Power Supply, Primary Switch Mode, Narrow Design
MINI-PS-100-240AC/24DC/2

MINI POWER provides:
• Extra narrow widths of 22.5 and 45 mm (0.886 and 1.772 in.)
• Global use due to a wide range input
• A high level of operational safety in complex global networks
• Reliable start up of heavy loads due to POWER BOOST

The reliability of a power supply determines the availability of individual components in a system and whether complex systems can function safely.
The globalization of markets increases the demands placed on the power supply. A wide range input and a high level of availability are required. These requirements are met by MINI POWER.

1. Brief Description

MINI POWER is the extra narrow power supply, which is available in widths of 22.5 and 45 mm (0.886 and 1.772 in.).
In addition to a 24 V version with output currents of 0.65 A and 2 A, special voltages are also available with 5 V/3 A and +/-15 V/1 A.
The POWER BOOST - a power reserve of up to 100% - ensures a reliable start of difficult loads.
The high level of operational safety is also ensured in complex global networks. MINI POWER also operates in applications where static voltage dips, transient power supply failures or phase failure are common.
Large capacitors ensure mains buffering of more than 20 ms at full load.

2. Area of Application

MINI POWER can be used globally due to the consistent conversion of a wide range input.
In this way, your entire system can be tested at any production location in the world and can be delivered to any location in the world without faulty switching of the input voltage. This reduces storage costs and logistical effort.
An international approval package including UL 60950 for IT equipment and UL 508 for industrial control equipment enables the device to be used globally.
3. Technical Data

### Technical Data

#### Input Data
1. **Nominal input voltage**
2. **Input voltage range**
3. **Frequency**
4. **Current consumption (I t (+25°C [+77 °F]))**
5. **Mains buffering for a nominal load (typical)**
6. **Switch-on time after applying the AC supply voltage**
7. **Transient surge protection**
8. **Input fuse, internal**
9. **Recommended fuse**

#### Output Data
1. **Nominal output voltage (U N/tolerance)**
2. **Setting range for the output voltage**
3. **Output current during convection cooling and nominal values**
4. **POWER BOOST (t = 2, minutes [typical])**
5. **Nominal output current I N (-25°C to +60°C [-13°F to +140°F])**
6. **Derating**
7. **Short-circuit current limit**
8. **Startup of capacitive loads**
9. **System deviation on: Load change static 10 - 90%**
10. **Load change dynamic 10 - 90%**
11. **Input voltage change ±10%**
12. **Maximum power loss No load/nominal load**
13. **Level of efficiency (typical) **
14. **Response time (U OUT (10% - 90%))**
15. **Residual ripple/switching peaks (20 MHz)**
16. **Can be connected in parallel**
17. **Internal surge protection**
18. **Resistance to return supply**

#### Signal Output Data
- **DC OK (active) (U OUT > 0.9 x U N = high signal)**
- **LED (U OUT > 21.5 V DC = LED permanently on)**

### MINI-PS-100-240AC/24DC/2

- **Type**: MINI-PS-100-240AC/24DC/2
- **Order No.**: 2938730
- **Pos. Pkt.**: 1

### Specifications
- **Power Supply, Primary Switch Mode, Narrow Design**
- **Input voltage range**: 85 - 264 V AC (0.82-0.33 A) / 90 - 350 V DC (0.65-0.19 A)
- **Frequency**: 45 - 65 Hz / 0 Hz
- **Current consumption**: 1.4 A (120 V AC) - 0.8 A (230 V AC), approximately
- **Mains buffering**: > 20 ms (120 V AC) / > 100 ms (230 V AC)
- **Switch-on time**: < 1 s
- **Varistor**: 2.5 AT (device protection)
- **Circuit breaker**: 10 A or 16 A Characteristic B (EN 60 898)
- **Output voltage**: 24 V DC/±1% / 22.5 - 28.5 V DC
- **Output current**: Up to 4 A (U OUT = 24 V DC) / 2 A (U OUT = 24 V DC)
- **Power loss**: 2 W/10W (for 230 V AC and nominal values)
- **Response time**: < 100 ms, typical / < 100 mVpp (for nominal values)
- **Resistance to return supply**: 30 V DC
- **Green LED**: +24 V signal/20 mA, maximum
### General Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation voltage: Input/output</td>
<td>4 kV AC (type test)/3 kV AC (routine test)</td>
</tr>
<tr>
<td>Approval package</td>
<td>EN 61 558-2-17</td>
</tr>
<tr>
<td>Safety transformers for switched-mode power supplies</td>
<td>EN 60950/VDE 0805</td>
</tr>
<tr>
<td>Electrical safety (of IT equipment)</td>
<td>UL/C-UL Recognized UL 60 950</td>
</tr>
<tr>
<td>Industrial control equipment</td>
<td>EN 50 178/VDE 0160 (Surge Voltage Category III)</td>
</tr>
<tr>
<td>Equipping high voltage installations with electronic equipment</td>
<td>SELV (EN 60 950)</td>
</tr>
<tr>
<td>Safety extra-low voltage</td>
<td>VDE 0100-410</td>
</tr>
<tr>
<td>Safe isolation</td>
<td>DIN VDE 0106-101</td>
</tr>
<tr>
<td>Protection against dangerous shock currents, basic requirements for safe isolation in electrical equipment</td>
<td>According to EN 61000-3-2</td>
</tr>
<tr>
<td>Limitation of harmonic line currents</td>
<td>On horizontal NS 35 DIN rail according to EN 50022</td>
</tr>
</tbody>
</table>

### Mounting position
- Can be mounted with spacing: Vertical - Horizontal

### Degree of protection
- Class of protection: IP 20
- (in closed control cabinets) > 500 000 h according to IEC 1709 (SN 29 500)

### Housing version
- Polyamide PA, color green

### Dimensions (W x H x D)
- (45 x 99 x 114.5 mm [1.722 x 3.898 x 4.508 in.])
- Weight: 0.25 kg, approximately

### Climatic Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature: Operation</td>
<td>-25°C to +70°C (-13°F to +158°F) (&gt; +60°C [+140°F] derating)</td>
</tr>
<tr>
<td>Humidity</td>
<td>up to 95% at +25°C (+77°F), no condensation</td>
</tr>
<tr>
<td>Vibration according to IEC 68-2-6</td>
<td>&lt; 15 Hz, amplitude ±2.5 mm/15 Hz - 150 Hz, 2.3 g</td>
</tr>
<tr>
<td>Shock according to IEC 68-2-27</td>
<td>30 g all space directions</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>2 (according to EN 50 178) 3K3 (according to EN 60 721)</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge (ESD)</td>
<td>EN 61 000-6-2 MINI-PS-100-240AC/2</td>
</tr>
<tr>
<td>Electromagnetic HF field</td>
<td>Level 3</td>
</tr>
<tr>
<td>Fast transients (burst)</td>
<td>2 kV asymmetrical, 4 kV (Level 4)</td>
</tr>
<tr>
<td>Surge current loads</td>
<td>2 kV asymmetrical, 2 kV (Level 3)</td>
</tr>
<tr>
<td>Conducted interference</td>
<td>0.5 V, 0.15 - 80 MHz</td>
</tr>
<tr>
<td>Voltage dips</td>
<td>30% reduction of the input voltage for 0.5 periods</td>
</tr>
</tbody>
</table>

### Noise Emission According to EN 50081-2:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio interference</td>
<td>EN 55011</td>
</tr>
<tr>
<td>Radio interference</td>
<td>EN 55011</td>
</tr>
<tr>
<td>EN 55011 corresponds to CISPR11/EN 55022 corresponds to CISPR22</td>
<td>EN 61000 corresponds to IEC 1000</td>
</tr>
</tbody>
</table>

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2) Criterion A: Normal operating characteristics within the specified limits.
3) Criterion B: Temporary adverse effects on the operating characteristics that the device corrects independently.
4. Device View, Connections, and Control Elements

![Diagram of MINI POWER](image)

1. **AC input:**
   - Input voltage 85 - 264 V AC
   - Frequency 45 - 65 Hz
   - (0.2 mm² to 2.5 mm² solid)
   - (0.2 mm² to 2.5 mm² flexible)
   - (24 - 14 AWG)
   - Internal fuse 2.5 AT
   - Recommended fuse 10 A or 16 A c.b./Characteristic B

2. **DC output:**
   - Output voltage 24 V DC (default), can be set from 22.5 - 28.5 V DC using a potentiometer
   - (0.2 mm² to 2.5 mm² solid)
   - (0.2 mm² to 2.5 mm² flexible) (AWG 24 - 14)
   - The device is idling-proof and short-circuit-proof.

3. **DC OK output active**

4. **Potentiometer 22.5 - 28.5 V DC**

5. **DC OK LED**

6. **Universal latching foot for EN DIN rails**

5. Safety and Warning Instructions

To ensure safe operation of the device and that all functions can be used, please read these instructions carefully.

![Caution](image)

**Installation and startup** must only be carried out by qualified personnel. The relevant country-specific regulations (e.g., VDE, DIN) must also be observed.

Before startup it is particularly important to ensure that:

- The line has been connected correctly and protection is provided against electric shock.
- The device can be switched off outside the power supply according to EN 60950 regulations (e.g., by the line protection on the primary side).
- All supply lines have sufficient fuse protection and are the correct size.
- All output cables are the correct size for the maximum device output current or have separate fuse protection.
- Sufficient convection is ensured.

MINI POWER is a built-in device. After installation the terminal area must be covered to provide sufficient protection against unauthorized access to live parts. This is ensured by installing the device in the control cabinet or distributor box.

The device contains dangerous live components and high levels of stored energy.
6. Installation

6.1. Mounting

The power supply can be snapped onto all DIN rails according to EN 50022-35. The device must be mounted horizontally (input terminals facing downwards).

Installation Dimensions

![Figure 05](image)

To ensure sufficient convection, we recommend the following minimum spacing be used between modules:

8.0 cm (3.150 in.) for vertical installation

![Figure 06](image)

![Figure 07](image)

Mounting:

Place the module with the DIN rail guideway on the top edge of the DIN rail and then snap it downwards.

Removal:

Release the snap-on catch using a screwdriver and then detach the module from the bottom edge of the DIN rail.
6.2. Connection of Various Types of Network: 100 - 240 V AC Networks

**Connection Cable:**

The device is equipped with COMBICON connectors. This reliable user-friendly connection method enables quick device connection and safe isolation of the electrical connection, if required. **Only operate connectors when the power is switched off.**

The following cable cross sections can be connected:

- **Solid:** mm²
- **Flexible:** mm²
- **AWG:**
- **Torque:** N

<table>
<thead>
<tr>
<th></th>
<th>Input:</th>
<th>Flexible</th>
<th>AWG</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.2 - 2.5</td>
<td>0.2 - 2.5</td>
<td>24 - 14</td>
<td>0.5 - 0.6</td>
</tr>
<tr>
<td>2</td>
<td>0.2 - 2.5</td>
<td>0.2 - 2.5</td>
<td>24 - 14</td>
<td>0.5 - 0.6</td>
</tr>
<tr>
<td>3</td>
<td>0.2 - 2.5</td>
<td>0.2 - 2.5</td>
<td>24 - 14</td>
<td>0.5 - 0.6</td>
</tr>
</tbody>
</table>

**For reliable and safe-to-touch connection:** Strip 8 mm (0.31 in.) from the connector ends.

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6.3. Input (①, Figure 9)

The 100 - 240 V AC connection is made using screw connections L and N.

**Protecting the Primary Side**

The device must be installed according to the specifications of EN 60 950. It must be possible to switch off the device using a suitable disconnecting device outside the power supply. For example, primary side line protection could be used.

Additional device protection is not required, as an internal fuse is present.

**Recommended Fuse:**

- Circuit breaker 10 A or 16 A, Characteristic B (or equivalent).
- A suitable fuse must be fitted for DC applications.
6.4. Output (2, Figure 9)

The 24 V DC connection is made using the "+" and "-" screw connections on the screw-cage connection (2). The output voltage set upon delivery is 24 V DC. The output voltage can be adjusted from 22.5 to 28.5 V DC on the potentiometer (4).

Protecting the Secondary Side:

The device is electronic short-circuit-proof and idling-proof. In the event of an error, the output voltage is limited to a maximum of 33 V DC.

It should be ensured that all output cables are the correct size for the maximum output current or have separate fuse protection.

The secondary side cables should have large cross sections to keep voltage drops on the cables to a minimum.

Active signal output (3, Figure 10)

The 24 V DC signal is between the "DC OK" and "-" connection terminals and can be loaded with 20 mA maximum. This signal output indicates that the output voltage has fallen below 21.5 V DC when "active high" changes to "low".

The DC OK signal is isolated from the power output. This ensures that a separate supply does not enter from devices connected in parallel.

The 24 V DC signal can be connected directly to the logic input for evaluation.

DC OK LED

The green DC OK LED enables local function evaluation in the control cabinet.

<table>
<thead>
<tr>
<th>LED on</th>
<th>Normal operation of the power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED off</td>
<td>a) The output voltage is ≤ 21.5 V DC.</td>
</tr>
<tr>
<td></td>
<td>There is a secondary load short circuit or overload outside the POWER BOOST area.</td>
</tr>
<tr>
<td></td>
<td>b) No AC supply voltage is present or there is a device fault.</td>
</tr>
</tbody>
</table>

7. Installation

7.1. Output Characteristic Curve

The device can supply up to 4 A at 24 V DC output voltage for a few minutes (P_{out} = 96 W).

With high loads, the working point demonstrates the U/I characteristic curve shown in Figure 11. The output current is limited to I_{BOOST}. The secondary voltage is reduced until the short circuit on the secondary side is removed.

The U/I characteristic curve ensures that both heavy capacitive loads and devices with DC/DC converters can be supplied by MINI POWER in the input circuit without any problems.

Connected fuses are reliably tripped. The selectivity in your system configuration is ensured at all times.
7.2. Temperature Response
At an ambient temperature of up to +60°C (+140°F) the device can supply a nominal current of 2 A. POWER BOOST is available for a few minutes. The output power must be decreased by 5% per Kelvin temperature increase for ambient temperatures over +60°C (+140°F).
At ambient temperatures over +70°C (+158°F) or in the event of a thermal overload, the device switches off to protect itself. The device switches on again once it has cooled down.

7.3. Parallel Operation
Devices of the same type can be connected in parallel to increase both redundancy and power. The default setting does not have to be adjusted.
If the output voltage is adjusted, an even current distribution can be ensured by precisely setting all power supplies that are operated in parallel to the same output voltage.
To ensure symmetrical current distribution we recommend that all cable connections from the power supply to the DIN rail are the same length and have the same cross section.
Depending on the system, for parallel connection of more than two power supplies a protective circuit should be installed at each individual device output (e.g., decoupling diode). This means that in the event of a secondary device fault high return currents are avoided.

7.4. Redundancy Operation
Redundant connections are designed for supplying systems, which place particularly high requirements on operational safety. If a fault occurs in the primary circuit of device no. 1, device no. 2 automatically takes over the complete power supply without interruption and vice versa.
For this purpose, the power supplies to be connected in parallel must be large enough that the total current requirements of all loads can be completely covered by one power supply. External decoupling diodes or DC fuse are required for 100% redundancy.

7.5. Power Increase
The output current can be increased to $n \times I_N$ where $n$ is the number of devices connected in parallel.
The parallel connection for power increase can be used to extend existing systems. A parallel connection is recommended if the power supply does not cover the current consumption of the most powerful load. Otherwise, the loads should be divided over independent individual devices.
A maximum of five devices can be connected in parallel.