fig. 7-1</td>
</tr>
<tr>
<td></td>
<td>min.</td>
<td>20ms</td>
<td>20ms</td>
<td>At 300W output load, see Fig. 7-1</td>
</tr>
</tbody>
</table>

Fig. 7-1: Hold-up time vs. input voltage

Fig. 7-2: Shut-down behavior, definitions

8. **DC-OK Relay Contact**

This feature monitors the output voltage, which is produced by the power supply itself. It is independent of an eventually present external voltage on the output of the power supply.

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact closes</td>
<td>As soon as the output voltage reaches typ. 22Vdc. The DC-OK Relay Contact is synchronized with the Status Led.</td>
</tr>
<tr>
<td>Contact opens</td>
<td>As soon as the output voltage dips below 22Vdc. Short dips will be extended to a signal length of 100ms. Dips shorter than 1ms will be ignored.</td>
</tr>
<tr>
<td>Switching hysteresis</td>
<td>1V</td>
</tr>
<tr>
<td>Contact ratings</td>
<td>Maximal 60Vdc 0.3A, 30Vdc 1A, 30Vac 0.5A, resistive load</td>
</tr>
<tr>
<td></td>
<td>Minimal permissible load: 1mA at 5Vdc</td>
</tr>
<tr>
<td>Isolation voltage</td>
<td>See dielectric strength table in chapter 18</td>
</tr>
</tbody>
</table>

Fig. 8-1: DC-OK relay contact behavior
## Efficiency And Power Losses

<table>
<thead>
<tr>
<th></th>
<th>3AC 400V</th>
<th>3AC 480V</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Efficiency</strong></td>
<td>typ.</td>
<td>95.2%</td>
</tr>
<tr>
<td><strong>Average efficiency</strong></td>
<td>typ.</td>
<td>93.6%</td>
</tr>
<tr>
<td><strong>Power losses</strong></td>
<td>typ.</td>
<td>3.0W</td>
</tr>
<tr>
<td></td>
<td>typ.</td>
<td>10.0W</td>
</tr>
<tr>
<td></td>
<td>typ.</td>
<td>15.1W</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.

---

![Efficiency vs. output power at 24V, typ.](image1)

![Losses vs. output power at 24V, typ.](image2)

![Efficiency vs. input voltage at 24V, 300W, typ.](image3)

![Losses vs. input voltage at 24V, 300W, typ.](image4)
10. 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>Calculated lifetime expectancy</td>
<td></td>
</tr>
<tr>
<td>235 000h</td>
<td>195 000h</td>
</tr>
<tr>
<td>312 000h</td>
<td>293 000h</td>
</tr>
<tr>
<td>664 000h</td>
<td>551 000h</td>
</tr>
<tr>
<td>882 000h</td>
<td>829 000h</td>
</tr>
</tbody>
</table>

At 24V, 300W and 40°C
At 24V, 150W and 40°C
At 24V, 300W and 25°C
At 24V, 15W and 25°C

11. 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></td>
</tr>
<tr>
<td>838 000h</td>
<td>814 000h</td>
</tr>
<tr>
<td>1 421 000h</td>
<td>1 380 000h</td>
</tr>
</tbody>
</table>

At 24V, 300W and 40°C
At 24V, 300W and 25°C

MTBF MIL HDBK 217F

<table>
<thead>
<tr>
<th>3AC 400V</th>
<th>3AC 480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>281 000h</td>
<td>268 000h</td>
</tr>
<tr>
<td>383 000h</td>
<td>366 000h</td>
</tr>
<tr>
<td>65 000h</td>
<td>62 000h</td>
</tr>
<tr>
<td>88 000h</td>
<td>84 000h</td>
</tr>
</tbody>
</table>

At 24V, 300W and 40°C; Ground Benign GB40
At 24V, 300W and 25°C; Ground Benign GB25
At 24V, 300W and 40°C; Ground Fixed GF40
At 24V, 300W and 25°C; Ground Fixed GF25

All parameters are specified at 24V, 12.5A, 230Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.
12. Functional Diagram

Fig. 12-1: Functional Diagram FPT300.242-008-102
13. Dimensions And Connector Variants

### Dimensions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>182mm / 7.17”</td>
</tr>
<tr>
<td>Height</td>
<td>272mm / 10.7”</td>
</tr>
<tr>
<td>Depth</td>
<td>70mm / 2.76”</td>
</tr>
<tr>
<td>Weight</td>
<td>1550g / 3.4lb</td>
</tr>
</tbody>
</table>

### Housing Material

- **Body:** Aluminium alloy
- **Covers:** Hi-grade polycarbonate

### Installation Clearances

See chapter 2

### Input Connection (X1):

<table>
<thead>
<tr>
<th>Connector Details</th>
<th>Harting HanQ4/2</th>
<th>Q4/2 Set AS female 2.5-6mm² 7-13mm</th>
<th>Harting order code</th>
<th>PULS order code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q4/2 Set AS female 2.5-6mm² 14-17mm</td>
<td>Harting order code</td>
<td>PULS order code</td>
<td></td>
</tr>
<tr>
<td>Pin assignment</td>
<td>Pin 1</td>
<td>L1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pin 2</td>
<td>L2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pin 3</td>
<td>L3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pin with the PE symbol</td>
<td>PE connection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### IO-Link Connection (X2):

<table>
<thead>
<tr>
<th>Connector Details</th>
<th>M12 A coded</th>
<th>M12-A 5pin cut clamp female 0.34-0.5mm² / 6-8mm</th>
<th>Harting order code</th>
<th>PULS order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin assignment</td>
<td>Pin 1 and Pin 4 for relay contact</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Output Connection (X3):

<table>
<thead>
<tr>
<th>Connection Details</th>
<th>QuickON</th>
<th>Pin assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pin 1</td>
<td>(+) pole</td>
</tr>
<tr>
<td></td>
<td>Pin 2</td>
<td>(−) pole</td>
</tr>
</tbody>
</table>

All parameters are specified at 24V, 12.5A, 230Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.
All parameters are specified at 24V, 12.5A, 230Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

Fig. 13-1: Hole pattern for wall mount

Fig. 13-2: Hole pattern for front mount
14. User Interface

LED Signalization Overview

The three LEDs on the front side is used to signalize conditions of the Power Supply.

- **DC-OK LED** lights up green continuously if the DC voltage is above 22V and all outputs run according to their settings.
- **DC-NOT-OK LED** lights up red continuously if the DC voltage output voltage is below 22V of a running device.
- **Overload LED** lights up red continuously if the output current is higher than 15A.
- **LEDs are off continuously if the** power supply is not powered.

All parameters are specified at 24V, 12.5A, 230Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.
15. 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 device is investigated according to EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2 and EN 61000-3-3.

**EMC immunity**

<table>
<thead>
<tr>
<th>Electrostatic discharge</th>
<th>EN 61000-4-2</th>
<th>Contact discharge</th>
<th>8kV</th>
<th>Criterion A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air discharge</td>
<td></td>
<td>Air discharge</td>
<td>15kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Electromagnetic RF field</td>
<td>EN 61000-4-3</td>
<td>80MHz - 2.7GHz</td>
<td>10V/m</td>
<td>Criterion A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.7GHz - 6GHz</td>
<td>3V/m</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Magnetic field</td>
<td>EN 61000-4-8</td>
<td>50Hz/60Hz</td>
<td>30A/m</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Fast transients (Burst)</td>
<td>EN 61000-4-4</td>
<td>AC Input lines</td>
<td>4kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DC Output lines</td>
<td>2kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DC OK Output</td>
<td>2kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Surge voltage on AC input</td>
<td>EN 61000-4-5</td>
<td>Lx to Ly</td>
<td>2kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L to PE</td>
<td>4kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Surge voltage on DC output</td>
<td>EN 61000-4-5</td>
<td>+ to -</td>
<td>1kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+/- to PE</td>
<td>1kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Surge voltage on Output OK</td>
<td>EN 61000-4-5</td>
<td>DC-OK to PE</td>
<td>1kV</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Conducted immunity</td>
<td>EN 61000-4-6</td>
<td>0.15 - 80MHz</td>
<td>20V</td>
<td>Criterion A</td>
</tr>
<tr>
<td>Voltage dips</td>
<td>EN 61000-4-11</td>
<td>0V</td>
<td>1 cycle</td>
<td>Criterion A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40% of (V_{nom})</td>
<td>200ms</td>
<td>Criterion A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70% of (V_{nom})</td>
<td>500ms</td>
<td>Criterion A</td>
</tr>
</tbody>
</table>

**Voltage interruptions**

| EN 61000-4-11 | 0V | 5000ms | Criterion C |

**Powerful transients**

| VDE 0160 | Over entire load range | 1550V, 1.3ms | Criterion A |

**Performance 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 AC input lines | EN 55032 , FCC Part 15 | Class B |
| Conducted emission DC output lines |                        |       |
| Conducted emission DC OK Output  |                        |       |
| Radiated emission                | EN 55032 / EN 55011    | Class B |
| Harmonics                        | EN 61000-3-2           | Pass for Class A equipment |
| Voltage fluctuations, flicker    | EN 61000-3-3           | Pass 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 Frequencies**

<table>
<thead>
<tr>
<th>PFC converter</th>
<th>20kHz to 135kHz</th>
<th>Input voltage and output load dependent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main converter</td>
<td>60kHz to 140kHz</td>
<td>Output load dependent</td>
</tr>
<tr>
<td>Auxiliary converter</td>
<td>54kHz to 66kHz</td>
<td>Output load dependent</td>
</tr>
<tr>
<td>Microcontroller clocks</td>
<td>48Mhz and 32Mhz</td>
<td>Fixed frequency</td>
</tr>
</tbody>
</table>
### 16. Environment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational temperature</strong></td>
<td>-25°C to +70°C (-13°F to 158°F)</td>
<td>Operational temperature is the same as the ambient or surrounding temperature and is defined as the air temperature 2cm below the unit.</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-40°C to +85°C (-40°F to 185°F)</td>
<td>For storage and transportation</td>
</tr>
<tr>
<td><strong>Output de-rating</strong></td>
<td>10W/°C</td>
<td>Between +55°C and +70°C (131°F to 140°F)</td>
</tr>
<tr>
<td></td>
<td>20W/1000m or 5°C/1000m</td>
<td>For altitudes &gt;2000m (6560ft), see Fig. 16-2: Output power vs. altitude</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The de-rating is not hardware controlled. The user has to take this into consideration to stay below the de-rated current limits in order not to overload the unit.</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>5 to 95% r.h.</td>
<td>According to IEC 60068-2-30</td>
</tr>
<tr>
<td><strong>Atmospheric pressure</strong></td>
<td>54-110kPa</td>
<td>See Fig. 16-2: Output power vs. altitude for details</td>
</tr>
<tr>
<td><strong>Altitude</strong></td>
<td>Up to 5000m (16 400ft)</td>
<td>See Fig. 16-2: Output power vs. altitude for details</td>
</tr>
<tr>
<td><strong>Over-voltage category</strong></td>
<td>III</td>
<td>According to IEC 60664-1</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>According to IEC 60664-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For TN, TT mains systems with earthed neutral and IT star mains systems with insulation monitoring for altitudes up to 2000m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For TN, TT mains systems with earthed neutral and IT star mains systems with insulation monitoring for altitudes between 2000m and 5000m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>According to IEC 60664-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For TN, TT, IT Delta mains systems or IT star mains systems without insulation monitoring for altitudes up to 2000m</td>
</tr>
<tr>
<td><strong>Degree of pollution</strong></td>
<td>3</td>
<td>According to IEC 62477-1, not conductive</td>
</tr>
<tr>
<td><strong>Vibration sinusoidal</strong></td>
<td>2-17.8Hz: ±1.6mm; 17.8-500Hz: 2g</td>
<td>According to IEC 60068-2-6</td>
</tr>
<tr>
<td></td>
<td>2 hours / axis</td>
<td></td>
</tr>
<tr>
<td><strong>Shock</strong></td>
<td>30g 6ms, 20g 11ms</td>
<td>According to IEC 60068-2-27</td>
</tr>
<tr>
<td></td>
<td>3 bumps / direction, 18 bumps in total</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>LABS compatibility</strong></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Audible noise</strong></td>
<td>Some audible noise may be emitted from the power supply during no load, overload or short circuit.</td>
<td></td>
</tr>
</tbody>
</table>

---

![Allowed Output Power](chart1.png)  
**Fig. 16-1: Output power vs. ambient temp.**

![Allowed Output Power](chart2.png)  
**Fig. 16-2: Output power vs. altitude**

---

All parameters are specified at 24V, 12.5A, 230Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.
# Safety And Protection Features

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Isolation resistance</strong></td>
<td>min. 500MOhm</td>
<td>At delivered condition between input and output, measured with 500Vdc</td>
</tr>
<tr>
<td></td>
<td>min. 500MOhm</td>
<td>At delivered condition between input and PE, measured with 500Vdc</td>
</tr>
<tr>
<td></td>
<td>min. 500MOhm</td>
<td>At delivered condition between output and Output OK contacts, measured with 500Vdc</td>
</tr>
<tr>
<td><strong>PE resistance</strong></td>
<td>max. 0.1Ohm</td>
<td>Resistance between PE terminal and the housing</td>
</tr>
<tr>
<td><strong>Input/Output separation</strong></td>
<td></td>
<td>IEC/EN/UL 61010-2-201, IEC/EN 62368-1, IEC/EN 60950-1</td>
</tr>
<tr>
<td><strong>Output over-voltage protection</strong></td>
<td>typ. 31.8Vdc max. 32.5Vdc</td>
<td>In case of an internal defect, a redundant circuit limits the maximum output voltage. The output shuts down and automatically attempts to restart</td>
</tr>
<tr>
<td><strong>Class of protection</strong></td>
<td></td>
<td>According to IEC 61140, A PE (Protective Earth) connection is required</td>
</tr>
<tr>
<td><strong>Ingress protection</strong></td>
<td>IP 54</td>
<td>According to EN/IEC 60529</td>
</tr>
<tr>
<td><strong>Over-temperature protection</strong></td>
<td>Included</td>
<td>Output shut-down with automatic restart. Temperature sensors are installed on critical components inside the unit and turn the unit off in safety critical situations, which can happen e.g. when ambient temperature is too high, ventilation is obstructed or the de-rating requirements are not followed. There is no correlation between the operating temperature and turn-off temperature since this is dependent on input voltage, load and installation methods.</td>
</tr>
<tr>
<td><strong>Input transient protection</strong></td>
<td>MOV (Metal Oxide Varistor)</td>
<td>For protection values, see chapter 22.2, EMC.</td>
</tr>
<tr>
<td><strong>Internal input fuse</strong></td>
<td>Included</td>
<td>Not user replaceable slow-blow high-braking capacity fuse</td>
</tr>
<tr>
<td><strong>Touch current (leakage current)</strong></td>
<td>max. 0.45 / 1.5 mA</td>
<td>At 3x 480Vac, 60Hz, TN-,TT-mains / IT-mains</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower currents at lower voltages and frequencies.</td>
</tr>
</tbody>
</table>
18. Dielectric Strength

The negative potential of the outputs is permanently connected to PE within the unit. The output is insulated from 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 before conducting the test. When testing, set the cut-off current settings to the value in the table below.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type test</td>
<td>60s</td>
<td>2700Vac</td>
</tr>
<tr>
<td>Routine test</td>
<td>5s</td>
<td>2200Vac</td>
</tr>
<tr>
<td>Field test</td>
<td>5s</td>
<td>2000Vac</td>
</tr>
<tr>
<td>Cut-off current setting for field test</td>
<td>&gt; 10mA</td>
<td>&gt; 10mA</td>
</tr>
</tbody>
</table>

Fig. 18-1: Dielectric strength
19. Approvals And Fulfilled Standards

<table>
<thead>
<tr>
<th>Approval</th>
<th>Description</th>
</tr>
</thead>
</table>
| IEC 62368-1 | CB Scheme Certificate  
IEC 62368-1 - Audio/video, information and communication technology equipment - Safety requirements  
Output safety level: ES1 |
| IEC 61010 | CB Scheme Certificate  
IEC 61010-2-201 - Electrical Equipment for Measurement, Control and Laboratory Use - Particular requirements for control equipment |
| IEC 60950-1 | Manufacturers Declaration  
IEC 60950-1 - General safety requirements for Information Technology Equipment (ITE) |
| UL 61010 | UL Certificate  
Listed equipment for category NMTR - UL 61010-2-201 - Electrical equipment for measurement, control and laboratory use - Particular requirements for control equipment  
Applicable for US and Canada  
E-File: E198865 |
| Semi F47 | Test Report  
Voltage Sag Immunity for Semiconductor Processing Equipment Tested for AC 400V L-L mains voltages, nominal output voltage and nominal output load |
| VDMA 24364 | 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 |

20. Regulatory Compliance

<table>
<thead>
<tr>
<th>Directive</th>
<th>Description</th>
</tr>
</thead>
</table>
| EU Declaration of Conformity | Trade conformity assessment for Europe  
The CE mark indicates conformance with the European  
- EMC directive  
- Low-voltage directive (LVD)  
- RoHS directive |
| WEEE Directive | Manufacturer’s Statement  
EU-Regulation on Waste Electrical and Electronic Equipment Registered in Germany as business to business (B2B) products. |
| REACH Directive | Manufacturer’s Statement  
EU-Regulation regarding the Registration, Evaluation, Authorisation and Restriction of Chemicals |
| RoHS-China | Manufacturer’s Statement  
Administrative Measures for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products 25 years |
| IEC/EN 61558-2-16 (Annex BB) | Safety Isolating Transformer  
Safety Isolating Transformers corresponding to Part 2-6 of the IEC/EN 61558 |

All parameters are specified at 24V, 12.5A, 230Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.
21. Accessories

21.1. DIN RAIL Mounting KIT: ZM.FP-DIN2

In addition to screw mounting FIEPOS has the option to be simply attached to a DIN rail.

- DIN-Rail not included
- DIN-Fixture pre-assembled

21.2. Connectors

FIEPOS features a large number of different connectors. Mating connectors can be ordered at PULS from stock in order to be able to supply customers quickly in the design-in phase.

For a higher number of pieces or other options use www.harting.com.

<table>
<thead>
<tr>
<th>Connector Name</th>
<th>Order number</th>
<th>Connector Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harting HanQ4/2</td>
<td>ZCF.hanq42</td>
<td>Q4/2 Set AS female 2.5-6mm² 7-13mm</td>
</tr>
<tr>
<td>Harting HanQ4/2</td>
<td>ZCF.hanq42-1</td>
<td>Q4/2 Set AS female 2.5-6mm² 14-17mm</td>
</tr>
<tr>
<td>Harting HanQ2/0</td>
<td>ZCM.hanq20</td>
<td>Q2/0 Set screw male 2.5-6mm² 6-12mm</td>
</tr>
<tr>
<td>Harting HanQ4/0</td>
<td>ZCM.hanq40</td>
<td>Q4/0 Set 1m cable 2.5mm² IP67</td>
</tr>
<tr>
<td>Harting HanQ5/0</td>
<td>ZCF.hanq50</td>
<td>Q5/0 Set QuickLock female 0.5-2.5mm² 6-12mm</td>
</tr>
<tr>
<td>Harting M12-A</td>
<td>ZCF.m12a5p</td>
<td>M12-A Spin cut clamp female 0.34-0.5mm² / 6-8mm</td>
</tr>
<tr>
<td>Harting M12-A</td>
<td>ZCM.m12a5p</td>
<td>M12-A Spin cut clamp male 0.34-0.5mm² / 6-8mm</td>
</tr>
<tr>
<td>Harting M12-S</td>
<td>ZCM.m12s4p</td>
<td>M12-S 4pin screw female 2.5mm² / 6-8mm</td>
</tr>
<tr>
<td>Harting M12-L</td>
<td>ZCM.m12l5p</td>
<td>M12-L 5pin cut clamp male 0.75-1.5mm² / 5.8-13.5mm</td>
</tr>
<tr>
<td>Harting M12-T</td>
<td>ZCM.m12t4p</td>
<td>M12-T 4pin screw male 1.5mm² / 8-10mm</td>
</tr>
<tr>
<td>Harting 7/8&quot;</td>
<td>ZCM.78inch4p</td>
<td>7/8&quot; 4pin screw male 1.5mm² / 6-8mm</td>
</tr>
<tr>
<td>Harting 7/8&quot;</td>
<td>ZCF.78inch3p</td>
<td>7/8&quot; 3pin screw female 1.5mm² / 6-8mm</td>
</tr>
<tr>
<td>Harting 7/8&quot;</td>
<td>ZCF.78inch5p</td>
<td>7/8&quot; 5pin screw female 0.75-1.5mm² / 6.8-12.5mm</td>
</tr>
</tbody>
</table>
22. Related Products

The FIEPOS product family includes various devices with different technical parameters and features. The following page provides a general overview of the available solutions. Please also get in touch with your PULS contact person, for more detailed application advice and technical information.

FPT300.242-008-103:
Power Supply similar to FPT300.242-008-102 but with protection grade IP65/67 and without mounting braked.

### SHORT-FORM DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage</td>
<td>DC 24V</td>
</tr>
<tr>
<td>Adjustment range</td>
<td>Nominal</td>
</tr>
<tr>
<td>Output power</td>
<td>Continuous:</td>
</tr>
<tr>
<td></td>
<td>300W</td>
</tr>
<tr>
<td></td>
<td>Up to +55°C ambient</td>
</tr>
<tr>
<td></td>
<td>150W</td>
</tr>
<tr>
<td></td>
<td>At +70°C ambient</td>
</tr>
<tr>
<td>Short-term, up to:</td>
<td>450W / 60s</td>
</tr>
<tr>
<td></td>
<td>Up to +55°C ambient</td>
</tr>
<tr>
<td></td>
<td>600W / 1s</td>
</tr>
<tr>
<td></td>
<td>At +70°C ambient</td>
</tr>
<tr>
<td></td>
<td>Derate linearly between +55°C to +70°C</td>
</tr>
<tr>
<td>Protection Grade</td>
<td>IP65/67</td>
</tr>
</tbody>
</table>

FPT300.241-002-101:
Power Supply with HAN connectors on in- and output and protection grade IP65/67.

### SHORT-FORM DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Output voltage</td>
<td>DC 24V</td>
</tr>
<tr>
<td>Adjustment range</td>
<td>Nominal</td>
</tr>
<tr>
<td>Output power</td>
<td>Continuous:</td>
</tr>
<tr>
<td></td>
<td>300W</td>
</tr>
<tr>
<td></td>
<td>Up to +55°C ambient</td>
</tr>
<tr>
<td></td>
<td>150W</td>
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</tr>
</tbody>
</table>

HANQ4/2 input and HANQ4/0 output connectors

All parameters are specified at 24V, 12.5A, 230Vac, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.
23. Application Notes

23.1. Repetitive Pulse Loading

Typically, a load current is not constant and varies over time. This power supply is designed to support loads with a higher short-term power demand (=BonusPower®). The short-term duration is hardware controlled by an output power manager and is available on a repeated basis. If the average load is higher than the nominal output power, the output voltage will dip.

To avoid this, the following rules must be met:
   a) The power demand of the pulse must be below 200% of the nominal output power.
   b) The duration of the pulse power must be shorter than the allowed BonusPower® time. (see output section)
   c) The average power should be lower than the nominal output power.

The R.M.S. output current must be below the specified continuous output current. If the R.M.S. current is higher, the unit will respond with a thermal shut-down after a period of time.

23.2. External Input Protection

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

23.3. Inductive and Capacitive Loads

The unit is designed to supply any kind of loads, including capacitive and inductive loads. If extreme large capacitors, such as EDLCs (electric double layer capacitors or “UltraCaps”) with a capacitance larger than 100mF are connected to the output, the unit might charge the capacitor in the HiccupPLUS mode (see chapter).

23.4. Two Phases Operation

No external protection devices are required to protect against a phase-loss.

Continuous two phase operation is not recommended for this power class since the supplying 3-phase network could become unbalanced. However, if one phase fails, the unit may continue to operate if the load is below the power limit shown in Fig. 24-1.

Exceeding of these limits for an extended period may result in a thermal shut-down of the unit.

During power-on, some start-up attempts can occur until a permanent output power is available. EMC performance, hold-up time, losses, and output ripple differ from a three phase operation. Such use is not included in the approval according to UL61010 and IEC62368.

Fig. 23-1: Two phase power capability
23.5. Back Feeding Loads

Loads such as decelerating motors and inductors can feed voltage back to the power supply. This feature is also called return voltage immunity or resistance against Back- E.M.F. (Electro Magnetic Force).

This power supply 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.

23.6. Mounting Orientations

The device can be mounted in various mounting orientations. 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 power in different mounting orientations for altitudes up to 2000m (6560ft).

![Standard Orientation diagram]

- Standard Orientation
- Upside down
- Horizontal cw and ccw
- Over-head and Table-top mounting

![Output Power curve graph]