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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



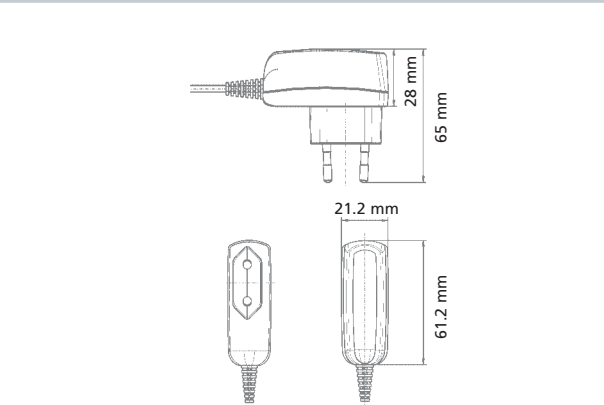
PP 3 USA/EURO

Applications

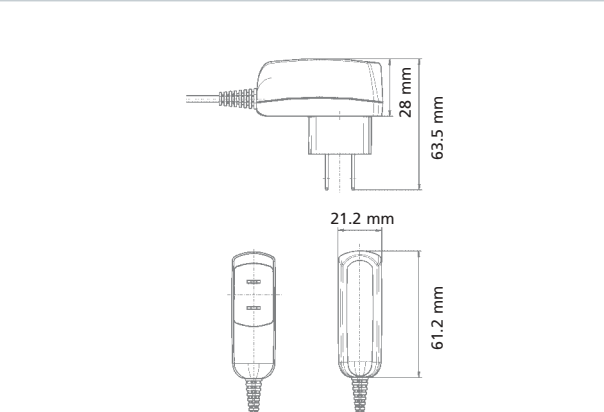
Telecom applications
Portable instruments peripherals

Characteristics

Universal input 100 - 240 V AC
Constant voltage current limited
Low leakage current < 10 μ 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



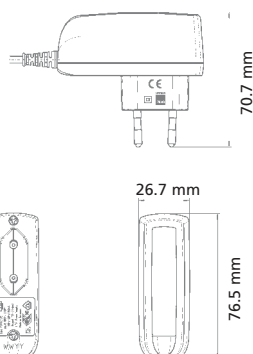
PP 6 USA

Applications

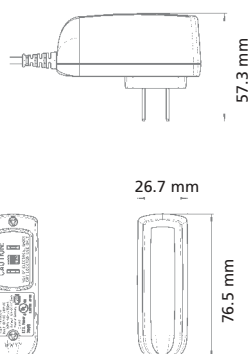
Modems
Portable battery operated equipment
Household appliances
Communication accessories

Characteristics

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



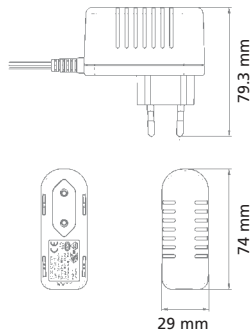
PP 8

Applications

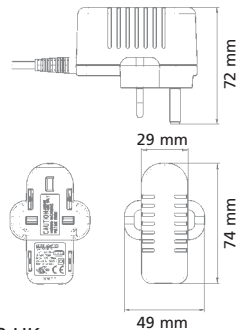
IT equipment
Measurement and weighing technology
Laser and lighting technology
Security technology / camera technology
Office and data transmission appliances

Characteristics

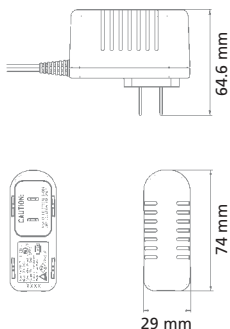
Universal input 100 - 240 V AC
EMC conformity
High performance
Constant voltage, current limited
Light weight, compact size
Low leakage current < 10 μ A
Low standby power $\leq$ 0.3 Watt



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



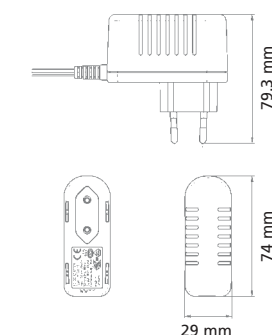
PP 8 Medical

Applications

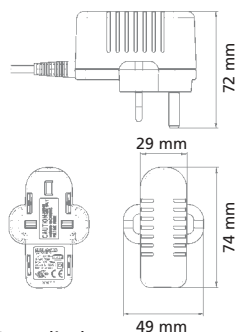
Blood analyzer
Patient monitors
Measuring instruments
Laboratory technology

Characteristics

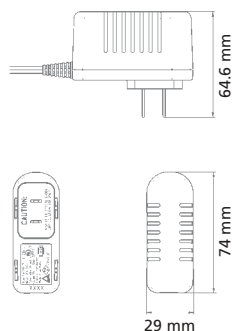
Universal input 100 - 240 V AC
EMC conformity
High performance
Constant voltage, current limited
Light weight, compact size
Low leakage current < 10 μ A
Low standby power $\leq$ 0.3 Watt



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 μ 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

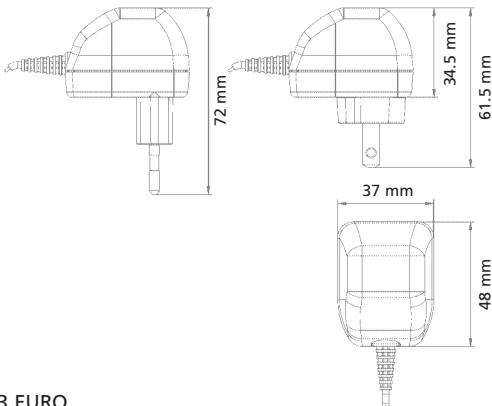
SPA 3

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 μ 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

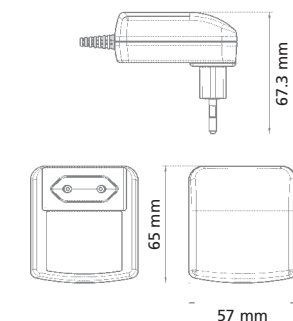
Standards Fulfills Class II SELV for the following applications: IEC 60950, UL 60950, VDE, CE label

Reliability specification

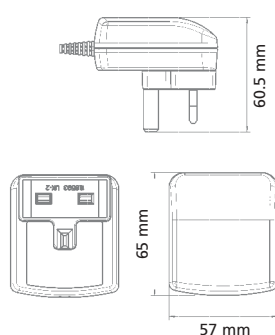
MTBF calculation 200,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

Mechanical specification

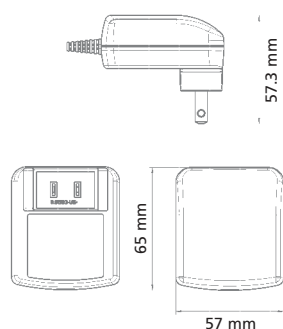
Weight 90 g
Plug connector AC input: FRIWO exchangeable mains plug system: EURO, UK, USA/Japan, ROW
DC output: Universal output plug system



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



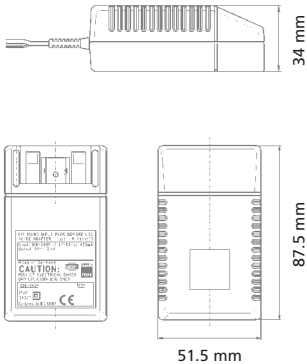
MPP 15

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



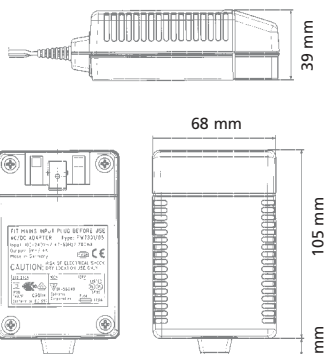
MPP 30

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 _{out}	15.0543	1811820
15-48 V	550-1400 mA	ca. 1% U _{out}	15.0542	1811819

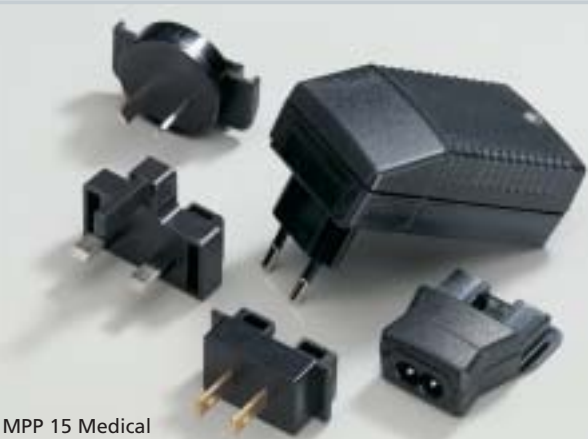
Worldwide

Switchmode Power Supplies

MPP 15 Medical

Conforms to IEC 60601

15 Watt



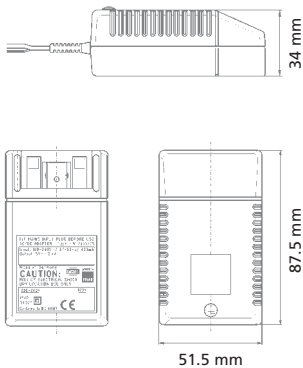
MPP 15 Medical

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 μ 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 μ 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



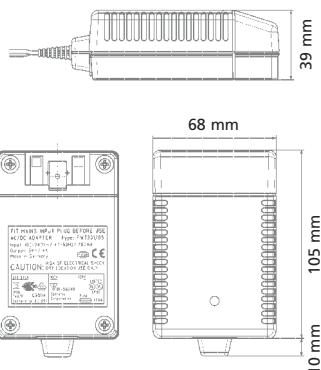
MPP 30 Medical

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 μ 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 μ 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



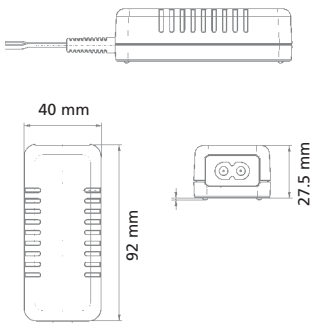
DT 10

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 μ A
Standby power $\leq$ 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 $\pm$ 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

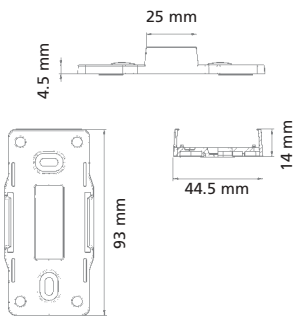
Standards Fulfills Class II SELV for the following applications: UL 60950, CSA 950 (cUL), IEC 60950, VDE, CE label

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



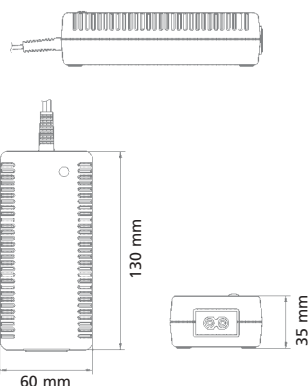
DT 55

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)

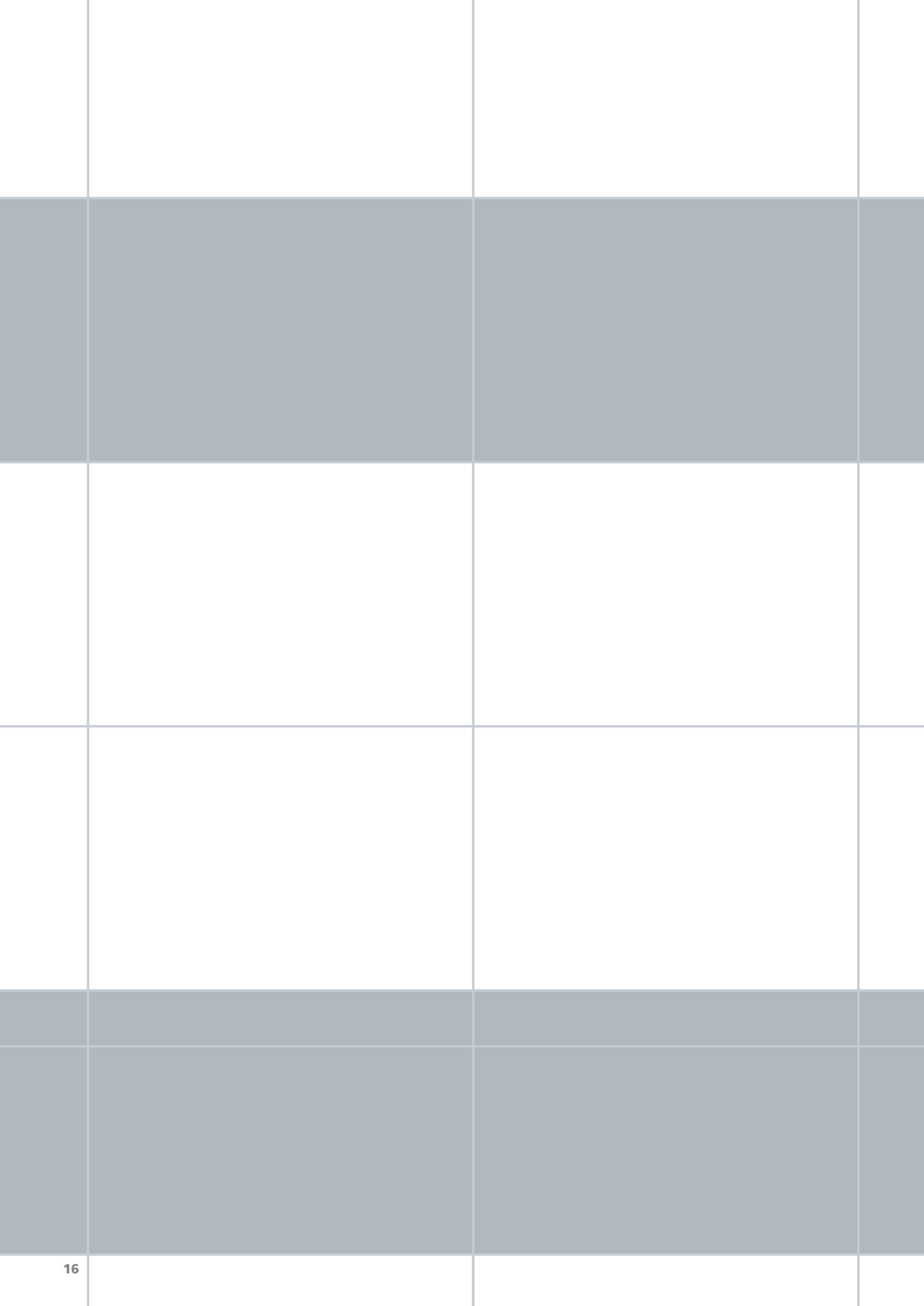
Mechanical specification

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

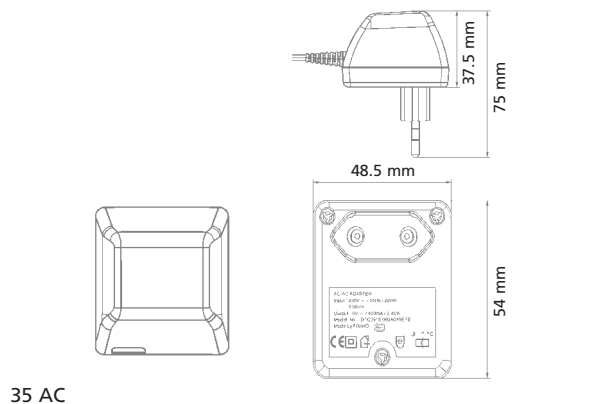
Standards Fulfills Class II SELV for the following applications: IEC 61558, CE label

Reliability specification

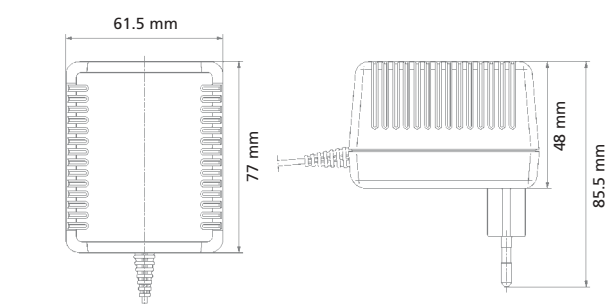
MTBF calculation 100,000 hours at maximum load levels and an ambient temperature of 25 °C
(in correspondence with MIL-HDBK-217)

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

EURO						UK				
Output data						Output data				
Voltage	Current	Housing	Part No.	Order No.		Voltage	Current	Housing	Part No.	Order No.
6 V	400 mA	35 AC	22.0371	1883559		9 V	1900 mA	48 AC	22.0376	1883564
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						

Linear Power Supplies

DC Unregulated

L 41/48

12 Watt

Conforms to IEC 61558

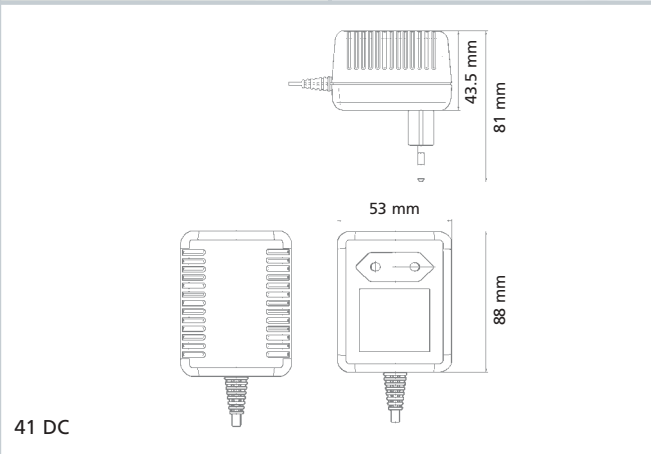


Applications

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

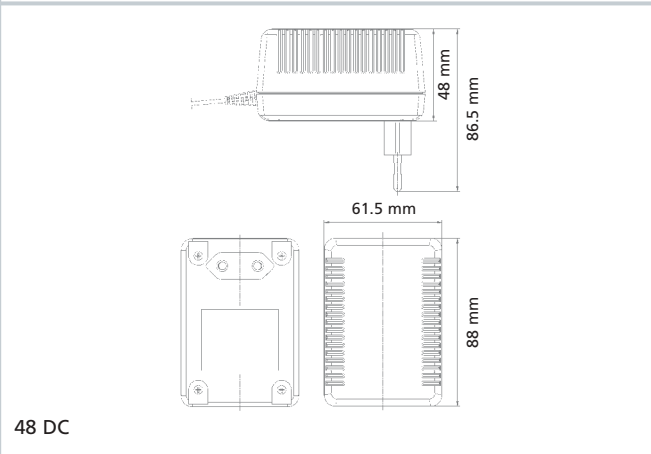
Standards Fulfills Class II SELV for the following applications: IEC 61558, CE label

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

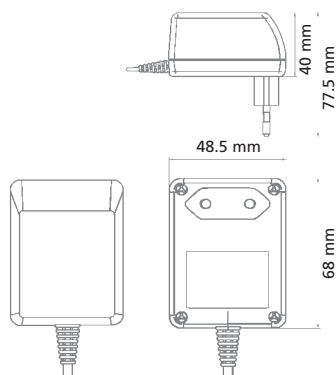
Standards Fulfills Class II SELV for the following applications: IEC 61558, CE label

Reliability specification

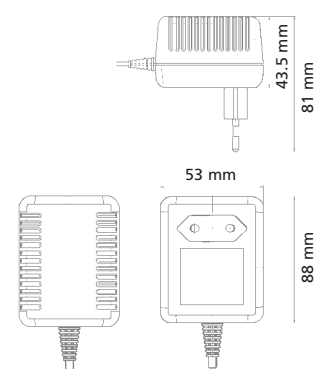
MTBF calculation 100,000 hours at maximum load levels and an ambient temperature of 25 °C
(in correspondence with MIL-HDBK-217)

Mechanical specification

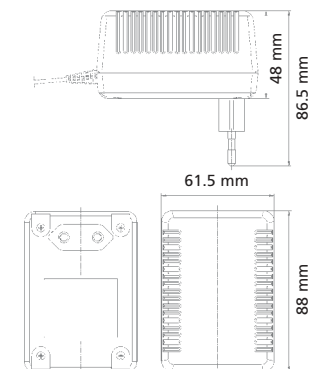
Weight 200 g (35 DC) / 250 g (41 DC) / 500 g (48 DC)
Plug connector AC input: Mains plugs are available for the following countries: EURO, UK, USA
DC output: Universal output plug system



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



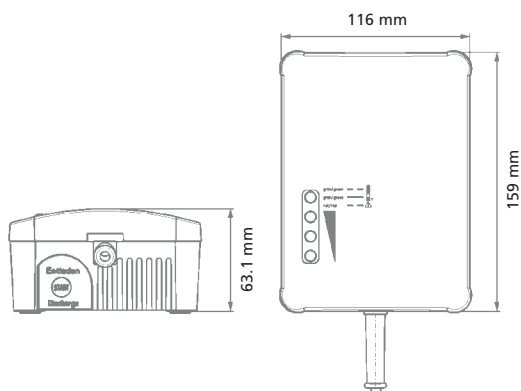
MPP 30-Ni

Applications

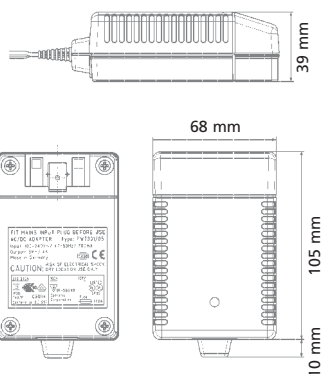
Diving lights
Electrical vehicles
Cleaning machines
Stair lifts/patient lifts
Medical technology
Mobile lighting

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



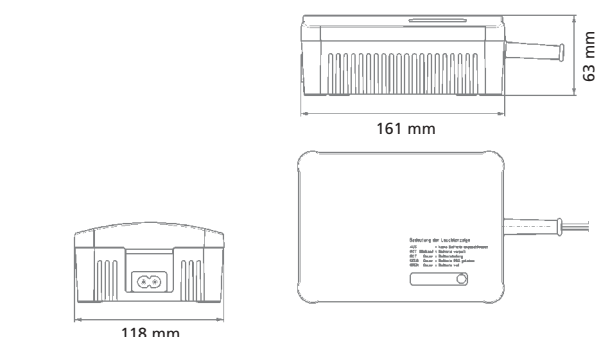
MPP 30-PB

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

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)

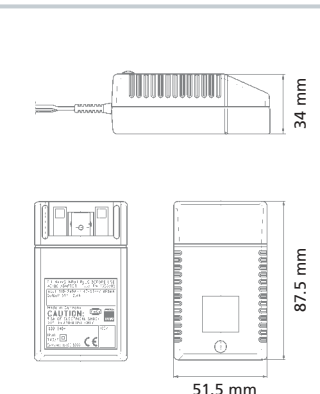
Standards Fulfills Class II SELV for the following applications: IEC 61000 / IEC 60335-2-29, EN 60335-2-29, VDE, UL CUL

Reliability specification (DT 80-PB / MPPs)

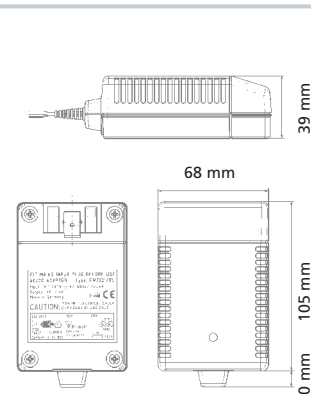
MTBF calculation 100,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

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



MPP 15



MPP 30

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

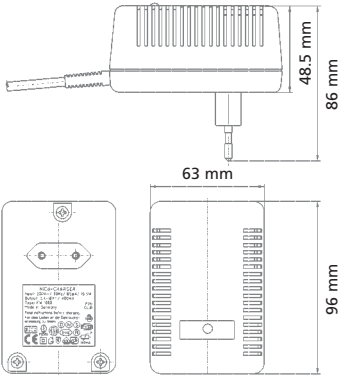
Photographic technology
- Characteristics

Overload protection

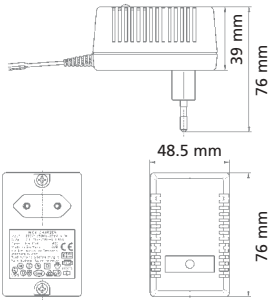
Gentle charging

LED charging display

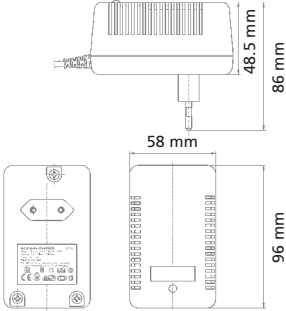
Low EMC emissions



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



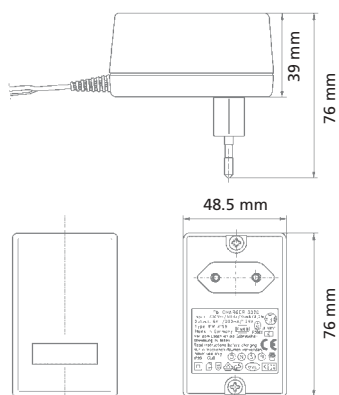
L 38-PB

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

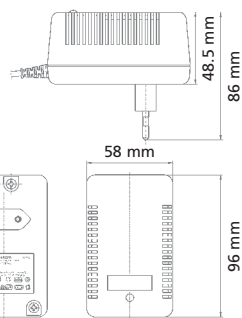
Standards Fulfills Class II SELV for the following applications: IEC 60335-2-29, EN 60335-2-29, CE label, VDE

Reliability specification

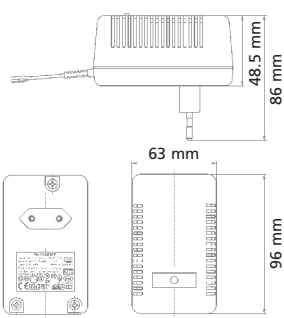
MTBF calculation 100,000 hours at maximum load levels and an ambient temperature of 25 °C (in correspondence with MIL-HDBK-217)

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

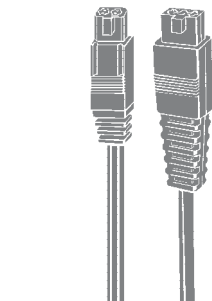


Universal jacks

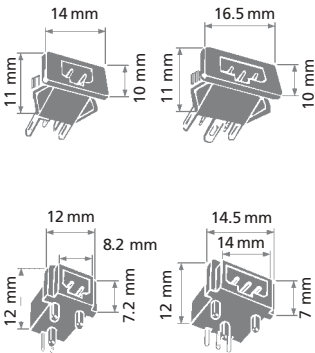
In addition to the standardized low voltage plug-in connections such as coaxial (in accordance with DIN 45323) and jack connectors (in accordance with DIN 45318) FRIWO also provides customized connecting cables.

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.

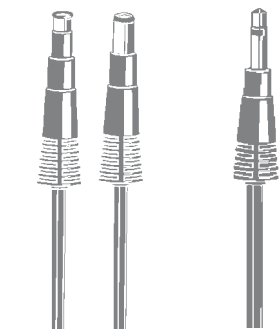
In addition to the safe contact and the self cleaning of the fork contacts this system also provides the advantage of extremely small dimensions. The illustrated low voltage plugs only represent one section of the comprehensive range. Customized designs, special versions and conditions and other dimensions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

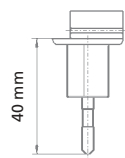


Primary adapters

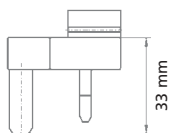
The unit series can be variably equipped with the country mains plugs which are illustrated. Your applications and products can be sold and used worldwide due to the set of all country mains plugs which can be added to the unit.

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.

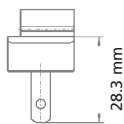
In countries with mains plugs which are not covered by EURO, UK, USA mains plugs the ROW adapter (Rest of the world) with the 2 contact IEC 320 C 8 socket provides a standardized alternative.



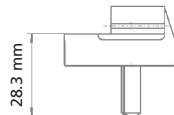
EURO



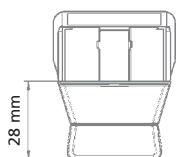
UK



USA



Australia



ROW

Primary adapters

Country

Order No.

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

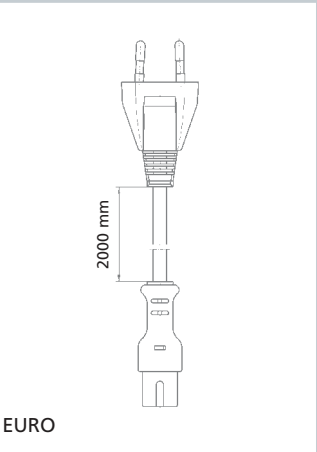
Power Cords with IEC 320 C 7 Plug



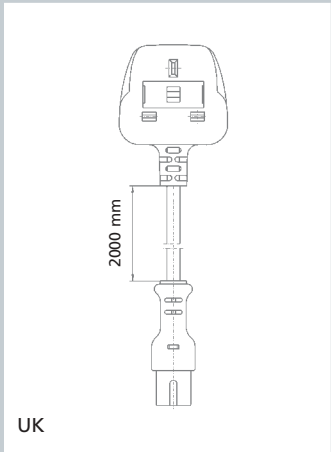
2 metre power cords

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.

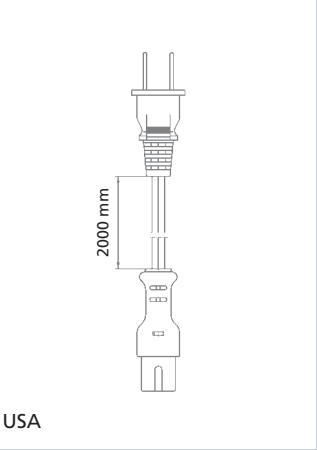
You will find the IEC 320 C 8 socket in our FRIWO ROW adapter (see page 25) in the DT 55 mains power supplies (see page 15) and also in the DT 10 mains power supplies (see page 14).



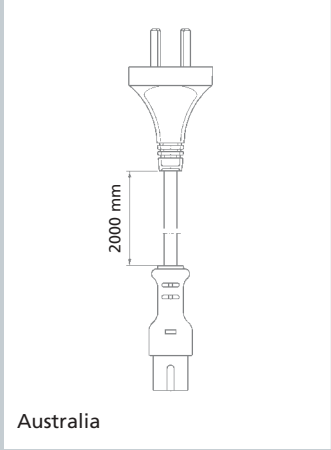
EURO



UK



USA



Australia

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