

FOX6-XM

Switchmode power supply

MEDICAL

With interchangeable adapter system



Description

FRIWO's medical products are designed for the most sensitive applications and for use under the harshest conditions. They must continue to work perfectly despite falls in the emergency room while protecting patients by offering the lowest possible levels of leakage current. FRIWO develops and manufactures power supply units you can trust. In order to ensure maximum patient safety, FRIWO medical technology devices are equipped with its 2 x MOPP (Means of Patient Protection) safety system and feature a minimal leakage current of $\leq 10 \mu\text{A}$ as well as double-sealed housings.

The power supply will operate at universal input voltage range of 90Vac to 264Vac in a wide temperature range of 0-45°C without derating. In addition to patient safety, efficiency plays a major role: with low standby losses of 50mW and high efficiency rates the medical FOX line complies with the demanding US efficiency standard DOE (Department of Energy) and its European counterpart ErP (Energy related Products).

Another particular highlight of the FOX product family is its interchangeable adapter system with IP42 protection (against drops of water and dampness), which is available as an optional accessory. In practice, this means that the devices can be cleaned using wet cloths – an invaluable advantage in sterile environments. FRIWO's additional features make its products easier to use, day in, day out.

Features

- High efficiency: up to 81.6 %
- Low no load power consumption < 95 mW
- Meets DoE efficiency level VI
- CoC version 5 ready
- Ultra-low leakage current $\leq 10 \mu\text{A}$
- IEC 60601-1-2, 4th edition ready
- Wide operating temperature range 0 - 45°C
- Isolation 2x MOPP
- Double housing safety: snapped & welded
- IP42 approved interchangeable plug system as additional accessories
- Also available as version with fixed plugs: FOX6-FM

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Model Selection: Output Specifications

| Article no. | FW Type | Voltage | Current | Power | Ripple voltage* | Efficiency (typ) | No-Load Power |
|-------------|------------|---------|---------|--------|-----------------|------------------|---------------|
| 1898096 | FW8002M/5 | 5 V | 1400 mA | 7.0 W | 180 mV pp | 76.5 % | < 50 mW |
| 189897 | FW8002M/6 | 5.9 V | 1200 mA | 7.08 W | 150 mV pp | 76.2 % | < 50 mW |
| 1898098 | FW8002M/8 | 7.5 V | 800 mA | 6.0 W | 150 mV pp | 78.8 % | < 50 mW |
| 1898099 | FW8002M/9 | 9 V | 800 mA | 7.2 W | 150 mV pp | 80.1 % | < 50 mW |
| 1898100 | FW8002M/12 | 12 V | 600 mA | 7.2 W | 200 mV pp | 81.6 % | < 50 mW |
| 1898101 | FW8002M/15 | 15 V | 500 mA | 7.5 W | 200 mV pp | 80.5 % | < 75 mW |
| 1898102 | FW8002M/18 | 18 V | 400 mA | 7.2 W | 180 mV pp | 80.3 % | < 90 mW |
| 1898103 | FW8002M/24 | 24 V | 300 mA | 7.2 W | 240 mV pp | 81.1 % | < 95 mW |
| 1898105 | FW8002M/48 | 48 V | 125 mA | 6.0 W | 480 mV pp | 79.2 % | < 95 mW |

* Ripple measured with 20MHz Bandwidth Oscilloscope and 0.1uF/50V ceramic capacitor and 10uF/50V aluminum electrolytic capacitor across the output terminal.

| Input Specifications | | General Specifications | |
|--------------------------------|-----------------|---------------------------------|--|
| Input voltage | 100-240 V ±10 % | Operating temperature | 0..+45 °C |
| Frequency | 50-60 Hz | Operating humidity | 10..95 % |
| Input current | 160-80 mA | Operating altitude | 3000 m |
| Inrush current (@240 V) | < 35 A | Storage temperature | -40 °C..+70 °C |
| | | Storage humidity | 10..95 % |
| | | Non-operating altitude | 3000 m |
| | | Atmospheric pressure | 70-106 kPa |
| | | Output voltage tolerance | ±5 % |
| | | Line regulation | ±1 % |
| | | Load regulation | ±4 % |
| | | Turn-on delay | ≤ 2 s |
| | | Hold-up time | > 5 ms (120 V) > 50 ms (230 V) |
| | | MTBF calculation | 200.000 h acc. Mil217F ⁽¹⁾ |
| | | Housing material | PC-ABS |
| | | Dimensions | 58x31.5x41 mm |
| | | Weight | 112 g |
| | | AC input | see page 5 ⁽²⁾ |
| | | DC output | see page 6 ⁽³⁾ |

(1): based on calculations at 120 Vac/ 60 Hz & 230 Vac/ 50 Hz, ambient 25 °C and 100 % load

(2): FRIWO interchangeable mains plug system: see Primary Adapters

(3): FRIWO Universal output plug system: see Secondary Adapters

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Safety

| | | | |
|-------------------------|--|---------------------------------|---|
| Safety standards | IEC/EN/UL60601-1 3.1 Edition | Flame class | UL 94 V0 |
| Approbations | Europe, USA, Australia, Japan | IP code | IP40 (IP42 adapters optionally available) |
| Protection class | II | Overload protection | Yes |
| Isolation | Input-Output 2x MOPP, Input-Ground 1x MOPP | Overvoltage protection | Yes |
| Leakage Current | ≤ 10 µA | Short circuit protection | Yes |

EMC Compliance

| | | | | | |
|--|---|--------------|------------------|------------------|------------------|
| Conducted and radiated Emmissions | EN55022, EN55011, FCC15, Class B, EN60601-1-2 | | | | |
| Immunity | EN55024, EN60601-1-2 | | | | |
| Harmonics | EN61000-3-2 | Class A | | | |
| Flicker noise | EN61000-3-3 | Yes | | | |
| ESD (contact / air) | EN61000-4-2 | 8 kV / 15 kV | Criteria B 100 V | Criteria B 240 V | |
| Immunity against radiated field | EN61000-4-3 | 10 V/m | Criteria A 100 V | Criteria A 240 V | |
| ETF / Burst | EN61000-4-4 | 2 kV | Criteria B 100 V | Criteria B 240 V | |
| Surge | EN61000-4-5 | 1 kV / 2 kV | Criteria B 100 V | Criteria B 240 V | |
| Immunity against conducted disturbances | EN61000-4-6 | 10 V | Criteria A 100 V | Criteria A 240 V | |
| Voltage dips | EN61000-4-11 | 0 % | 0.5 Cycle | Criteria B 100 V | Criteria A 240 V |
| | | 40 % | 5 Cycle | Criteria B 100 V | Criteria A 240 V |
| | | 70 % | 25 Cycle | Criteria B 100 V | Criteria A 240 V |
| | | 0 % | 5 s | Criteria B 100 V | Criteria B 240 V |
| Immunity against magnetic field | EN61000-4-8 | 30 A/m | Criteria A 100 V | Criteria A 240 V | |

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| Drop Test | | Vibration | |
|--------------------------|----------------|------------------------|---------------|
| Standard | IEC 60068-2-32 | Standard | IEC 60068-2-6 |
| Surface | Steel | Frequency range | 10–500 Hz |
| Drop height | 1 m | Cross-over-frequency | 58–62 Hz |
| Numbers of Drops (total) | 3 | Displacement amplitude | 0.2 mm |
| | | Peak acceleration | 3 g |
| | | Number of cycles | 10 per axis |

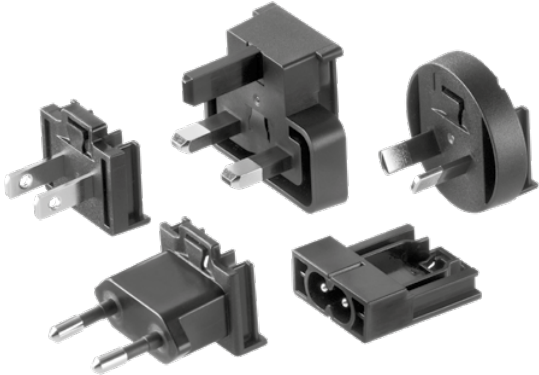
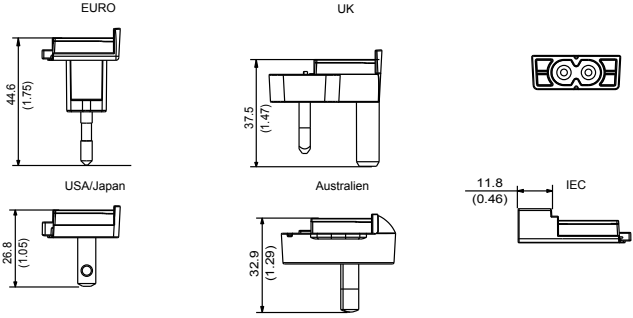
| Mechanical Drawings | Output Characteristics |
|---|---|
| <p>Alle Abmessungen in Millimeter (Inch), Abweichung ± 0,5 (0.02) All Dimensions in Millimeter (Inch), Deviation ± 0,5 (0.02)</p> | <p>Alle Abmessungen in Millimeter (Inch), Abweichung ± 0,5 (0.02) All Dimensions in Millimeter (Inch), Deviation ± 0,5 (0.02)</p> |

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| Primary Adapters | Mechanical Drawings |
|--|--|
|  |  <p>Alle Abmessungen in Millimeter (Inch), Abweichung ± 0,5 (0.02) All Dimensions in Millimeter (Inch), Deviation ± 0,5 (0.02)</p> |

| FOX | IPx0 | IPx2 | FOX | IPx0 | IPx2 | FOX | IPx0 | IPx2 |
|-----------|-------------|-------------|---------|-------------|-------------|-------------|-------------|-------------|
| Country | Article no. | Article no. | Country | Article no. | Article no. | Country | Article no. | Article no. |
| EURO | 1847556 | 1847618 | IEC | 1847552 | – | IND 2-polig | 1847547 | – |
| UK | 1847544 | 1847606 | ARG | 1847548 | – | IND 3-polig | 1847546 | – |
| USA / JPN | 1847554 | 1847604 | BRA | 1847551 | – | KOR | 1847545 | – |
| AUS | 1847553 | 1847624 | CHN | 1847550 | – | ZAF | 1847549 | – |

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Secondary Adapters

| Straight coaxial connectors | | | | Angled coaxial connectors | | | |
|-----------------------------|-------|-----------|-------------|---------------------------|-------|-----------|-------------|
| Ø out. | Ø in. | Length mm | Article no. | Ø out. | Ø in. | Length mm | Article no. |
| 3.5 | 1.3 | 9.5 | 1807699 | 3.5 | 1.3 | 9.5 | 1822478 |
| 4.0 | 1.7 | 9.5 | 1822557 | 4.0 | 1.7 | 9.5 | 1822558 |
| 4.0 | 1.7 | 11.0 | 1811994 | 4.0 | 1.7 | 11.0 | 1822482 |
| 4.8 | 1.7 | 9.5 | 1822559 | 4.8 | 1.7 | 9.5 | 1822560 |
| 5.5 | 2.1 | 9.5 | 1807700 | 5.5 | 2.1 | 9.5 | 1822479 |
| 5.5 | 2.1 | 11.5 | 1807701 | 5.5 | 2.1 | 11.5 | 1822480 |
| 5.5 | 2.1 | 14.0 | 1807697 | 5.5 | 2.1 | 14.0 | 1822476 |
| 5.5 | 2.5 | 9.5 | 1807698 | 5.5 | 2.5 | 9.5 | 1822477 |
| 5.5 | 2.5 | 11.5 | 1807702 | 5.5 | 2.5 | 11.5 | 1822481 |
| 5.5 | 3.3 | 9.5 | 1822561 | 5.5 | 3.3 | 9.5 | 1822562 |
| DIN 45323 | | | 1807703 | DIN 45323 | | | 1822483 |

| Straight jack connectors | | | Angled jack connectors | | |
|--------------------------|-----------|-------------|------------------------|-----------|-------------|
| Ø out. | Length mm | Article no. | Ø out. | Length mm | Article no. |
| 2.5 | 13 | 1807704 | 2.5 | 13 | 1822484 |
| 3.5 | 14 | 1807705 | 3.5 | 14 | 1822485 |

| Connectors / Sockets | | | | | |
|--------------------------|-------------|---------------------|-------------|---------------------|-------------|
| Model | Article no. | Model | Article no. | Model | Article no. |
| Texas connector | | Texas sockets 2-pin | | Texas sockets 3-pin | |
| Straight texas connector | 1807706 | Snap-in type | 1323938 | Snap-in type | 1327259 |
| Angled texas connector | 1822486 | PCB type | 1321609 | PCB type | 1363506 |