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# Power unlimited



**Distribution Handbook**



Distribution Handbook

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# Company & Products



IT-Communication

Medical equipment

Consumer

Industrial equipment

## **FRIWO – power unlimited Power supplies for all applications**

FRIWO develops and produces power supplies and chargers which correspond to various technical and country specific requirements.

FRIWO Gerätebau GmbH, wholly-owned subsidiary of CEAG AG, being listed in the SDax, is the world's leading supplier of chargers and power supplies. As a global player the CEAG group is present in all the world's markets with a global sales and distribution network, and above all in those areas where you need us.

FRIWO develops and produces power supplies and chargers which correspond to various technical and country specific requirements. FRIWO has laid the foundation stone for the present market success with the launch of the first plug power supply in 1971 and is a noted leader of power supply and charger technology throughout the world.

FRIWO is continually extending its leading position in the power supply field by means of the consistent, technological advancement of the products coupled with an innovative design.

## **FRIWO delivers state-of-the-art power supplies and chargers in line with its strategic business units**

### **For the four customer segments:**

IT-Communication  
Medical equipment  
Consumer  
Industrial equipment

Switchmode Power Supplies

PP 3

Conforms to IEC 60950

3 Watt



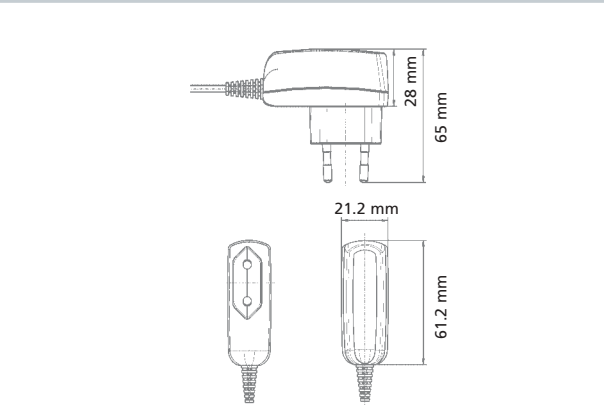
PP 3 USA/EURO

Applications

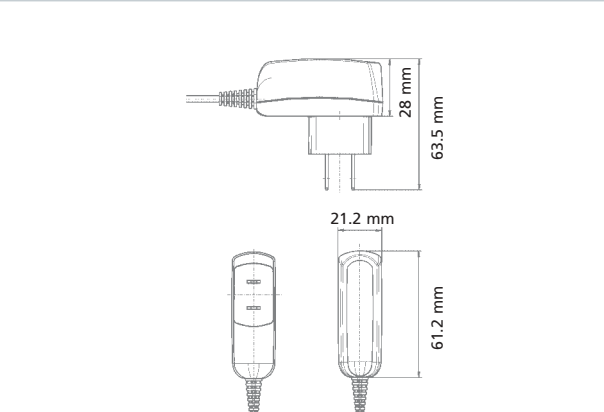
Telecom applications  
Portable instruments peripherals

Characteristics

Universal input 100 - 240 V AC  
Constant voltage current limited  
Low leakage current < 10  $\mu$ A  
Low standby power  $\leq$  0.3 Watt



PP 3 EURO



PP 3 USA

Technical data

**Input voltage** 100 - 240 V  
**Input current** 85 mA  
**Frequency** 50 - 60 Hz  
**Efficiency** 75% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
**Output voltage tolerance**  $\pm$  5%

Environmental specification

**Operating temp.** 0  $^{\circ}$ C to 40  $^{\circ}$ C at maximum load  
**Storage temp.** -40  $^{\circ}$ C to 85  $^{\circ}$ C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

Safety specification

**Standards** Fulfills Class II SELV for the following applications: EN 60950/IEC 60950, VDE, CE label,

Reliability specification

**MTBF calculation** 200,000 hours at maximum load levels and an ambient temperature of 25  $^{\circ}$ C (in correspondence with MIL-HDBK-217)

Mechanical specification

**Weight** 60 g  
**Plug connector** AC input: Mains plugs are available for the following countries: EURO, USA  
DC output: Universal output plug system

| Output data |         | EURO     |           | USA      |           |
|-------------|---------|----------|-----------|----------|-----------|
| Voltage     | Current | Part No. | Order No. | Part No. | Order No. |
| 5 V         | 600 mA  | 15.1291  | 1882750   | 15.1301  | 1882760   |
| 12 V        | 250 mA  | 15.1294  | 1882753   | 15.1304  | 1882763   |

# Switchmode Power Supplies

## PP 6

Conforms to IEC 60950

6 Watt



PP 6 EURO



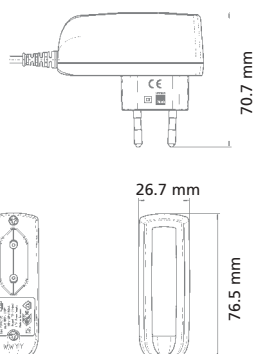
PP 6 USA

### Applications

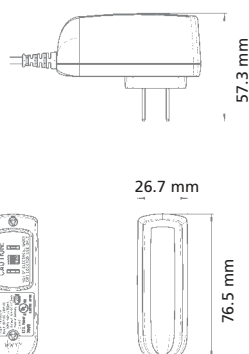
Modems  
Portable battery operated equipment  
Household appliances  
Communication accessories

### Characteristics

Universal input 100 - 240 V AC  
EMC conformity  
Constant voltage, current limited  
Light weight, compact size  
Low leakage current  $< 10 \mu\text{A}$   
Low standby power  $\leq 0.3 \text{ Watt}$



PP 6 EURO



PP 6 USA

### Technical data

**Input voltage** 100 V AC - 240 V AC  
**Input current** 0.15 A  
**Frequency** 50 - 60 Hz  
**Efficiency** 75% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6

### Output voltage tolerance

$\pm 5\%$

### Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 85 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

### Safety specification

**Standards** Fulfills Class II SELV for the following applications: EN 60950/IEC 60950, VDE, CE label, UL 60950

### Reliability specification

**MTBF calculation** 200,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

### Mechanical specification

**Weight** 70 g  
**Plug connector** AC input: Mains plugs are available for the following countries: EURO, USA  
DC output: Universal output plug system

### Output data

| Voltage | Current | Ripple volt. | EURO     |           | USA      |           |
|---------|---------|--------------|----------|-----------|----------|-----------|
|         |         |              | Part No. | Order No. | Part No. | Order No. |
| 3 V     | 1300 mA | 300 mV pp    | 15.1614  | 1883765   | 15.1616  | 1883767   |
| 5 V     | 1000 mA | 200 mV pp    | 15.1028  | 1882105   | 15.1583  | 1814934   |
| 6 V     | 850 mA  | 180 mV pp    | 15.1029  | 1882106   | 15.1584  | 1814935   |
| 7.5 V   | 650 mA  | 150 mV pp    | 15.1030  | 1882107   | 15.1585  | 1814936   |
| 9 V     | 550 mA  | 150 mV pp    | 15.1031  | 1882108   | 15.1586  | 1814937   |
| 12 V    | 450 mA  | 150 mV pp    | 15.1032  | 1882109   | 15.1587  | 1814938   |
| 15 V    | 360 mA  | 150 mV pp    | 15.1033  | 1882110   | 15.1588  | 1814939   |
| 18 V    | 300 mA  | 150 mV pp    | 15.1034  | 1882111   | 15.1589  | 1814940   |
| 24 V    | 220 mA  | 150 mV pp    | 15.1035  | 1882112   | 15.1590  | 1814941   |

# Switchmode Power Supplies

## PP 8

Conforms to IEC 60950

8 Watt



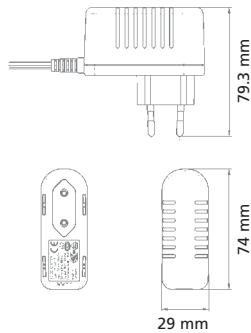
PP 8

### Applications

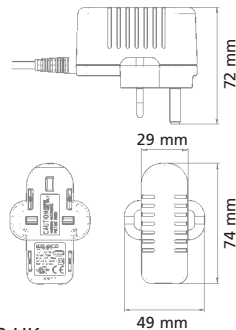
IT equipment  
Measurement and weighing technology  
Laser and lighting technology  
Security technology / camera technology  
Office and data transmission appliances

### Characteristics

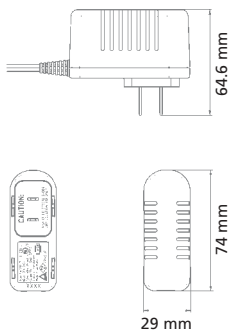
Universal input 100 - 240 V AC  
EMC conformity  
High performance  
Constant voltage, current limited  
Light weight, compact size  
Low leakage current < 10  $\mu$ A  
Low standby power  $\leq$  0.3 Watt



PP 8 EURO



PP 8 UK



PP 8 USA

### Technical data

**Input voltage** 100 V AC - 240 V AC  
**Input current** 0.17 A at 115 V AC / 0.08 A at 230 V AC  
**Frequency** 50 - 60 Hz  
**Efficiency** 70% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
 $\pm$  5% at full load

### Output voltage tolerance

### Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 70 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

### Safety specification

**Standards** Fulfills Class II SELV for the following applications: IEC 60950, UL 60950, VDE, CE label

### Reliability specification

**MTBF calculation** 200,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

### Mechanical specification

**Weight** 70 g  
**Plug connector** AC input: Mains plugs are available for the following countries: EURO, UK, USA/Japan  
DC output: Universal output plug system

| Output data |         |              | EURO     |           | UK       |           | USA      |           |
|-------------|---------|--------------|----------|-----------|----------|-----------|----------|-----------|
| Voltage     | Current | Ripple volt. | Part No. | Order No. | Part No. | Order No. | Part No. | Order No. |
| 3 V         | 1700 mA | 300 mV pp    | 15.1617  | 1819725   | 15.1618  | 1819726   | 15.1619  | 1819727   |
| 5 V         | 1300 mA | 200 mV pp    | 15.1530  | 1814804   | 15.1543  | 1814894   | 15.1551  | 1814902   |
| 6 V         | 1150 mA | 180 mV pp    | 15.1531  | 1814805   | 15.1544  | 1814895   | 15.1552  | 1814903   |
| 7.5 V       | 900 mA  | 150 mV pp    | 15.1532  | 1814806   | 15.1545  | 1814896   | 15.1553  | 1814904   |
| 9 V         | 800 mA  | 150 mV pp    | 15.1533  | 1814807   | 15.1546  | 1814897   | 15.1554  | 1814905   |
| 12 V        | 700 mA  | 150 mV pp    | 15.1534  | 1814808   | 15.1547  | 1814898   | 15.1555  | 1814906   |
| 15 V        | 530 mA  | 150 mV pp    | 15.1535  | 1814809   | 15.1548  | 1814899   | 15.1556  | 1814907   |
| 18 V        | 440 mA  | 150 mV pp    | 15.1536  | 1814810   | 15.1549  | 1814900   | 15.1557  | 1814908   |
| 24 V        | 330 mA  | 150 mV pp    | 15.1537  | 1814811   | 15.1550  | 1814901   | 15.1558  | 1814909   |

## Switchmode Power Supplies

# PP 8 Medical

Conforms to IEC 60601-1

8 Watt



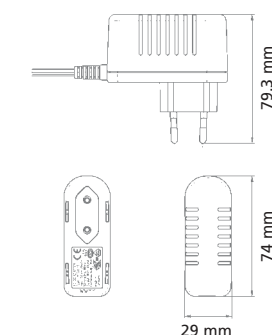
PP 8 Medical

### Applications

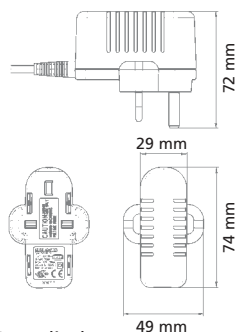
Blood analyzer  
Patient monitors  
Measuring instruments  
Laboratory technology

### Characteristics

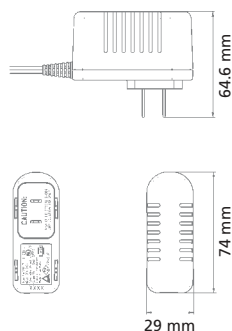
Universal input 100 - 240 V AC  
EMC conformity  
High performance  
Constant voltage, current limited  
Light weight, compact size  
Low leakage current < 10  $\mu$ A  
Low standby power  $\leq$  0.3 Watt



PP 8 Medical EURO



PP 8 Medical UK



PP 8 Medical USA

### Technical data

**Input voltage** 100 V AC - 240 V AC  
**Input current** 0.17 A at 115 V AC / 0.08 A at 230 V AC  
**Frequency** 50 - 60 Hz  
**Efficiency** 70% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
 $\pm$  5% at full load

### Output voltage tolerance

### Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 70 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

### Safety specification

**Standards** Fulfills Class II SELV for the following applications: IEC 60601-1, UL 60950, VDE, CE label

### Reliability specification

**MTBF calculation** 200,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

### Mechanical specification

**Weight** 70 g  
**Plug connector** AC input: Mains plugs are available for: EURO, UK, USA/Japan  
DC output: Universal output plug system

### World exclusive

**Medical power supplies** 100 - 240 V input voltage without earthing, leakage current < 10  $\mu$ A

| Output data |         |              | EURO     |           | UK       |           | USA      |           |
|-------------|---------|--------------|----------|-----------|----------|-----------|----------|-----------|
| Voltage     | Current | Ripple volt. | Part No. | Order No. | Part No. | Order No. | Part No. | Order No. |
| 3 V         | 1700 mA | 240 mV pp    | 15.1620  | 1819728   | 15.1621  | 1819729   | 15.1622  | 1819730   |
| 5 V         | 1300 mA | 240 mV pp    | 15.1504  | 1883631   | 15.1559  | 1814910   | 15.1567  | 1814918   |
| 6 V         | 1150 mA | 240 mV pp    | 15.1505  | 1883632   | 15.1560  | 1814911   | 15.1568  | 1814919   |
| 7.5 V       | 900 mA  | 240 mV pp    | 15.1506  | 1883633   | 15.1561  | 1814912   | 15.1569  | 1814920   |
| 9 V         | 800 mA  | 240 mV pp    | 15.1507  | 1883634   | 15.1562  | 1814913   | 15.1570  | 1814921   |
| 12 V        | 700 mA  | 240 mV pp    | 15.1508  | 1883635   | 15.1563  | 1814914   | 15.1571  | 1814922   |
| 15 V        | 530 mA  | 240 mV pp    | 15.1509  | 1883636   | 15.1564  | 1814915   | 15.1572  | 1814923   |
| 18 V        | 440 mA  | 240 mV pp    | 15.1510  | 1883637   | 15.1565  | 1814916   | 15.1573  | 1814924   |
| 24 V        | 330 mA  | 240 mV pp    | 15.1511  | 1883638   | 15.1566  | 1814917   | 15.1574  | 1814925   |

Switchmode Power Supplies

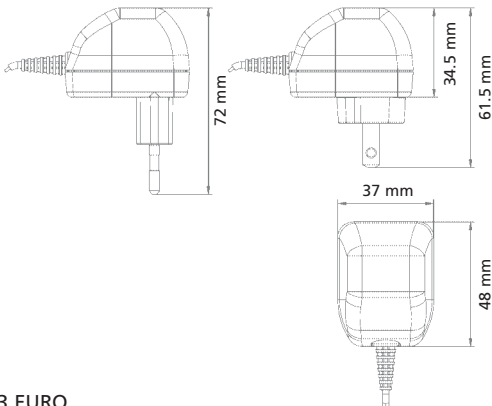
# SPA 3

Conforms to IEC 60950

3 Watt



SPA 3 EURO



SPA 3 EURO

Applications

Portable battery operated equipment  
Household appliances

Characteristics

Universal input 100 - 240 V AC  
EMC conformity  
For applications without earth connection only  
Ultra light weight and compact size

Technical data

**Input voltage** 100 V AC - 240 V AC  
**Input current** 0.2 A at 115 V AC / 0.1 A at 230 V AC  
**Frequency** 47 - 63 Hz  
**Efficiency** min. 60% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
**Output voltage tolerance** ± 15%

Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 85 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

Safety specification

**Standards** Fulfills Class II SELV for the following applications: EN 60950/IEC 60950, conforms to CE label, CCEE/CCiB GB 4943

Reliability specification

**MTBF calculation** 100,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

Mechanical specification

**Weight** 76 g  
**Plug connector** AC input: Main plug are available for the following country: EURO  
DC output: Universal output plug system

| Output data |         |              | EURO     |           |  |
|-------------|---------|--------------|----------|-----------|--|
| Voltage     | Current | Ripple volt. | Part No. | Order No. |  |
| 5 V         | 540 mA  | 500 mV pp    | 22.0353  | 1883498   |  |
| 6 V         | 450 mA  | 400 mV pp    | 22.0354  | 1883499   |  |
| 7.5 V       | 360 mA  | 350 mV pp    | 22.0355  | 1883500   |  |
| 9 V         | 300 mA  | 300 mV pp    | 22.0356  | 1883501   |  |
| 12 V        | 225 mA  | 300 mV pp    | 22.0357  | 1883502   |  |
| 15 V        | 180 mA  | 300 mV pp    | 22.0358  | 1883503   |  |

## Switchmode Power Supplies

# MPP 6

Conforms to IEC 60950

6 Watt

MPP 6



### Applications

PDA's  
MPEG Players  
Digital Cameras

### Characteristics

Universal input 100 - 240 V AC  
Interchangeable primary adapters  
Constant voltage, current limited  
Low leakage current < 10  $\mu$ A  
Low standby power  $\leq$  0.3 Watt

### Technical data

**Input voltage** 100 V AC - 240 V AC  
**Input current** 0.15 A  
**Frequency** 50 - 60 Hz  
**Efficiency** 75% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
**Output voltage tolerance**  $\pm$  5%

### Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 85 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

### Safety specification

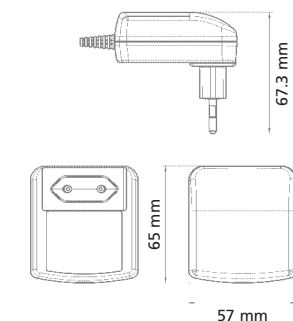
**Standards** Fulfills Class II SELV for the following applications: IEC 60950, UL 60950, VDE, CE label

### Reliability specification

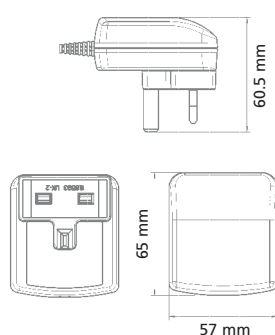
**MTBF calculation** 200,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

### Mechanical specification

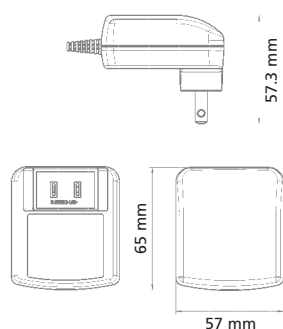
**Weight** 90 g  
**Plug connector** AC input: FRIWO exchangeable mains plug system: EURO, UK, USA/Japan, ROW  
DC output: Universal output plug system



MPP 6 EURO



MPP 6 UK



MPP 6 USA

### Output data

### Worldwide

| Voltage | Current | Ripple volt. | Part No. | Order No. |
|---------|---------|--------------|----------|-----------|
| 3 V     | 1300 mA | 300 mV pp    | 15.1615  | 1883766   |
| 5 V     | 1000 mA | 200 mV pp    | 15.1575  | 1814927   |
| 6 V     | 850 mA  | 180 mV pp    | 15.1576  | 1814928   |
| 7.5 V   | 650 mA  | 150 mV pp    | 15.1577  | 1814929   |
| 9 V     | 550 mA  | 150 mV pp    | 15.1578  | 1814930   |
| 12 V    | 450 mA  | 150 mV pp    | 15.1579  | 1814931   |
| 15 V    | 360 mA  | 150 mV pp    | 15.1580  | 1814932   |
| 18 V    | 300 mA  | 150 mV pp    | 15.1581  | 1814933   |
| 24 V    | 220 mA  | 150 mV pp    | 15.1582  | 1814934   |

Switchmode Power Supplies

MPP 15

Conforms to IEC 60950

15 Watt



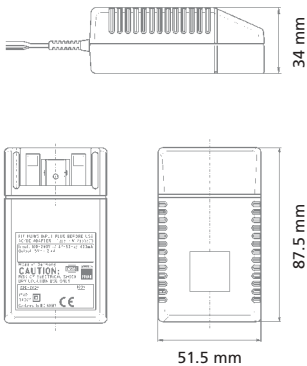
MPP 15

Applications

- Office equipment
- Data transmission devices
- IT equipment
- Measurement and weighing technology

Characteristics

- Universal input 100 - 240 V AC
- Interchangeable primary adapters
- Constant voltage, current limited
- Light weight and universal use
- Low leakage current < 10 µA
- Low standby power ≤ 0.5 Watt



MPP 15

Technical data

- Input voltage** 100 V AC - 240 V AC
- Input current** 0.4 A
- Frequency** 47 - 63 Hz
- Efficiency** 80% typ. at full load
- EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6
- Output voltage tolerance** ± 10%

Environmental specification

- Operating temp.** 0 °C to 40 °C at maximum load
- Storage temp.** -40 °C to 70 °C
- Humidity** 5% to 95% non condensing
- Input Transient Susceptibility** Complies with IEC 61000 requirements

Safety specification

- Standards** Fulfills Class II SELV for the following applications: UL 60950, CSA 950 (cUL), IEC 60950, VDE, CE label

Reliability specification

- MTBF calculation** 200,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

Mechanical specification

- Weight** 130 g
- Plug connector** AC input: FRIWO exchangeable mains plug system: EURO, UK, USA/Japan, Australia, ROW  
DC output: Universal output plug system

| Output data |         |              | Worldwide |           |  |
|-------------|---------|--------------|-----------|-----------|--|
| Voltage     | Current | Ripple volt. | Part No.  | Order No. |  |
| 3 V         | 2500 mA | 75 mV pp     | 15.0891   | 1812102   |  |
| 5 V         | 2400 mA | 75 mV pp     | 15.0792   | 1812037   |  |
| 6 V         | 2100 mA | 75 mV pp     | 15.0791   | 1812036   |  |
| 7.5 V       | 1700 mA | 90 mV pp     | 15.0788   | 1812038   |  |
| 9 V         | 1500 mA | 120 mV pp    | 15.0661   | 1811970   |  |
| 12 V        | 1250 mA | 150 mV pp    | 15.0740   | 1811971   |  |
| 15 V        | 1000 mA | 180 mV pp    | 15.0793   | 1812039   |  |
| 18 V        | 840 mA  | 240 mV pp    | 15.0584   | 1812040   |  |
| 24 V        | 630 mA  | 240 mV pp    | 15.0794   | 1812041   |  |

## Switchmode Power Supplies

# MPP 30

Conforms to IEC 60950

30 Watt



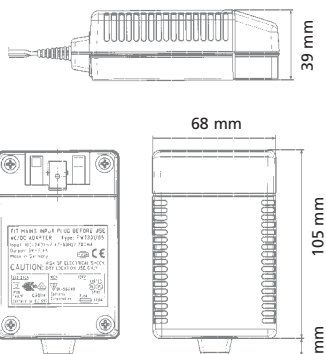
MPP 30

### Applications

Office equipment  
Data transmission devices  
IT equipment  
Measurement and weighing technology

### Characteristics

Universal input 100 - 240 V AC  
Interchangeable primary adapters  
Constant voltage, current limited  
Compact size & universal use  
Low leakage current  $< 10 \mu\text{A}$   
Low standby power  $\leq 0.5 \text{ Watt}$



MPP 30

### Technical data

**Input voltage** 100 V AC - 240 V AC  
**Input current** 0.7 A  
**Frequency** 47 - 63 Hz  
**Efficiency** 80% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
**Output voltage tolerance**  $\pm 10\%$

### Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 70 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

### Safety specification

**Standards** Fulfills Class II SELV for the following applications: UL 60950, CSA 950 (cUL), IEC 60950, VDE, CE label

### Reliability specification

**MTBF calculation** 200,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

### Mechanical specification

**Weight** 278 g  
**Plug connector** AC input: FRIWO exchangeable mains plug system: EURO, UK, USA/Japan, Australia, ROW  
DC output: Universal output plug system

#### Output data

| Voltage | Current | Ripple volt. | Part No. | Order No. |
|---------|---------|--------------|----------|-----------|
| 5 V     | 4000 mA | 75 mV pp     | 11.9831  | 1811463   |
| 6 V     | 3600 mA | 80 mV pp     | 11.9832  | 1811464   |
| 7.5 V   | 3300 mA | 90 mV pp     | 11.9833  | 1811465   |
| 9 V     | 3000 mA | 90 mV pp     | 11.9834  | 1811466   |
| 12 V    | 2500 mA | 100 mV pp    | 11.9835  | 1806413   |
| 15 V    | 2000 mA | 100 mV pp    | 11.9836  | 1811467   |
| 18 V    | 1660 mA | 120 mV pp    | 11.9837  | 1811483   |
| 24 V    | 1250 mA | 80 mV pp     | 11.9838  | 1811484   |

#### Worldwide

#### Internally adjustable power supplies

| Voltage | Current      | Ripple volt.            | Part No. | Order No. |
|---------|--------------|-------------------------|----------|-----------|
| 5-15 V  | 1700-2700 mA | ca. 1% U <sub>out</sub> | 15.0543  | 1811820   |
| 15-48 V | 550-1400 mA  | ca. 1% U <sub>out</sub> | 15.0542  | 1811819   |

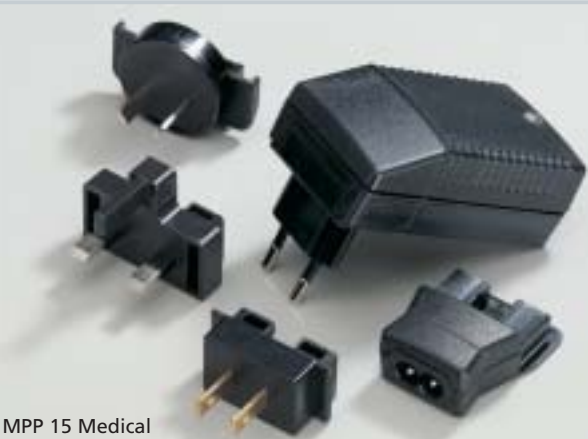
#### Worldwide

Switchmode Power Supplies

# MPP 15 Medical

Conforms to IEC 60601

15 Watt



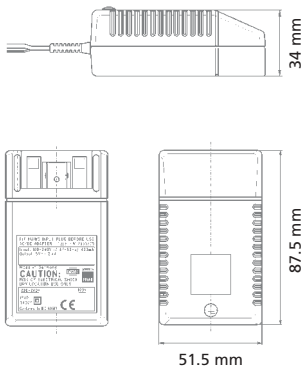
MPP 15 Medical

Applications

Blood analyzer  
Patient monitors  
Measuring instruments  
Laboratory technology

Characteristics

Universal input 100 - 240 V AC  
Interchangeable primary adapters  
Constant voltage, current limited  
Green LED indicating power-on  
Low leakage current < 10  $\mu$ A  
Low standby power  $\leq$  0.5 Watt



MPP 15 Medical

Technical data

**Input voltage** 100 V AC - 240 V AC  
**Input current** 0.4 A  
**Frequency** 50 - 60 Hz  
**Efficiency** 80% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
**Output voltage tolerance**  $\pm$  10%

Environmental specification

**Operating temp.** 0  $^{\circ}$ C to 40  $^{\circ}$ C at maximum load  
**Storage temp.** -40  $^{\circ}$ C to 70  $^{\circ}$ C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

Safety specification

**Standards** Fulfills Class II SELV for the following applications: IEC 60601-1, UL 2601, VDE, CE label, fulfills medical application class B/BF/CF

Reliability specification

**MTBF calculation** 200,000 hours at maximum load levels and an ambient temperature of 25  $^{\circ}$ C (in correspondence with MIL-HDBK-217)

Mechanical specification

**Weight** 130 g  
**Plug connector** AC input: FRIWO exchangeable mains plug system: EURO, UK, USA/Japan, Australia, ROW  
DC output: Universal output plug system

World exclusive

**Medical power supplies** 100 - 240 V input voltage without earthing, leakage current < 10  $\mu$ A

| Output data |         |              | Worldwide |           |
|-------------|---------|--------------|-----------|-----------|
| Voltage     | Current | Ripple volt. | Part No.  | Order No. |
| 5 V         | 2400 mA | 75 mV pp     | 15.1429   | 1883256   |
| 6 V         | 2100 mA | 75 mV pp     | 15.1430   | 1883257   |
| 7.5 V       | 1700 mA | 75 mV pp     | 15.1431   | 1883258   |
| 9 V         | 1500 mA | 90 mV pp     | 15.1432   | 1883259   |
| 12 V        | 1250 mA | 120 mV pp    | 15.1433   | 1883260   |
| 15 V        | 1000 mA | 150 mV pp    | 15.1434   | 1883261   |
| 18 V        | 840 mA  | 180 mV pp    | 15.1435   | 1883262   |
| 24 V        | 630 mA  | 240 mV pp    | 15.1436   | 1883263   |

# Switchmode Power Supplies

## MPP 30 Medical

Conforms to IEC 60601

30 Watt



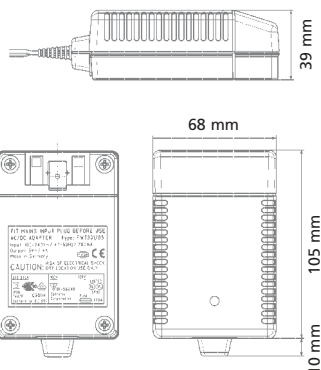
MPP 30 Medical

### Applications

Inhalers  
Patient monitors  
Patient lifts  
Measuring instruments  
Laboratory technology

### Characteristics

Universal input 100 - 240 V AC  
Interchangeable primary adapters  
Constant voltage, current limited  
Green LED indicating power-on  
Low leakage current < 10  $\mu$ A  
Low standby power  $\leq$  0.5 Watt



MPP 30 Medical

### Technical data

**Input voltage** 100 V AC - 240 V AC  
**Input current** 0.7 A  
**Frequency** 50 - 60 Hz  
**Efficiency** 80% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6

### Output voltage tolerance

$\pm$  10%

### Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 70 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

### Safety specification

**Standards** Fulfills Class II SELV for the following applications: IEC 60601-1, UL 2601, VDE, CE label, fulfills medical application class B/BF/CF

### Reliability specification

**MTBF calculation** 200,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

### Mechanical specification

**Weight** 278 g  
**Plug connector** AC input: FRIWO exchangeable mains plug system: EURO, UK, USA/Japan, Australia, ROW  
DC output: Universal output plug system

### World exclusive

**Medical power supplies** 100 - 240 V input voltage without earthing, leakage current < 10  $\mu$ A

| Output data |         |              | Worldwide |           |
|-------------|---------|--------------|-----------|-----------|
| Voltage     | Current | Ripple volt. | Part No.  | Order No. |
| 5 V         | 4000 mA | 75 mV pp     | 15.1437   | 1883264   |
| 6 V         | 3600 mA | 75 mV pp     | 15.1438   | 1883265   |
| 7.5 V       | 3300 mA | 75 mV pp     | 15.1439   | 1883266   |
| 9 V         | 3000 mA | 90 mV pp     | 15.1440   | 1883267   |
| 12 V        | 2500 mA | 100 mV pp    | 15.1441   | 1883268   |
| 15 V        | 2000 mA | 100 mV pp    | 15.1442   | 1883269   |
| 18 V        | 1660 mA | 120 mV pp    | 15.1443   | 1883270   |
| 24 V        | 1250 mA | 120 mV pp    | 15.1444   | 1883271   |

Switchmode Power Supplies

DT 10

Conforms to IEC 60950

10 Watt



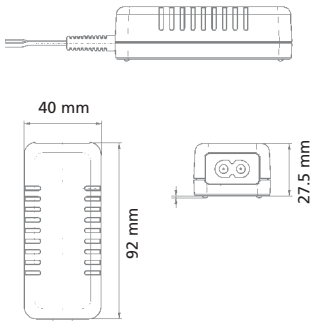
DT 10

Applications

Office equipment  
Data transmission devices  
IT equipment  
Measurement and weighing technology

Characteristics

Universal input 100 - 240 V AC  
EMC conformity  
High performance  
Constant voltage, current limited  
Compact desktop unit  
Low leakage current < 250 µA  
Standby power ≤ 1 Watt



DT 10

Technical data

**Input voltage** 100 V AC - 240 V AC  
**Input current** 0.3 A  
**Frequency** 50 - 60 Hz  
**Efficiency** 79% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
**Output voltage tolerance** ± 10% at full load

Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 70 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

Safety specification

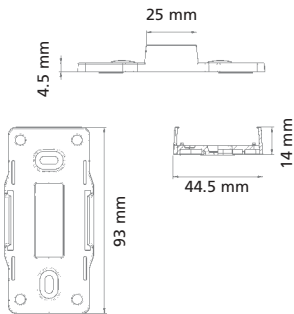
**Standards** Fulfills Class II SELV for the following applications: UL 60950, CSA 950 (cUL), IEC 60950, VDE, CE label

Reliability specification

**MTBF calculation** 200,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

Mechanical specification

**Weight** 126 g including a 2 metre output cable  
**Plug connector** AC input: 2 PIN IEC 320, C 8 input socket  
DC output: Universal output plug system



Wall fastening

| Output data |         |              | Worldwide |           |
|-------------|---------|--------------|-----------|-----------|
| Voltage     | Current | Ripple volt. | Part No.  | Order No. |
| 5 V         | 2000 mA | 120 mV pp    | 15.1010   | 1812115   |
| 6 V         | 1700 mA | 120 mV pp    | 15.1011   | 1812116   |
| 7.5 V       | 1400 mA | 115 mV pp    | 15.1012   | 1812117   |
| 9 V         | 1200 mA | 135 mV pp    | 15.1013   | 1812307   |
| 12 V        | 1000 mA | 180 mV pp    | 15.1014   | 1812110   |
| 15 V        | 800 mA  | 225 mV pp    | 15.1015   | 1812308   |
| 18 V        | 660 mA  | 270 mV pp    | 15.1016   | 1812309   |
| 24 V        | 500 mA  | 300 mV pp    | 15.1017   | 1812310   |
| 48 V        | 250 mA  | 480 mV pp    | 15.1018   | 1812311   |

## Switchmode Power Supplies

# DT 55

Conforms to IEC 60950

55 Watt



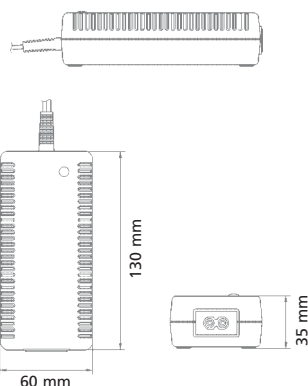
DT 55

### Applications

Notebooks  
Computer accessories  
Telecommunication equipment  
Automation technology  
TFT displays

### Characteristics

Universal input 120 - 240 V AC  
High performance  
Compact desktop unit  
Overvoltage protection and  
short circuit protection



DT 55

### Technical data

**Input voltage** 120 V AC - 240 V AC  
**Input current** 1.5 A  
**Frequency** 47 - 63 Hz  
**Efficiency** min. 80% typ. at full load  
**Inrush current** max. 40 A at 230 V Cold Start  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
**Output voltage tolerance**  $\pm 10\%$

### Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 70 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

### Safety specification

**Standards** Fulfills Class II SELV for the following applications: EN 60950/IEC 60950, TÜV GS, UL 60950, CSA 950 (cUL), conforms to CE label, CCEE/CCIB GB 4943

### Reliability specification

**MTBF calculation** 100,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

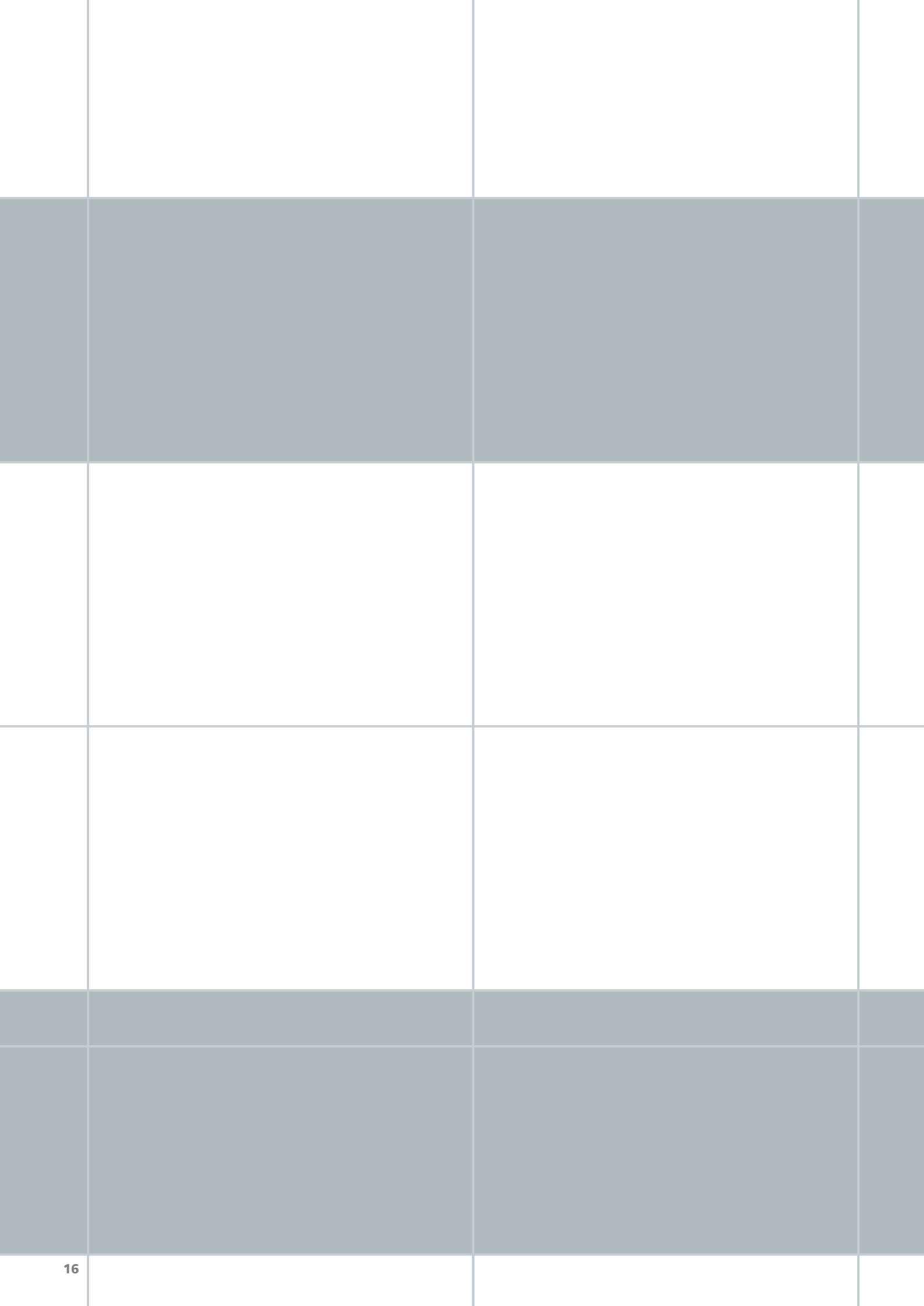
### Mechanical specification

**Weight** 295 g including a 2 metre output cable  
**Plug connector** AC input: 2 PIN IEC 320, C 8 input socket  
DC output: 2 m cable with connector plug  
2.5 x 5.5 x 9.5 mm,  
center positiv standard

#### Output data

#### Worldwide

| Voltage | Current | Ripple volt. | Part No. | Order No. |
|---------|---------|--------------|----------|-----------|
| 12 V    | 3800 mA | 250 mV pp    | 22.0060  | 1808889   |
| 15 V    | 3300 mA | 250 mV pp    | 22.0059  | 1808888   |
| 18 V    | 3000 mA | 200 mV pp    | 22.0058  | 1808887   |
| 20 V    | 2700 mA | 200 mV pp    | 22.0057  | 1808886   |
| 24 V    | 2300 mA | 200 mV pp    | 22.0056  | 1808885   |



# Linear Power Supplies

## AC/AC L 35/48

Conforms to IEC 61558

3-20 Watt



### Applications

Small office equipment  
Personal electronic power  
Portable electronic battery charger

### Characteristics

Lowest cost Linear  
Enclosed plastic case  
High sensibility

### Technical data

**Input voltage** 230 V AC  
**Frequency** 50 Hz  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6

### Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 40 °C

### Safety specification

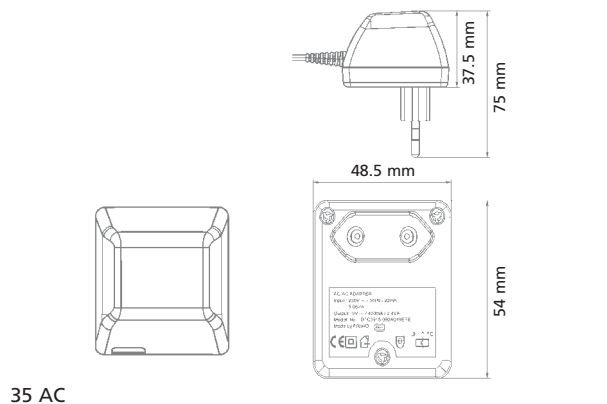
**Standards** Fulfills Class II SELV for the following applications: IEC 61558, CE label

### Reliability specification

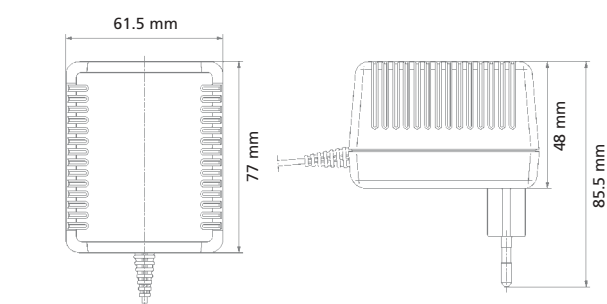
**MTBF calculation** 100,000 hours at maximum load levels and an ambient temperature of 25 °C  
(in correspondence with MIL-HDBK-217)

### Mechanical specification

**Weight** 110 g (35 AC) / 400 g (48 AC)  
**Plug connector** AC input: Main plug is available for the following country: EURO  
DC output: Universal output plug system



35 AC



48 AC

| Output data |         |         | EURO     |           |  |
|-------------|---------|---------|----------|-----------|--|
| Voltage     | Current | Housing | Part No. | Order No. |  |
| 6 V         | 400 mA  | 35 AC   | 22.0371  | 1883559   |  |
| 9 V         | 300 mA  | 35 AC   | 22.0330  | 1883465   |  |
| 9 V         | 1900 mA | 48 AC   | 22.0360  | 1883466   |  |
| 12 V        | 230 mA  | 35 AC   | 22.0368  | 1883556   |  |
| 12 V        | 1540 mA | 48 AC   | 22.0331  | 1883467   |  |
| 15 V        | 190 mA  | 35 AC   | 22.0367  | 1883555   |  |
| 15 V        | 1240 mA | 48 AC   | 22.0373  | 1883561   |  |
| 18 V        | 980 mA  | 48 AC   | 22.0366  | 1883554   |  |
| 24 V        | 125 mA  | 35 AC   | 22.0375  | 1883563   |  |
| 24 V        | 750 mA  | 48 AC   | 22.0372  | 1883560   |  |

| Output data |         |         | UK       |           |  |
|-------------|---------|---------|----------|-----------|--|
| Voltage     | Current | Housing | Part No. | Order No. |  |
| 9 V         | 1900 mA | 48 AC   | 22.0376  | 1883564   |  |

Linear Power Supplies

# DC Unregulated

## L 41/48

12 Watt

Conforms to IEC 61558

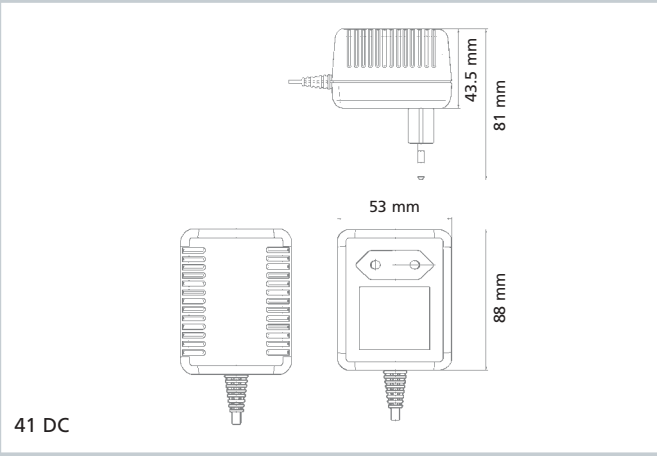


Applications

Small office equipment  
Personal electronic power  
Portable electronic battery charger

Characteristics

Lowest cost Linear  
Enclosed plastic case  
High sensibility



Technical data

**Input voltage** 230 V AC  
**Frequency** 50 Hz  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6

Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 40 °C

Safety specification

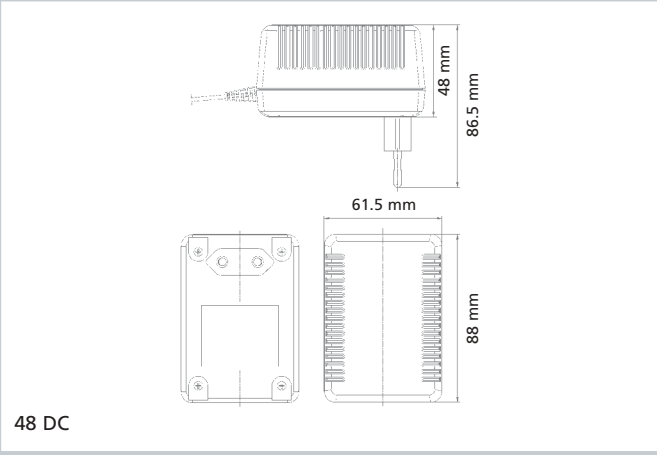
**Standards** Fulfills Class II SELV for the following applications: IEC 61558, CE label

Reliability specification

**MTBF calculation** 100,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

Mechanical specification

**Weight** 270 g (41 DC) / 410 g (48 DC)  
**Plug connector** AC input: Mains plug are available for the following countries: EURO, UK  
DC output: Universal output plug system



| Output data |         |         | EURO     |           |  |
|-------------|---------|---------|----------|-----------|--|
| Voltage     | Current | Housing | Part No. | Order No. |  |
| 6 V         | 900 mA  | 41 DC   | 22.0369  | 1883557   |  |
| 9 V         | 1000 mA | 48 DC   | 22.0332  | 1883468   |  |
| 9 V         | 680 mA  | 41 DC   | 22.0370  | 1883558   |  |
| 12 V        | 580 mA  | 41 DC   | 22.0341  | 1883472   |  |
| 12 V        | 1000 mA | 48 DC   | 22.0333  | 1883469   |  |
| 18 V        | 500 mA  | 48 DC   | 22.0374  | 1883562   |  |
| 24 V        | 500 mA  | 48 DC   | 22.0342  | 1883482   |  |

| Output data |         |         | UK       |           |  |
|-------------|---------|---------|----------|-----------|--|
| Voltage     | Current | Housing | Part No. | Order No. |  |
| 12 V        | 580 mA  | 41 DC   | 22.0377  | 1883565   |  |

# Linear Power Supplies

## Adjustable and Regulated

Conforms to IEC 61558

7 Watt



35 DC



41 DC



48 DC

### Applications

Small office equipment  
Personal electronic power  
Portable electronic battery charger

### Characteristics

Lowest cost Linear  
Enclosed plastic case  
High sensibility

### Technical data

**Input voltage** 230 V AC  
**Frequency** 50 Hz  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6

### Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 40 °C

### Safety specification

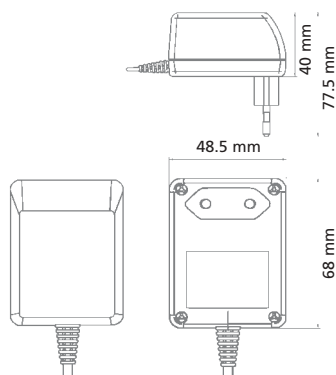
**Standards** Fulfills Class II SELV for the following applications: IEC 61558, CE label

### Reliability specification

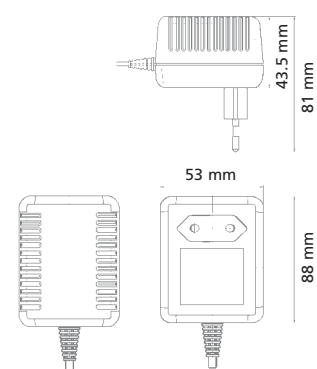
**MTBF calculation** 100,000 hours at maximum load levels and an ambient temperature of 25 °C  
(in correspondence with MIL-HDBK-217)

### Mechanical specification

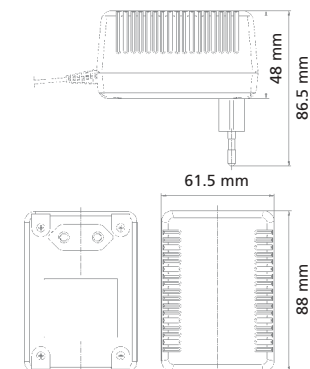
**Weight** 200 g (35 DC) / 250 g (41 DC) / 500 g (48 DC)  
**Plug connector** AC input: Mains plugs are available for the following countries: EURO, UK, USA  
DC output: Universal output plug system



35 DC



41 DC



48 DC

### Internally adjustable / Output data

| Voltage | Set. range | Work. range | EURO     |           | UK       |           | USA      |           |
|---------|------------|-------------|----------|-----------|----------|-----------|----------|-----------|
|         |            |             | Part No. | Order No. | Part No. | Order No. | Part No. | Order No. |
| 1-11 V  | 600-60 mA  | 600-60 mA   | 11.4070  | 1430084   | 11.4600  | 1463586   | 11.4911  | 1482157   |
| 10-24 V | 280-60 mA  | 280-60 mA   | 11.4071  | 1430092   | 11.4601  | 1463594   | 11.4912  | 1482181   |

### Regulated / Output data

| Voltage | Current | Housing | EURO     |           |
|---------|---------|---------|----------|-----------|
|         |         |         | Part No. | Order No. |
| 5 V     | 270 mA  | 35 DC   | 22.0334  | 1883470   |
| 5 V     | 500 mA  | 41 DC   | 22.0336  | 1883473   |
| 6 V     | 500 mA  | 41 DC   | 22.0337  | 1883474   |
| 7.5 V   | 500 mA  | 41 DC   | 22.0338  | 1883475   |
| 9 V     | 190 mA  | 35 DC   | 22.0335  | 1883471   |
| 9 V     | 300 mA  | 41 DC   | 22.0339  | 1883476   |
| 12 V    | 600 mA  | 48 DC   | 22.0340  | 1883477   |

# Switchmode Chargers

## NiCd / NiMH

Conforms to IEC 60335



DT 80-Ni



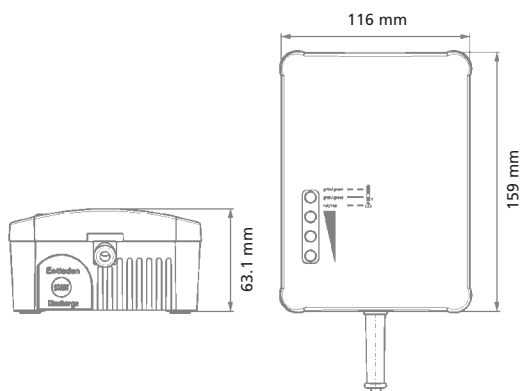
MPP 30-Ni

### Applications

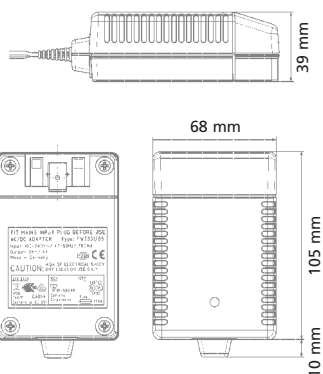
Diving lights  
Electrical vehicles  
Cleaning machines  
Stair lifts/patient lifts  
Medical technology  
Mobile lighting

### Characteristics

Input 230 V AC / 100 - 240 V AC  
Interchangeable primary adapters  
Low standby power  
EMC conformity  
Constant Current  
Discharge button  
-delta U or gradient recording of the temp.  
( $\delta T / \delta t$ )



DT 80



MPP 30

### Technical data (DT 80-Ni / MPP 30-Ni)

**Input voltage** 230 V AC / 100 V AC - 240 V AC  
**Input current** 0.5 A / 0.4 A  
**Frequency** 50 - 60 Hz  
**Efficiency** 80% typ. at full load / typ. 30...83%  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
**Output voltage tolerance**  $\pm 10\%$

### Environmental specification (DT 80-Ni / MPP 30-Ni)

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 70 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

### Safety specification (DT 80-Ni / MPP 30-Ni)

**Standards** Fulfills Class II SELV for the following applications: UL 60950, CSA 950 (cUL), IEC 60950, IEC 60335-2-29, VDE, CE label

### Reliability specification (DT 80-Ni / MPP 30-Ni)

**MTBF calculation** 100,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

### Mechanical specification (DT 80-Ni / MPP 30-Ni)

**Weight** 700 g / 278 g  
**Plug connector** AC input: 2 PIN IEC 320, C 8 plug / FRIWO exchangeable mains plug system: EURO, UK, USA/Japan, Australia, ROW  
DC output: customized plug / 2 m connecting cable with customized plug connection / chargers with temp. cut-out. with a 3 wire output cable stripped and tinned

| Output data   |         |              |         | Starting by |         | Cut-out by |       |          | EURO     |           | Worldwide |           |
|---------------|---------|--------------|---------|-------------|---------|------------|-------|----------|----------|-----------|-----------|-----------|
| Battery Cap.  | Current | No. of cells | Housing | Mains       | Battery | Time       | Temp. | -delta U | Part No. | Order No. | Part No.  | Order No. |
| 5.0 - 20.0 Ah | 2500 mA | 20           | DT 80   | •           | •       | •          | •     | •        | 15.1108  | 1882926   | -         | -         |
| 3.5 - 7.0 Ah  | 950 mA  | 10 - 20      | MPP 30  | •           | •       | •          | •     | •        | -        | -         | 15.0377   | 1811894   |
| 2.8 - 7.0 Ah  | 1000 mA | 10 - 12      | MPP 30  | •           | •       | •          | •     | •        | -        | -         | 15.0350   | 1812609   |
| 2.8 - 4.5 Ah  | 1400 mA | 8 - 12       | MPP 30  | •           | •       | •          | •     | •        | -        | -         | 15.0493   | 1880408   |
| 2.5 - 10.0 Ah | 2000 mA | 5 - 6        | MPP 30  | •           | •       | •          | •     | •        | -        | -         | 15.0635   | 1818681   |

## Switchmode Chargers

# Lead Acid

Conforms to IEC 60335



DT 80-PB



MPP 15-PB

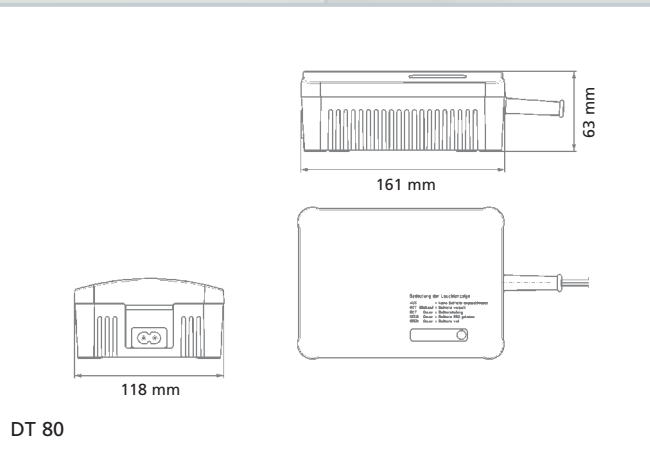
MPP 30-PB

### Applications

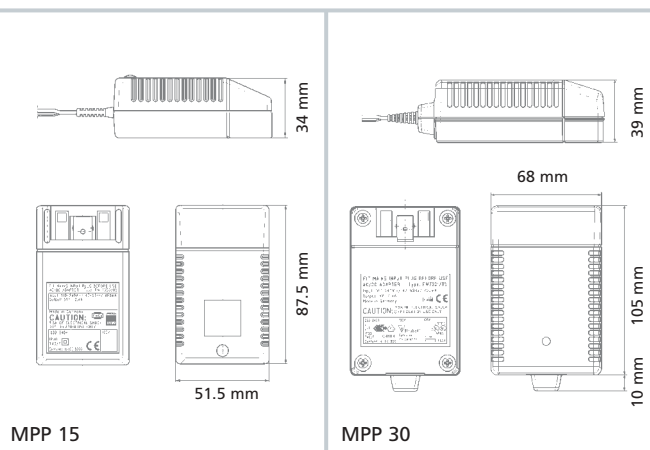
Starter batteries  
Cleaning machines  
Stair lifts/patient lifts  
Electrical vehicles  
Mobile lighting  
Mobile measuring technology  
Professional photographic technology

### Characteristics

EMC conformity  
Interchangeable primary adapters  
Low standby power  
Constant Current  
Light weight, compact size  
High performance



DT 80



MPP 15

MPP 30

### Technical data (DT 80-PB / MPPs)

**Input voltage** 230 V AC / 100 V AC - 240 V AC  
**Input current** 0.6 A / 0.18 A (MPP 15-PB) / 0.5 A (MPP 30-PB)  
**Frequency** 47 - 53 Hz / 50 - 60 Hz  
**Efficiency** 80% typ. at full load  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6

**Output voltage tolerance** ± 10%

### Environmental specification (DT 80-PB / MPPs)

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 70 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

### Safety specification (DT 80-PB / MPPs)

**Standards** Fulfills Class II SELV for the following applications: IEC 61000 / IEC 60335-2-29, EN 60335-2-29, VDE, UL CUL

### Reliability specification (DT 80-PB / MPPs)

**MTBF calculation** 100,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

### Mechanical specification (DT 80-PB / MPPs)

**Weight** 700 g / 110 g (MPP 15-PB), 225 g (MPP 30-PB)  
**Plug connector** AC input: 2 PIN IEC 320, C 8 plug / FRIWO exchangeable mains plug system: EURO, UK, USA/Japan, Australia, ROW  
DC output: customized plug / 2 m connecting cable with customized plug connection

| Output data |         |                |                 |         | EURO/UK  |           | Worldwide |           |
|-------------|---------|----------------|-----------------|---------|----------|-----------|-----------|-----------|
| Voltage     | Current | Capacity       | Characteristics | Housing | Part No. | Order No. | Part No.  | Order No. |
| 6 V         | 1600 mA | 3.0 - 6.0 Ah   | IU0U            | MPP 15  | -        | -         | 15.0982   | 1812114   |
| 12 V        | 1000 mA | 3.0 - 20.0 Ah  | IU0U            | MPP 15  | -        | -         | 15.0765   | 1812105   |
| 12 V*       | 1500 mA | 4.5 - 30.0 Ah  | IU0U            | MPP 15  | 15.1088  | 1881712   | -         | -         |
| 12 V        | 2000 mA | 4.5 - 28.0 Ah  | IU0U            | MPP 30  | -        | -         | 15.0981   | 1812112   |
| 12 V*       | 5000 mA | 25.0 - 40.0 Ah | IU0U            | DT 80   | 15.1317  | 1882566   | -         | -         |
| 24 V*       | 750 mA  | 3.0 - 14.0 Ah  | IU0U            | MPP 15  | 15.0694  | 1812104   | -         | -         |
| 24 V        | 1000 mA | 3.0 - 7.2 Ah   | IU0U            | MPP 30  | -        | -         | 15.0933   | 1812113   |
| 24 V*       | 1400 mA | 4.5 - 28.0 Ah  | IU0U            | MPP 30  | 15.0980  | 1812108   | -         | -         |
| 24 V*       | 2000 mA | 10.0 - 16.0 Ah | IU0U            | DT 80   | 15.1318  | 1882567   | -         | -         |

\* Input data 230 V AC

Linear Chargers

NiCd / NiMH

Conforms to IEC 60335



L 54-Ni

- Applications

Mobile lighting

Mobile measuring instruments

Toy applications

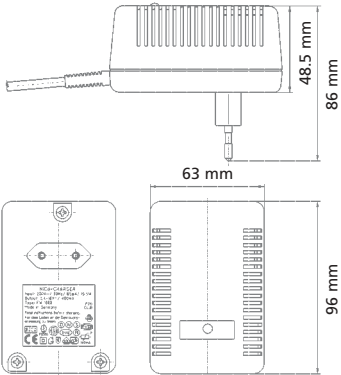
Photographic technology
- Characteristics

Overload protection

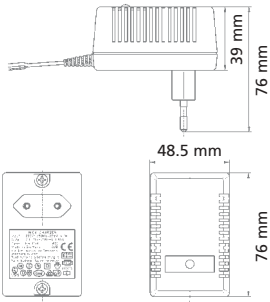
Gentle charging

LED charging display

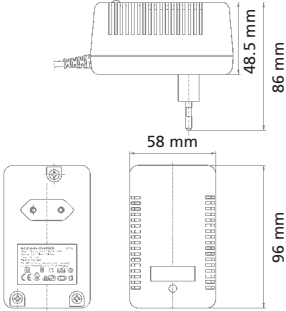
Low EMC emissions



54/5 EURO



38/15 EURO



48/2 EURO

- Technical data

Input voltage

120 V AC or 230 V AC

Input current

0.28 A (L 38-Ni) / 0.6 A (L 48-Ni) / 0.85 A (L 54-Ni)

Frequency

50 Hz

EMC norm

Conforms to FCC, CISPR 22, EN 55022, class B IEC 61000-4-3; IEC 61000-4-6

Output voltage tolerance

± 10%
- Environmental specification

Operating temp.

0 °C to 40 °C at maximum load

Storage temp.

-40 °C to 70 °C

Humidity

5% to 95% non condensing

Input Transient Susceptibility

Complies with IEC 61000 requirements
- Safety specification

Standards

Fulfills Class II SELV for the following applications: IEC 60335-2-29, EN 60335-2-29, CE label, VDE
- Reliability specification

MTBF calculation

100,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)
- Mechanical specification

Weight

219 g (L 38-Ni) / 384 g (L 48-Ni) / 516 g (L 54-Ni)

| Output data   |         |              |             |         | Starting by | EURO     |           | USA      |           |
|---------------|---------|--------------|-------------|---------|-------------|----------|-----------|----------|-----------|
| Capacity      | Current | No. of cells | Charg. time | Housing |             | Part No. | Order No. | Part No. | Order No. |
| 0.5 - 0.75 Ah | 180 mA  | 2 - 6        | 4           | 38/15   | Time        | 11.8076  | 1815549   | -        | -         |
| 0.5 - 0.75 Ah | 120 mA  | 7 - 11       | 6           | 38/15   | T. grad.    | 11.8860  | 1811315   | -        | -         |
| 1.2 - 1.4 Ah  | 260 mA  | 2 - 12       | 6           | 48/2    | -delta U    | 11.8156  | 1811179   | -        | -         |
| 4.0 - 5.0 Ah  | 400 mA  | 2 - 12       | 12          | 54/5    |             | 11.8291  | 1811182   | -        | -         |
| 4.0 - 5.0 Ah  | 400 mA  | 2 - 12       | 12          | 54/6    |             | -        | -         | 11.8563  | 1811827   |

# Linear Chargers

## Lead Acid

Conforms to IEC 60335



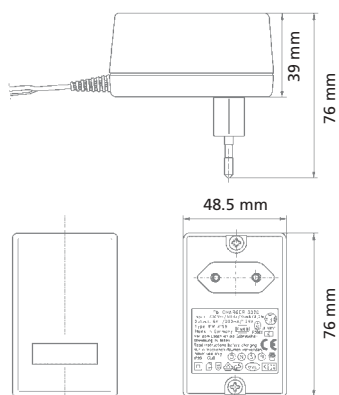
L 38-PB

### Applications

Mobile measuring instruments  
Security technology  
Photographic technology

### Characteristics

Overload protection  
Gentle charging  
LED charging display  
Low EMC emissions



38/15 EURO

### Technical data

**Input voltage** 230 V AC  
**Frequency** 50 Hz  
**EMC norm** Conforms to FCC, CISPR 22, EN 55022, class B  
IEC 61000-4-3; IEC 61000-4-6  
**Output voltage tolerance**  $\pm 10\%$

### Environmental specification

**Operating temp.** 0 °C to 40 °C at maximum load  
**Storage temp.** -40 °C to 70 °C  
**Humidity** 5% to 95% non condensing  
**Input Transient Susceptibility** Complies with IEC 61000 requirements

### Safety specification

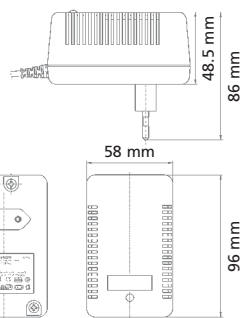
**Standards** Fulfills Class II SELV for the following applications: IEC 60335-2-29, EN 60335-2-29, CE label, VDE

### Reliability specification

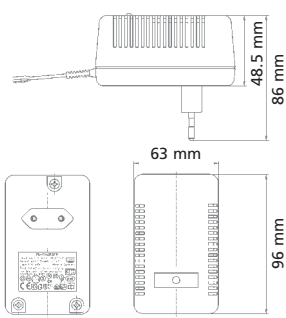
**MTBF calculation** 100,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

### Mechanical specification

**Weight** 239 g (L 38-PB) / 410 g (L 48-PB) / 507 g (L 54-PB)



48/2 EURO



54/5 EURO

| Output data |         |                |              |         | EURO     |           |
|-------------|---------|----------------|--------------|---------|----------|-----------|
| Voltage     | Current | Characteristic | Capacity     | Housing | Part No. | Order No. |
| 6 V         | 200 mA  | W              | 0.8 - 2.0 Ah | 38/15   | 11.8404  | 1811805   |
| 6 V         | 200 mA  | IU             | 0.8 - 2.0 Ah | 38/15   | 11.6302  | 1808096   |
| 6 V         | 600 mA  | IU             | 3.0 - 6.0 Ah | 54/5    | 11.6303  | 1811811   |
| 12 V        | 100 mA  | W              | 0.5 - 1.2 Ah | 38/15   | 11.8406  | 1811806   |
| 12 V        | 200 mA  | W              | 0.8 - 2.0 Ah | 38/15   | 11.8407  | 1811807   |
| 12 V        | 300 mA  | IU             | 1.2 - 3.0 Ah | 48/2    | 11.6301  | 1811809   |
| 12 V        | 500 mA  | IU             | 1.6 - 4.0 Ah | 54/5    | 11.6304  | 1811712   |
| 24 V        | 250 mA  | IU             | 2.0 - 5.0 Ah | 54/5    | 11.6305  | 1811683   |

The Secondary Adapter Plug System

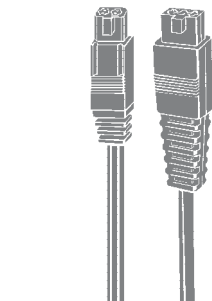


Universal jacks

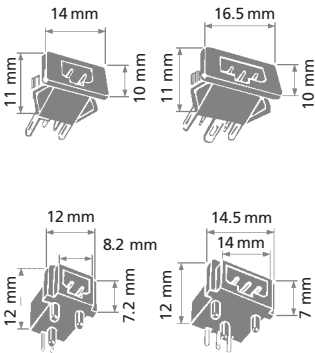
In addition to the standardized low voltage plug-in connections such as coaxial (in accordance with DIN 45323) and jack connectors (in accordance with DIN 45318) FRIWO also provides customized connecting cables.

The wire diameter which is generally used in this case ranges from 0.25 to 1.5 mm². Both flat and round cables can be used. FRIWO has its own plug system with self cleaning fork contacts and the corresponding sockets for or PWB installation. This plug connection is available in 2 or 3 contact design.

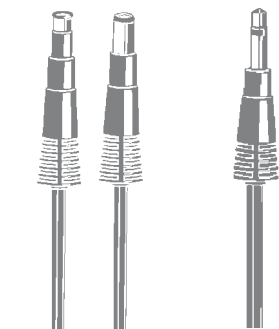
In addition to the safe contact and the self cleaning of the fork contacts this system also provides the advantage of extremely small dimensions. The illustrated low voltage plugs only represent one section of the comprehensive range. Customized designs, special versions and conditions and other dimensions can be obtained upon request.



Device connector



Texas sockets



Coaxial plugs & male jacks



Phone connectors (on request)

| Texas sockets       |           |           |
|---------------------|-----------|-----------|
| Designation         | Contacts  | Order No. |
| Housing inst.       | 2-pin     | 1323938   |
| Circuit board inst. | 2-pin     | 1321609   |
| Texas plug          |           |           |
| Designation         | Order No. |           |
| Plug                | 1812758   |           |
| Male jacks          |           |           |
| Outside Ø           | Length mm | Order No. |
| 2.5                 | 13        | 1812756   |
| 3.5                 | 14        | 1812757   |

| Coaxial plugs |          |           |           |
|---------------|----------|-----------|-----------|
| Outside Ø     | Inside Ø | Length mm | Order No. |
| 3.5           | 1.3      | 9.5       | 1812748   |
| 4.0           | 1.7      | 11.0      | 1812749   |
| 5.5           | 2.1      | 9.5       | 1812750   |
| 5.5           | 2.1      | 11.5      | 1812751   |
| 5.5           | 2.1      | 14.0      | 1812752   |
| 5.5           | 2.5      | 9.5       | 1812753   |
| 5.5           | 2.5      | 11.5      | 1812754   |
| 5.0           | 1.95     | DIN 45323 | 1812755   |

## Exchangeable Primary Adapters

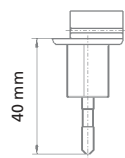


Primary adapters

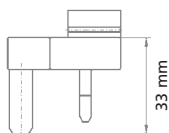
The unit series can be variably equipped with the country mains plugs which are illustrated. Your applications and products can be sold and used worldwide due to the set of all country mains plugs which can be added to the unit.

Mobility and dependability with respect to the use of the product are increased in this way and provide a constant level of dependability and availability – irrespective of the area of use.

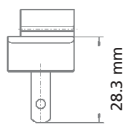
In countries with mains plugs which are not covered by EURO, UK, USA mains plugs the ROW adapter (Rest of the world) with the 2 contact IEC 320 C 8 socket provides a standardized alternative.



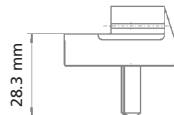
EURO



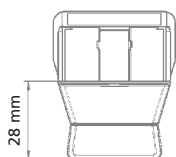
UK



USA



Australia



ROW

### Primary adapters

Country

Order No.

|                  |         |
|------------------|---------|
| EURO             | 1717707 |
| UK               | 1717618 |
| USA              | 1717715 |
| Australia MPP 15 | 1800496 |
| Australia MPP 30 | 1804237 |
| ROW              | 1809281 |

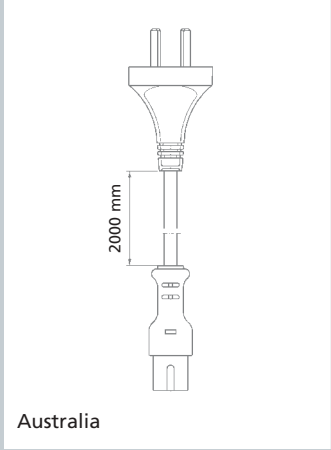
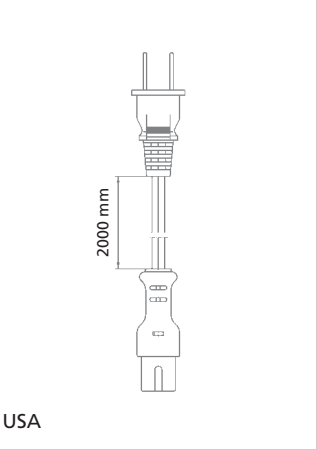
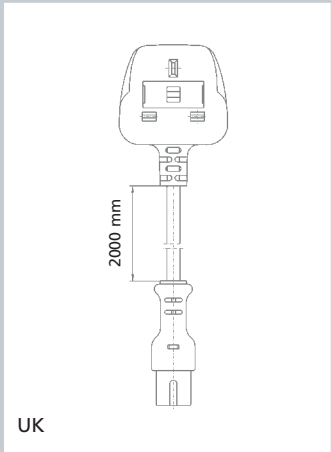
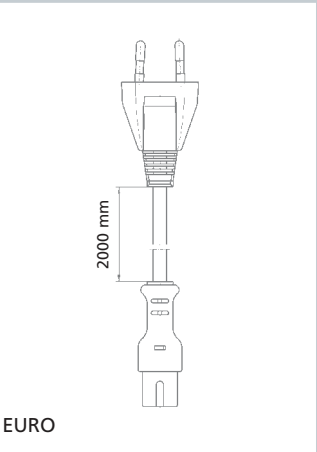
Power Cords with IEC 320 C 7 Plug



2 metre power cords

Mains power cords with the 2 contact IEC 320 C 7 mains plug provide a specific solution for each country. All power cords are 2 metres long. These power cords are envisaged for use in the IEC 320 C 8 socket which go with them.

You will find the IEC 320 C 8 socket in our FRIWO ROW adapter (see page 25) in the DT 55 mains power supplies (see page 15) and also in the DT 10 mains power supplies (see page 14).



| Power cords |           |
|-------------|-----------|
| Country     | Order No. |
| EURO        | 1812274   |
| UK          | 1812275   |
| USA         | 1812276   |
| Australia   | 1812277   |

# FRIWO

## Standards



type-approvals

Quite often the legal requirements for power supplies are very difficult to understand, and sometimes represent a hurdle even for the specialist. In order to ensure a standardised order processing.

FRIWO has created its own standards. It represents the minimum requirements for a power supplies and chargers specification.

In case the customer did not specify detailed requirements, this proprietary standard always applies. It essentially refers to the latest revisions of applicable national and international standards on safety and EMI/EMC. You can therefore rely on a uniform safety for all FRIWO power supplies and chargers.

| Input voltages (Tolerance $\pm 10\%$ ) |       |                   |           |       |
|----------------------------------------|-------|-------------------|-----------|-------|
| Wide range                             | EURO  | USA               | Australia | Japan |
| 100 - 240 V                            | 230 V | 120 V             | 240 V     | 100 V |
| Mains frequency                        |       | Temperature range |           |       |
| 50 - 60 Hz                             |       | 0 - 40 °C         |           |       |

| Interface according to the relevant standard |                                 |             |
|----------------------------------------------|---------------------------------|-------------|
| EURO                                         | USA                             | Worldwide   |
| EN 61558                                     | UL 1310                         | IEC 61558   |
| EN 60950                                     | UL 60950                        | IEC 60950   |
| EN 60335                                     | UL 1310                         | IEC 60335   |
| EN 60601                                     | UL 2601                         | IEC 60601   |
| Interference suppression                     |                                 |             |
| ISM devices                                  | Electronic household appliances | ITE devices |
| EN 55011                                     | EN 55014                        | EN 55022    |