



2011/2012

unlimited

Power

Content

FRIWO	4
Switchmode Power Supply Series	
PP 3, PP 6, PP 8	6
GPP 6, GPP 10, GPP 18, GPP 30	8
MPP 6, MPP 15, MPP 30	10
DT 12, DT 60, DT 100, DT 150	12
Medical Power Supply Series	
GPP 6, GPP 10, GPP 18	14
PP 8, MPP 15, MPP 30	16
DT 12, DT 50, DT 80, DT 150	18
USB Series	
GPP USB, PP USB, GUP	20
In-wall Power Supply Series	
UP 6, UP 12, UP 18, UP USB	22
Open Frame	
OF 65, OF 100, OF 150, OF 250	24
Chargers	
Li-Ion, LiFePO ₄	26
NiCd/NiMH, Pb	28
Accessories	
Primary/Secondary Adapter Plug System	30
Power Cords	
Inductive charging	32
EMS	33
Glossary	36
Addresses	38



Design, production and sale of innovative and competitive power supplies – worldwide

Mission

This mission statement has been our guiding light for more than 3 decades, governing our engineering, production and sales activities. It is also our commitment to you.

Global Player

As global player with R&D, production and sales departments, we are present in all the significant national and international markets – and wherever you need us.

FRIWO focuses on platform and customized power supplies, primarily for medical devices, IT & communication, domestic appliances, mobile tools, industrial applications, lighting and for units with increased power requirement.

Plug-in power supplies / chargers

Since the development of the world's first plug-in power supply, the brand has become very popular. FRIWO stands for technical expertise when it comes to standard or customized engineering, from conceptual design to finished product.

In 1971 FRIWO has both paved the way for today's market success and set new highlights for power supply and charging technologies – always in accordance with safety standards and regulations.

Standards, regulations and responsibility

FRIWO, of course, meets the stringent criteria and standards of medical technology – many of our products are even far below threshold limits! FRIWO products also comply with legal requirements which have not yet become effective, for instance low power consumption in standby mode.

All products are tested for operational safety on location and leave our factories in impeccable condition. FRIWO's power supplies and chargers are approved in Europe, USA and Canada without further review.

Laws and regulations for the responsible use of environmental resources are becoming increasingly important. FRIWO already meets the requirements of the „Electrical and Electronic Equipment Act“ – ElektroG.





ENERGY STAR

For a long time FRIWO has been involved in the design of energy efficient power supplies. Even prior to the global warming or power consumption discussions FRIWO had accepted environmental responsibility and has been engineering environmentally friendly solutions ever since.

Today, many programs deal with energy efficiency of electronic devices and define threshold limits (efficiency and standby no-load losses). FRIWO is committed to meeting these threshold limits and networks with the relevant authorities.

One of the most familiar programs is ENERGY STAR. In 1992 the U.S. Environmental Protection Agency and the U.S. Department of Energy started this certification program. In accordance with an EU regulation ENERGY STAR was officially implemented in 2003. The ENERGY STAR program currently includes a variety of electronic devices which have been awarded the ENERGY STAR for threshold limit compliance – and many more are to follow. FRIWO has earned the label by complying with the latest state-of-the-art requirements, and uses it to differentiate its products.

In addition, the ErP regulation (Energy related products) looks at all phases of a product's life-cycle. The eco-directive does not only focus on improved energy efficiency but also encourages environmentally-friendly designs. For that purpose, the so-called „Integrated Product Policy“ is to be implemented to improve both the entire production chain and recycling of the product. During a life-cycle, energy and other resources, which are required for production, should be saved. At the same time it must be avoided that improvements to a certain part of the life-cycle generate negative effects in another place.



This standard looks at particular product categories and defines product-specific ecological design requirements. For power supplies, depending on the output power, regulation no. 278/2009 rules the threshold limits for efficiency and standby no-load losses. The second step of the ErP standard has become effective on April 27, 2011.

For most of the global vendors it will become vital to comply with the current threshold limits. FRIWO has already fine-tuned its portfolio to engineer highly efficient power supplies with low standby losses. FRIWO already supplies products which even exceed the current requirements of the ErP standard, and is therefore optimally prepared for possible tightenings of the standard.



Top position in power supplies and chargers

Continuous enhancement of the sophisticated products, innovative design and technical expertise made FRIWO a reliable and experienced partner – worldwide. A highly qualified, flexible and motivated workforce safeguards short development periods.

Design-to-market and customer vicinity mark our product platforms. Flexible usage of global production capacities and an optimized sales organization led to FRIWO's successful positioning on the global market for power supplies and chargers.



Switchmode Power Supplies

PP Series

All products conform to IEC 60950

Applications

- Audio
- Bluetooth/WLAN
- Digital cameras
- Communication accessories
- Measurement and weighing technology
- MPEG Player
- Modems DSL, ADSL, VDSL
- PDA
- Safety technology

Characteristics

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Low leakage current $\leq 10 \mu\text{A}$
- Low standby power $\leq 0.3 \text{ Watts}$
- Continuously short circuit proof

Technical data

Input voltage

100 to 240 V AC ($\pm 10 \%$)

Input current

90 mA (PP 3)

150 mA (PP 6)

200 mA (PP 8)

Frequency

50 to 60 Hz

Efficiency

75 % typ. at full load

EMC

Conforms to EN 55011, EN 55022/B, FCC 47 part 15, EN 61000-3-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11

Output voltage tolerance

$\pm 5\%$

Environmental specification

Operating temperature

0 to 40° C at maximum load

Storage temperature

-20 to 70° C

Humidity

5 % to 95 % non condensing

Input transient susceptibility

Complies with IEC 61000 requirements

Safety specification

Standards

Fulfils Class II SELV for the following applications: EN 60950/IEC 60950, VDE, CE label resp. UL 60950

Reliability specification

MTBF calculation

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

Mechanical specification

Weight approx.

60 g (PP 3)

105 g (PP 6)

110 g (PP 8)

Plug connector

AC input:

FRIWO exchangeable mains plug system: EURO, UK, USA/Japan*

DC output:

Universal output plug system (page 30)

PP 3 FW 7600



PP 6 FW 7601

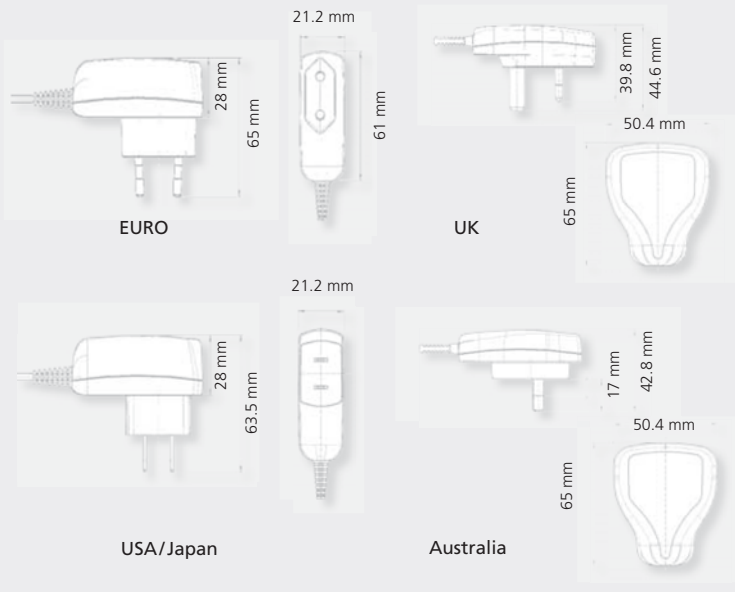


PP 8 FW 7333S



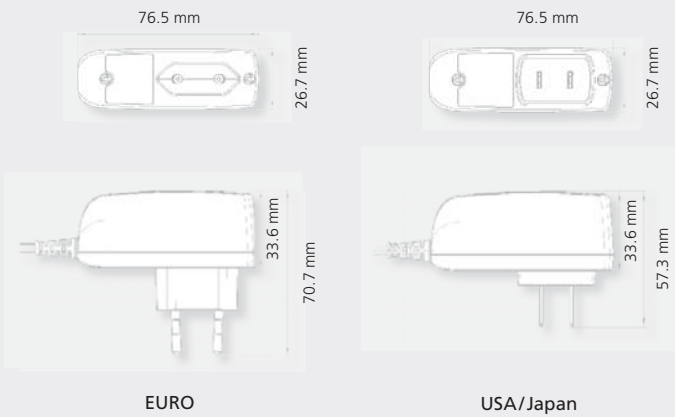
* Australia version available for OEM quantities

3 Watts



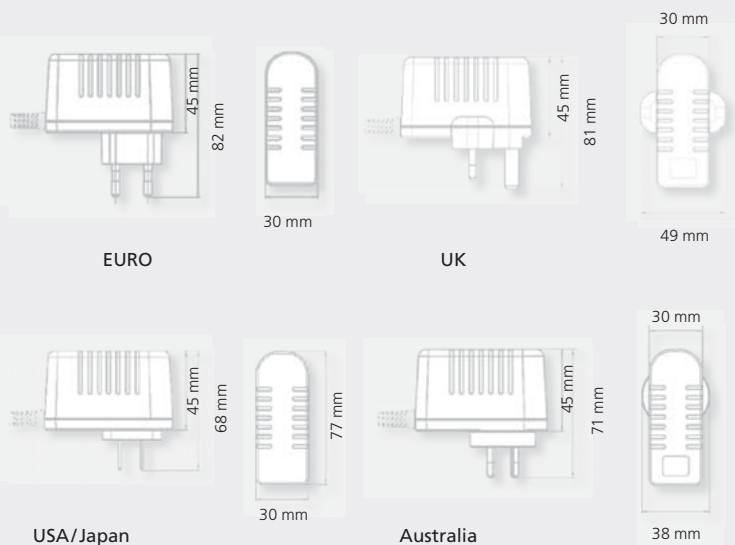
Output data		Ripple	EURO	USA/Japan	UK
Voltage	Current	Voltage	Order No.	Order No.	Order No.
5 V	650 mA	300 mV pp	1882750	1882760	1824460
6 V	550 mA	300 mV pp	1890574	1825734	1825733
7.5 V	450 mA	300 mV pp	1826282	1830703	1826268
9 V	360 mA	300 mV pp	1890562	1890576	1890575
12 V	270 mA	300 mV pp	1882753	1882763	1824461
15 V	220 mA	300 mV pp	1890714	1890716	1890715
24 V	135 mA	300 mV pp	1890717	1890718	1890719

6 Watts



Output data		Ripple	EURO	USA/Japan
Voltage	Current	Voltage	Order No.	Order No.
5 V	1000 mA	200 mV pp	1882105	1814934
6 V	850 mA	180 mV pp	1882106	1814935
7.5 V	650 mA	150 mV pp	1882107	1814936
9 V	550 mA	150 mV pp	1882108	1814937
12 V	450 mA	150 mV pp	1882109	1814938
15 V	360 mA	150 mV pp	1882110	1814939
18 V	300 mA	150 mV pp	1882111	1814940
24 V	220 mA	150 mV pp	1882112	1814941

8 Watts



Output data		Ripple	EURO	USA/Japan	UK
Voltage	Current	Voltage	Order No.	Order No.	Order No.
5 V	1300 mA	200 mV pp	1829491	1829580	1829562
6 V	1150 mA	180 mV pp	1829492	1829581	1829563
7.5 V	900 mA	150 mV pp	1829493	1829582	1829564
9 V	800 mA	150 mV pp	1829494	1829583	1829565
12 V	700 mA	150 mV pp	1829495	1829584	1829566
15 V	530 mA	150 mV pp	1829496	1829585	1829567
18 V	440 mA	150 mV pp	1829497	1829586	1829568
24 V	330 mA	150 mV pp	1829498	1829587	1829569



Switchmode Power Supplies

GPP Series

with exchangeable primary adapters

All products conform to IEC 60950

Applications

- Mobile applications
- Bluetooth
- Digital cameras
- Communication accessories
- Measurement and weighing technology
- Modems DSL, WLAN
- Elektronik cash systems
- Safety technology

Characteristics

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Exchangeable primary adapters
- Low leakage current $\leq 10 \mu\text{A}$ (GPP 6, GPP 10, GPP 18)
- Low standby power ≤ 0.3 Watts
- Continuously short circuit proof

Technical data

Input voltage
Input current

100 to 240 V AC ($\pm 10 \%$)
150 mA (GPP 6), 250 mA (GPP 10),
400 mA (GPP 18)

Frequency
Efficiency

50 to 60 Hz
80 % typ. at full load

EMC

Conforms to
EN 55011, EN 55022/B,
FCC 47 part 15, EN 61000-3-2,
EN 61000-4-2, EN 61000-4-3,
EN 61000-4-4, EN 61000-4-5,
EN 61000-4-6, EN 61000-4-11

Output voltage tolerance

+ 7 %, -5 % GPP 10
 $\pm 5 \%$ GPP 6/18
+ 5 %, -7 % GPP 30

Environmental specification

Operating temperature

0 to 40° C at maximum load

Storage temperature

-40 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, UL 60950,
CSA 950 (cUL), VDE, CE label, SiQ

Reliability specification

MTBF calculation

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

Mechanical specification

Weight approx.

80 g (GPP 6), 113 g (GPP 10), 170 g (GPP 18)
200 g (GPP 30)

Plug connector

AC input:
FRIWO exchangeable mains plug system:
EURO, UK, USA/Japan, Australia, IEC
DC output:
Universal output plug system (page 30)

For primary adapters see page 30

GPP 6 FW 7662



GPP 10 FW 7660



GPP 18 FW 7556

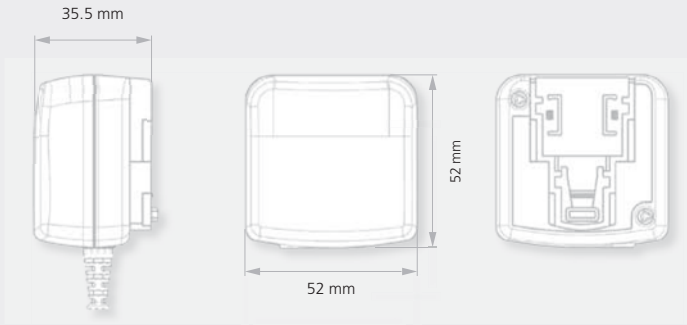


GPP 30 FW 7540



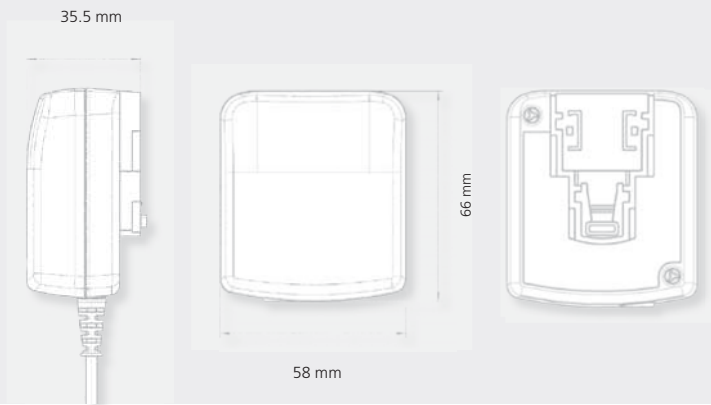
NEW

6 Watts



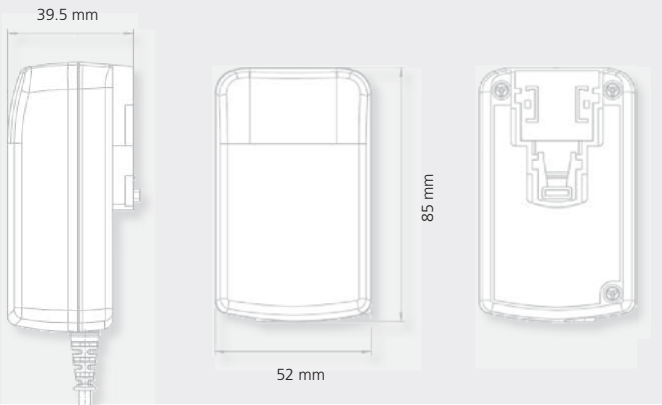
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	1100 mA	200 mV pp	1891660
5.9 V	1000 mA	200 mV pp	1891661
7.5 V	800 mA	200 mV pp	1891662
9 V	600 mA	200 mV pp	1891663
12 V	500 mA	200 mV pp	1891664
15 V	400 mA	200 mV pp	1891665
18 V	330 mA	200 mV pp	1891666
24 V	250 mA	200 mV pp	1891667

10 Watts



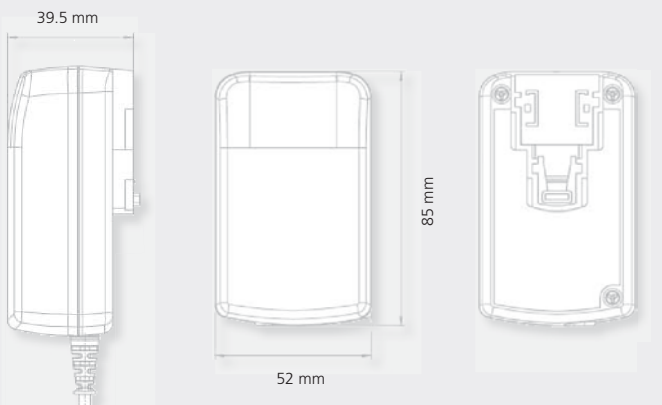
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	1600 mA	75 mV pp	1827490
5.9 V	1400 mA	75 mV pp	1827491
9 V	1000 mA	75 mV pp	1827493
12 V	800 mA	75 mV pp	1827494
15 V	700 mA	75 mV pp	1827495
18 V	560 mA	125 mV pp	1827496
24 V	420 mA	125 mV pp	1827497

18 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	3000 mA	75 mV pp	1828724
5.9 V	2500 mA	75 mV pp	1828725
9 V	1800 mA	90 mV pp	1828727
12 V	1500 mA	100 mV pp	1828728
15 V	1200 mA	100 mV pp	1828729
18 V	1000 mA	180 mV pp	1828730
24 V	750 mA	180 mV pp	1828731

30 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	5000 mA	50 mV pp	1891886
6 V	4200 mA	60 mV pp	1891887
7.5 V	3600 mA	75 mV pp	1891888
9 V	3000 mA	90 mV pp	1891889
12 V	2500 mA	120 mV pp	1891890
15 V	2000 mA	150 mV pp	1891891
18 V	1650 mA	180 mV pp	1891892
24 V	1250 mA	240 mV pp	1891893

Switchmode Power Supplies

MPP Series

with exchangeable primary adapters

All products conform to IEC 60950

Applications

- Weighing technology
- WLAN modems
- Bluetooth
- Communication accessories
- Measurement technology
- LED applications
- Laser technology
- IT accessories
- Safety technology

Characteristics

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Exchangeable primary adapters
- Low standby power ≤ 0.3 Watts
- Continuously short circuit proof
- High efficiency

Technical data

Input voltage

100 to 240 V AC ($\pm 10\%$)

Input current

150 mA (MPP 6),
400 mA (MPP 15),
700 mA (MPP 30)

Frequency

50 to 60 Hz

Efficiency

80% typ. at full load, resp. 75% (MPP 6)

EMC

Conforms to
EN 55011, EN 55022/B,
FCC 47 part 15, EN 61000-3-2,
EN 61000-4-2, EN 61000-4-3,
EN 61000-4-4, EN 61000-4-5,
EN 61000-4-6, EN 61000-4-11

Output voltage tolerance

$\pm 5\%$

Environmental specification

Operating temperature

0 to 40° C at maximum load

Storage temperature

-40 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, UL 60950, CSA 950 (cUL), VDE, CE label

Reliability specification

MTBF calculation

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

Mechanical specification

Weight approx.

100 g (MPP 6), 160 g (MPP 15), 255 g (MPP 30)

Plug connector

AC input:
FRIWO exchangeable mains plug system:
EURO, UK, USA/Japan, Australia, IEC
DC output:
Universal output plug system (page 30)

For primary adapters see page 30

MPP 6 FW 7650



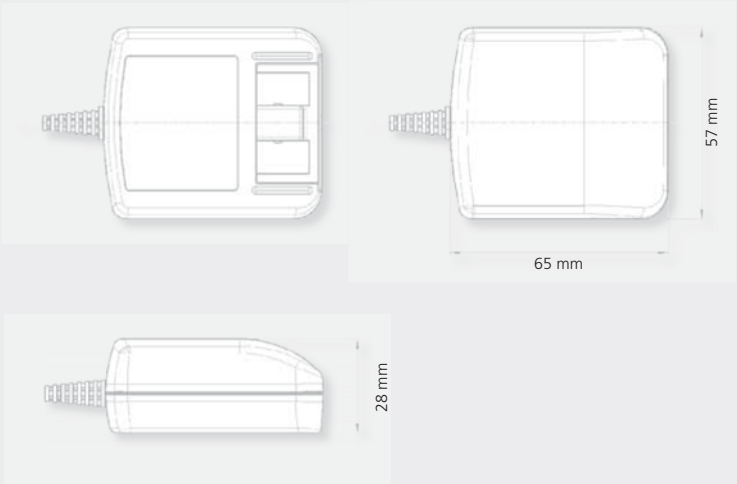
MPP 15 FW 7555



MPP 30 FW 7530

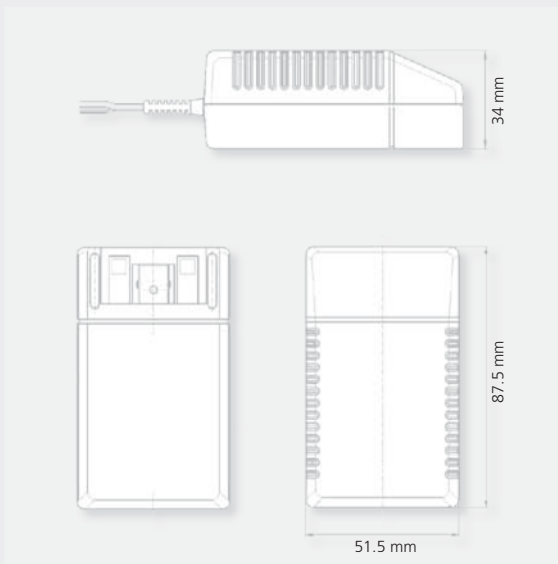


6 Watts



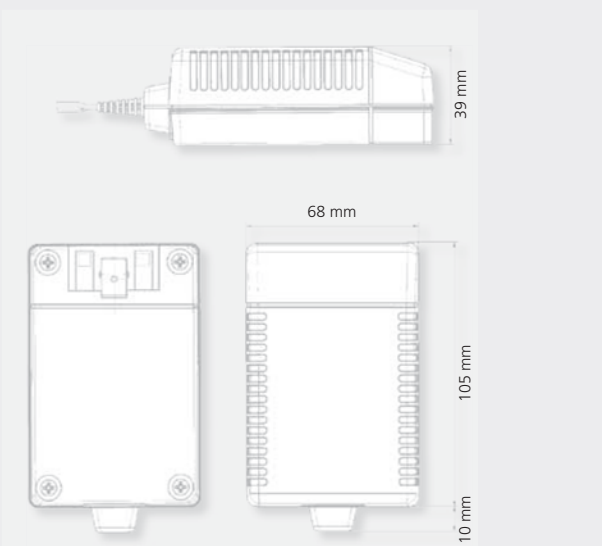
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	1000 mA	200 mV pp	1814926
6 V	850 mA	180 mV pp	1814927
7.5 V	650 mA	150 mV pp	1814928
9 V	550 mA	150 mV pp	1814929
12 V	450 mA	150 mV pp	1814930
15 V	360 mA	150 mV pp	1814931
18 V	300 mA	150 mV pp	1814932
24 V	220 mA	150 mV pp	1814933

15 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	3000 mA	75 mV pp	1894100
6 V	2500 mA	75 mV pp	1894101
7.5 V	2000 mA	75 mV pp	1894102
9 V	1500 mA	90 mV pp	1811970
12 V	1250 mA	120 mV pp	1811971
15 V	1000 mA	150 mV pp	1812039
18 V	840 mA	180 mV pp	1812040
24 V	625 mA	240 mV pp	1812041

30 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	5000 mA	50 mV pp	1894090
6 V	4200 mA	60 mV pp	1894091
7.5 V	3600 mA	75 mV pp	1894092
9 V	3000 mA	90 mV pp	1894093
12 V	2500 mA	120 mV pp	1894094
15 V	2000 mA	150 mV pp	1894095
18 V	1650 mA	180 mV pp	1894096
24 V	1250 mA	240 mV pp	1894097

Switchmode Power Supplies

DT Series

All products conform to IEC 61558

Applications

- Audio
- Bluetooth/WLAN
- Digital cameras
- Communication accessories
- Measurement and weighing technology
- MPEG Player
- Modems DSL, ADSL, VDSL
- Safety technology
- Laboratory equipment

Characteristics

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Low standby power
 ≤ 0.3 Watts (DT 12) resp.
 ≤ 0.5 Watts (DT 60, DT 100, DT 150)
- Continuously short circuit proof
- High efficiency

Technical data

Input voltage

100 to 240 V AC ($\pm 10\%$)

Input current

300 mA (DT 12), 1500 mA (DT 100),
1600 mA (DT 60), 2000 mA (DT 150)

Frequency

50 to 60 Hz

Efficiency

up to 91% typ. at full load

EMC

Conforms to EN 55011,
EN 55022/B, FCC 47 part 15, EN 61000-3-2,
EN 61000-4-2, EN 61000-4-3, EN 61000-4-4,
EN 61000-4-5, EN 61000-4-6, EN 61000-4-11
 $\pm 5\%$

Output voltage tolerance

Environmental specification

Operating temperature

0 to 40° C at maximum load

Storage temperature

-10 to 70° C

Humidity

10% to 95% non condensing

Input transient susceptibility

Complies with IEC 61000 requirements

Safety specification

Standards

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

Reliability specification

MTBF calculation

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

Mechanical specification

Weight approx.

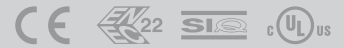
135 g (DT 12), 260 g (DT 60),
500 g (DT 100), 622 g (DT 150)

Plug connector

AC input: 2-pole IEC 320,
C8-socket (DT 12, DT 60)
C14-socket (DT 100, DT 150)
DC output:
Universal output plug system (page 30)

For power cords see page 30

DT 12 FW 7402



DT 60 DT 60



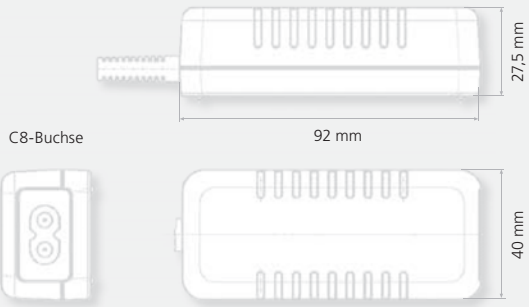
DT 100 DT 100



DT 150 DT 150

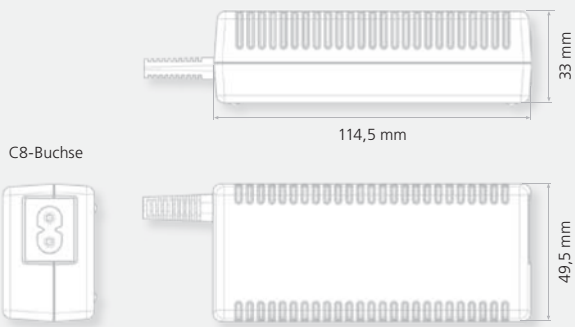


12 Watts



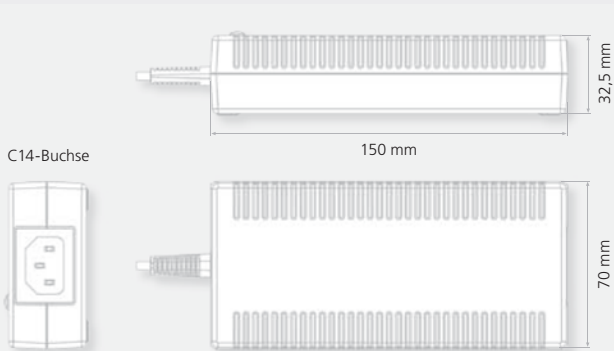
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	2000 mA	200 mV pp	1893922
5,9 V	1700 mA	200 mV pp	1893923
7,5 V	1400 mA	180 mV pp	1893924
9 V	1200 mA	135 mV pp	1893925
12 V	1000 mA	180 mV pp	1893926
15 V	800 mA	112 mV pp	1893927
18 V	660 mA	135 mV pp	1893928
24 V	500 mA	300 mV pp	1893929
48 V	250 mA	480 mV pp	1893930

60 Watts



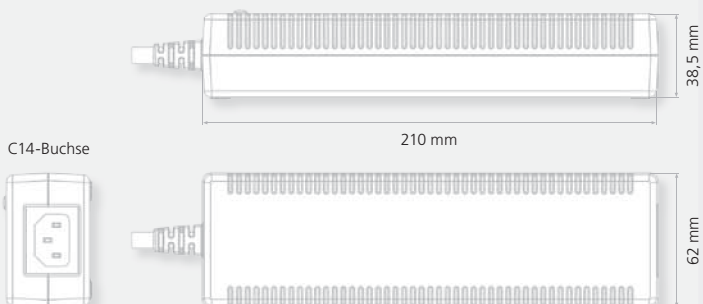
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
12 V	5000 mA	250 mV pp	1830993
15 V	4000 mA	250 mV pp	1830994
18 V	3300 mA	250 mV pp	1830995
24 V	2500 mA	250 mV pp	1831363

100 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
24 V	4170 mA	240 mV pp	1891551

150 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
24 V	6250 mA	240 mV pp	1894781

Switchmode Power Supplies Medical Series

with exchangeable primary adapters

All products conform to IEC 60601-1

Applications

- Blood analyser
- Patient monitors
- Measuring equipment
- Laboratory equipment
- Inhalers
- Patient lifts

Characteristics

- Universal input 100 to 240 V AC
- Exchangeable primary adapters
- Constant voltage, current limited
- Green LED indicator
- Low leakage current $\leq 10 \mu\text{A}$
- Low standby power
 ≤ 0.3 Watts GPP 6 / GPP 10
 ≤ 0.5 Watts GPP 18 (24 V)
- Continuously short circuit proof

Technical data

Input voltage
Input current

100 to 240 V AC ($\pm 10\%$)
150 mA (GPP 6), 250 mA (GPP 10),
400 mA, (GPP 18)

Frequency
Efficiency
EMC

50 to 60 Hz
80 % typ. at full load
Conforms to
EN 55011, EN 55022/B,
FCC 47 part 15, EN 61000-3-2,
EN 61000-4-2, EN 61000-4-3,
EN 61000-4-4, EN 61000-4-5,
EN 61000-4-6, EN 61000-4-11

Output voltage tolerance

+ 7 %, -5 % GPP 10
 ± 5 % GPP 6/18

Environmental specification

Operating temperature

0 to 40° C at maximum load

Storage temperature

-40 to 70° C

Humidity

5 % to 95 % non condensing

Input transient susceptibility

Complies with IEC 61000 requirements

Safety specification

Standards

Fulfils Class II SELV for the following applications:
IEC 60601-1, UL 2601, VDE, CE label, SIQ, fulfils medical application class B/BF/CF

Reliability specification

MTBF calculation

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

Mechanical specification

Weight

80 g (GPP 6), 113 g (GPP 10), 170 g (GPP 18)

Plug connector

AC input:
FRIWO exchangeable mains plug system:
EURO, UK, USA/Japan, Australia, IEC
DC output:
Universal output plug system (page 30)

For primary adapters see page 30



The new **open frame units** comply with standard IEC 60601-1, see pages 24/25.

GPP 6 FW 7662M



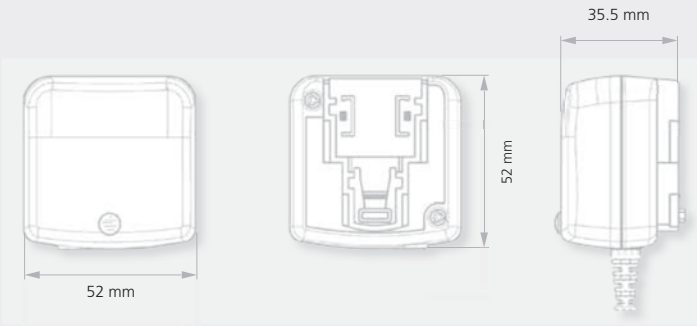
GPP 10 FW 7660M



GPP 18 FW 7556M

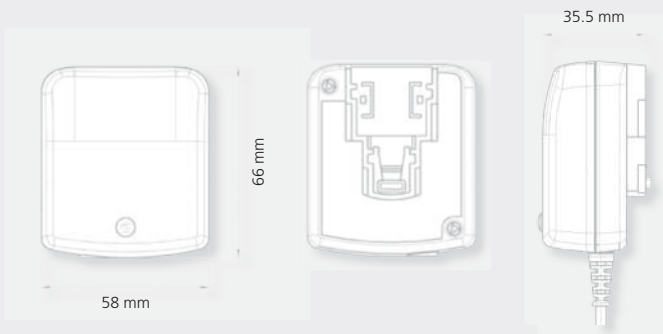


6 Watts



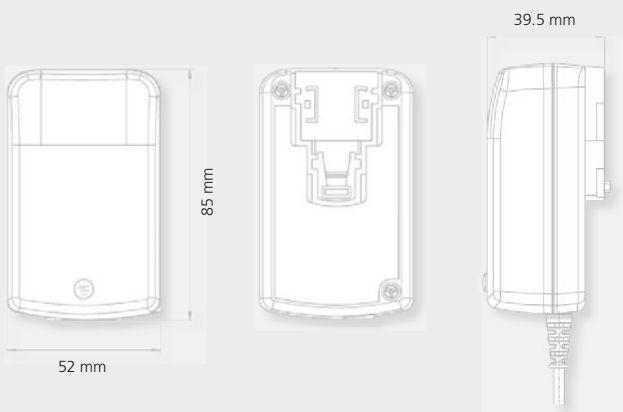
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	1100 mA	200 mV pp	1891201
6 V	1000 mA	200 mV pp	1891653
7.5 V	800 mA	200 mV pp	1891654
9 V	600 mA	200 mV pp	1891655
12 V	500 mA	200 mV pp	1891656
15 V	400 mA	200 mV pp	1891657
18 V	330 mA	200 mV pp	1891658
24 V	250 mA	200 mV pp	1891659

10 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	1600 mA	75 mV pp	1950062
6 V	1400 mA	75 mV pp	1950064
7.5 V	1200 mA	75 mV pp	1950063
9 V	1000 mA	75 mV pp	1950068
12 V	800 mA	75 mV pp	1950082
15 V	700 mA	75 mV pp	1950067
18 V	560 mA	125 mV pp	1950066
24 V	420 mA	125 mV pp	1950065

18 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	3000 mA	75 mV pp	1890854
6 V	2500 mA	75 mV pp	1890920
7.5 V	2000 mA	75 mV pp	1890925
9 V	1800 mA	90 mV pp	1890924
12 V	1500 mA	100 mV pp	1890856
15 V	1200 mA	100 mV pp	1890923
18 V	1000 mA	180 mV pp	1890922
24 V	750 mA	180 mV pp	1890855

Switchmode Power Supplies Medical Series

with exchangeable primary adapters
(MPP 15/30)

All products conform to IEC 60601-1

Applications

- Blood analyser
- Patient monitors
- Measuring equipment
- Laboratory equipment
- Inhalers
- Patient lifts

Characteristics

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Green LED indicator
- Low standby power
≤ 0.3 Watts (PP 8) resp.
≤ 0.5 Watts (MPP 15/30)
- Continuously short circuit proof
- Exchangeable primary adapters (MPP 15/30)

Technical data

Input voltage
Input current

100 to 240 V AC (± 10%)
200 mA (PP 8), 400 mA (MPP 15),
700 mA (MPP 30)

Frequency
Efficiency
EMC

50 to 60 Hz
80 % typ. at full load, PP 8 75%
Conforms to
EN 55011, EN 55022/B,
FCC 47 part 15, EN 61000-3-2,
EN 61000-4-2, EN 61000-4-3,
EN 61000-4-4, EN 61000-4-5,
EN 61000-4-6, EN 61000-4-11

Output voltage tolerance

± 5%

Environmental specification

Operating temperature
Storage temperature
Humidity

0 to 40° C at maximum load
-40 to 70° C, PP 8 (-20 to 70° C)
5 % to 95 % non condensing

Input transient susceptibility

Complies with IEC 61000 requirements

Safety specification

Standards

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

Reliability specification

MTBF calculation

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

Mechanical specification

Weight approx.
Plug connector

110 g (PP 8), 160 g (MPP 15), 255 g (MPP 30)
AC input:
FRIWO exchangeable mains plug system:
EURO, UK, USA/Japan, Australia, IEC
PP 8: EURO, UK, USA/Japan
DC output:
Universal output plug system (page 30)

For primary adapters see page 30



The new **open frame units**
comply with standard IEC 60601-1,
see pages 24/25.

PP 8 FW 7333SM



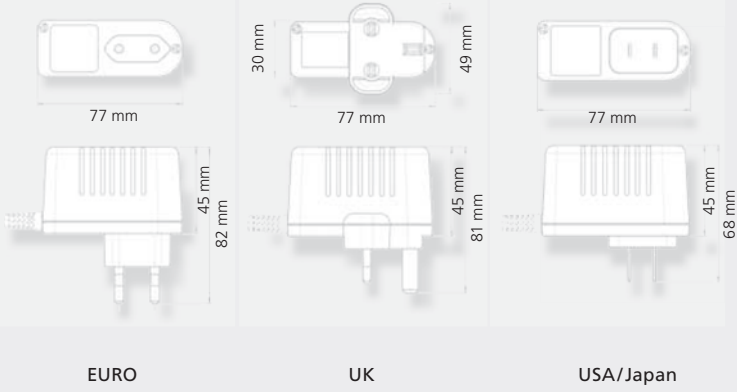
MPP 15 FW 7555M



MPP 30 FW 7362M

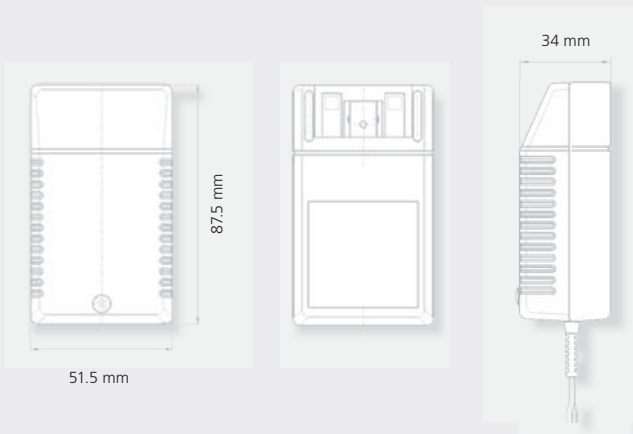


8 Watts



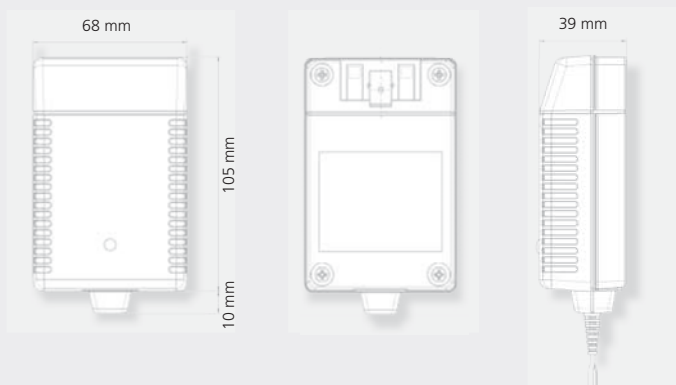
Output data		Ripple	EURO	USA/Japan	UK
Voltage	Current	Voltage	Order No.	Order No.	Order No.
5 V	1300 mA	200 mV pp	1829500	1829589	1829571
6 V	1150 mA	180 mV pp	1829501	1829590	1829572
7.5 V	900 mA	150 mV pp	1829502	1829591	1829573
9 V	800 mA	150 mV pp	1829503	1829592	1829574
12 V	700 mA	150 mV pp	1829504	1829593	1829575
15 V	530 mA	150 mV pp	1829505	1829594	1829576
18 V	440 mA	150 mV pp	1829506	1829595	1829577
24 V	330 mA	150 mV pp	1829507	1829596	1829578

15 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	2400 mA	75 mV pp	1883256
6 V	2100 mA	75 mV pp	1883257
7.5 V	1700 mA	75 mV pp	1883258
9 V	1500 mA	90 mV pp	1883259
12 V	1250 mA	120 mV pp	1883260
15 V	1000 mA	150 mV pp	1883261
18 V	840 mA	180 mV pp	1883262
24 V	625 mA	240 mV pp	1883263

30 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	4000 mA	75 mV pp	1883264
6 V	3600 mA	75 mV pp	1883265
7.5 V	3300 mA	75 mV pp	1883266
9 V	3000 mA	90 mV pp	1883267
12 V	2500 mA	100 mV pp	1883268
15 V	2000 mA	100 mV pp	1883269
18 V	1660 mA	120 mV pp	1883270
24 V	1250 mA	120 mV pp	1883271

Switchmode Power Supplies Medical Series

All products conform to IEC 60601-1

Applications

- Blood analyser
- Patient monitors
- Measuring equipment
- Laboratory equipment
- Inhalers
- Patient lifts

Characteristics

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Green LED indicator
- Leakage current $\leq 10 \mu\text{A}$
(DT 80 $\leq 100 \mu\text{A}$, DT 150 $\leq 100 \mu\text{A}$)
- Low standby power
 ≤ 0.5 Watts (DT 12, DT 150)
 ≤ 0.75 Watts (DT 50, DT 80)
- Continuously short circuit proof

Technical data

Input voltage Input current

100 to 240 V AC ($\pm 10\%$)
300 mA (DT 12), 1100 mA (DT 50),
1500 mA (DT 80), 2000 mA (DT 150)

Frequency

50 to 60 Hz

Efficiency

90 % typ. at full load

EMC

Conforms to
EN 55011, EN 55022/B,
FCC 47 part 15, EN 61000-3-2,
EN 61000-4-2, EN 61000-4-3,
EN 61000-4-4, EN 61000-4-5,
EN 61000-4-6, EN 61000-4-11
 $\pm 5\%$

Output voltage tolerance

Environmental specification

Operating temperature

0 to 40° C at maximum load

Storage temperature

-40 to 70° C

Humidity

5 % to 95 % non condensing

Input transient susceptibility

Complies with IEC 61000 requirements

Safety specification

Standards

Fulfils Class II SELV for the following applications: IEC 60601-1, UL 2601, VDE, CE label, fulfils medical application class B/BF/CF (DT 12/ DT 50) and B/BF (DT 80, DT 150)

Reliability specification

MTBF calculation

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

Mechanical specification

Weight approx.

135 g (DT 12), 295 g (DT 50),
350 g (DT 80), 622 g (DT 150)

Plug connector

AC input: 2-pole IEC 320,
C8-socket (DT 12, DT 50, DT 80)
C14-socket (DT 150)
DC output:
Universal output plug system (page 30)

For power cords see page 30

DT 12 FW 7401M



DT 50 FW 7405M



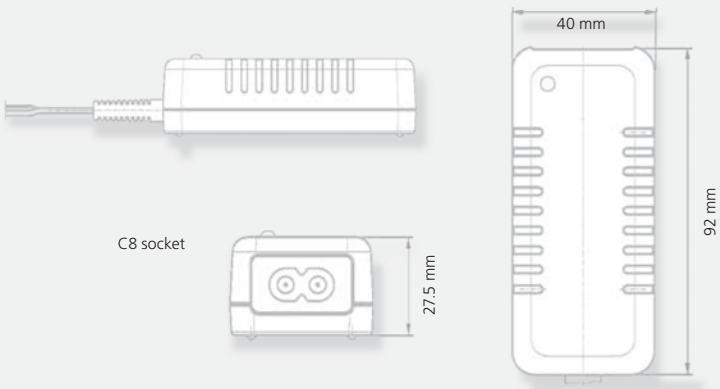
DT 80 FW 7488M



DT 150 DT 150

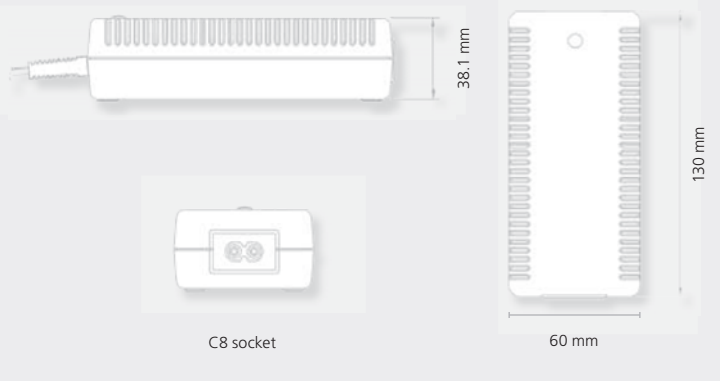


12 Watts



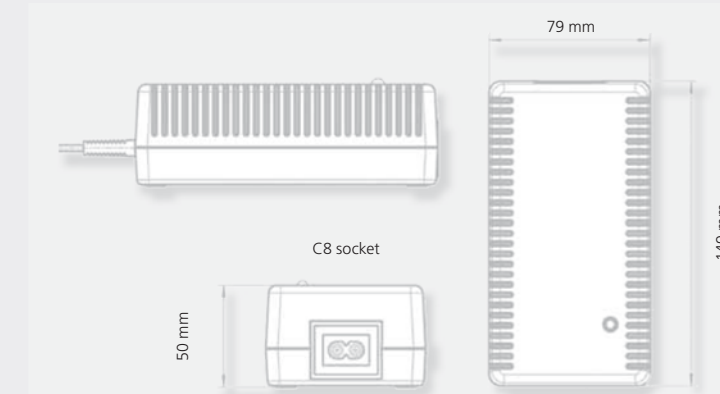
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	2000 mA	120 mV pp	1826391
6 V	1700 mA	120 mV pp	1826392
7.5 V	1400 mA	115 mV pp	1826393
9 V	1200 mA	135 mV pp	1826394
12 V	1000 mA	180 mV pp	1826395
15 V	800 mA	112 mV pp	1826396
18 V	660 mA	135 mV pp	1826397
24 V	500 mA	300 mV pp	1826398

50 Watts



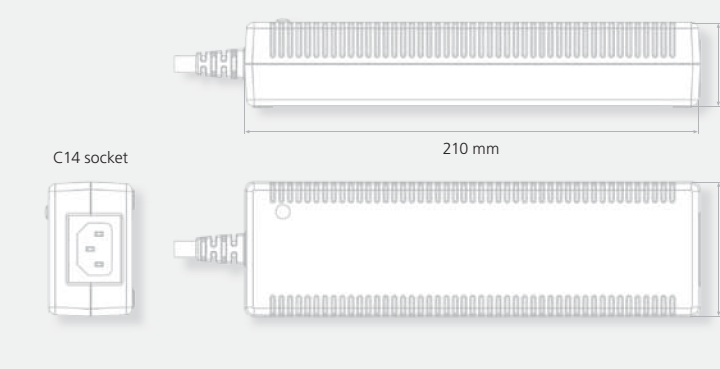
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	5000 mA	120 mV pp	1890649
12 V	3800 mA	120 mV pp	1890650
15 V	3000 mA	120 mV pp	1890839
24 V	2200 mA	120 mV pp	1825898

80 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
12 V	5500 mA	120 mV pp	1890865
15 V	5000 mA	120 mV pp	1828339
24 V	3300 mA	120 mV pp	1890981

150 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
24 V	6250 mA	240 mV pp	1893142

Switchmode Power Supplies USB Series

with exchangeable primary adapters
(GPP USB, GUP)

All products conform to IEC 60950

Applications

- Bluetooth
- Digital cameras
- Wireless communication accessories
- PDA
- Household applications
- MP3 Player
- E-Book

Characteristics

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Exchangeable primary adapters (GPP USB)
- Low standby power ≤ 0.3 Watts
- Continuously short circuit proof
- Low weight
- Compact design

Technical data

Input voltage	100 to 240 V AC ($\pm 10\%$)
Input current	100 mA (PP USB, GUP), 75 mA (GPP USB)
Frequency	50 to 60 Hz
Efficiency	70 % typ. at full load
EMC	Conforms to EN 55011, EN 55022/B, EN 55024, FCC 41 part 15, EN 61000-3-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11
Output voltage tolerance	$\pm 5\%$

Environmental specification

Operating temperature	0 to 45° C at maximum load
Storage temperature	-20 to 70° C
Humidity	5 % to 95 % non condensing
Input transient susceptibility	Complies with IEC 61000 requirements

Safety specification

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

Reliability specification

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

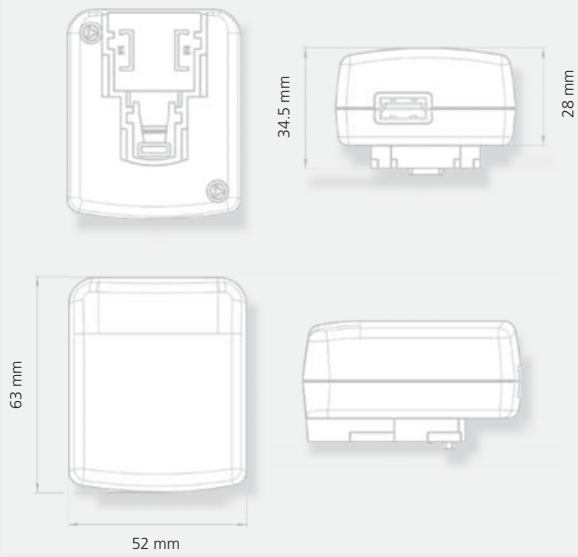
Mechanical specification

Weight approx.	34 g (PP USB), 50 g (GPP USB), 35 g (GUP)
Plug connector	AC input: FRIWO exchangeable mains plug system (GPP USB, GUP): EURO, UK, USA/Japan, Australia, IEC DC output: USB socket type A

For primary adapters see page 30



3.5 Watts

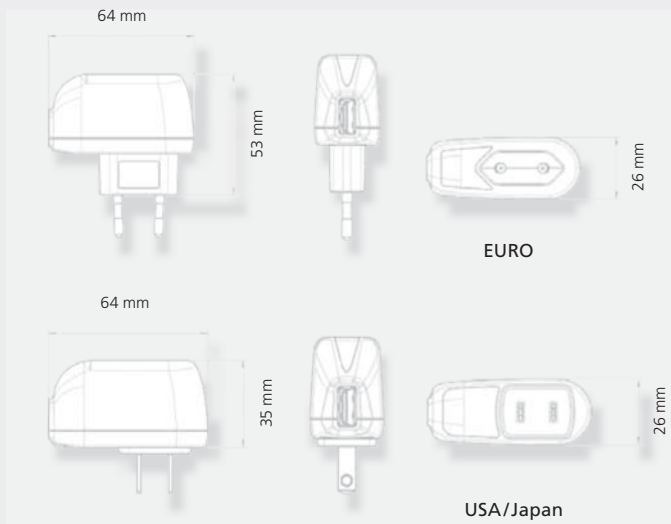


Output data

Voltage	Current	Ripple Voltage	Worldwide Order No.
---------	---------	----------------	---------------------

5 V	700 mA	200 mV pp	1891371
------------	---------------	------------------	----------------

3.5 Watts

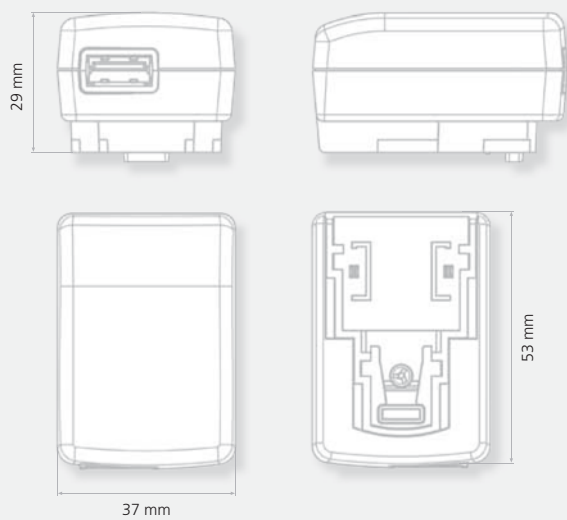


Output data

Voltage	Current	Ripple Voltage	EURO Order No.	USA/Japan Order No.	UK Order No.
---------	---------	----------------	----------------	---------------------	--------------

5 V	700 mA	200 mV pp	1891526	1891525	1832723
------------	---------------	------------------	----------------	----------------	----------------

3.5 Watts



Output data

Voltage	Current	Ripple Voltage	Worldwide Order No.
---------	---------	----------------	---------------------

5 V	700 mA	200 mV pp	1893271
------------	---------------	------------------	----------------



Switchmode Power Supplies In-wall Series

All products conform to
IEC 61558, 60335

Applications

- Safety technology
- Water taps
- Shutter control
- Door opener
- LED applications
- E-Books
- PDA
- MP3-Player
- iPad

Characteristics

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Low standby power
≤ 0.3 Watts
- High output power
- Continuously short circuit proof
- Compact design
- IP 64 protection class

Technical data

Input voltage Input current

100 to 240 V AC (± 10 %)
150 mA (UP 6), 400 mA (UP 12, UP 18),
180 mA (UP USB)

Frequency

50 to 60 Hz

Efficiency

up to 80 % typ. at full load

EMC

Conforms to EN 55011, 55014, EN 55022/B,
EN 55024, FCC 41 part 15, EN 61000-3-2,
EN 61000-4-2, EN 61000-4-3, EN 61000-4-4,
EN 61000-4-5, EN 61000-4-6, EN 61000-4-11,
± 5 % (UP 12, UP 18, UP USB)
± 7 % (UP 6)

Output voltage tolerance

Environmental specification

Operating temperature

0 to 40° C at maximum load

Storage temperature

- 20 to 70° C

Humidity

5 % to 95 % non condensing

Input transient susceptibility

Complies with IEC 61000 requirements

Internal functional

Temperature range

0 to 70° C

Safety specification

Standards

Fulfills Class II SELV for the following
applications: EN 61558/IEC 61558, UL 1310,
VDE, CE label

Reliability specification

MTBF calculation

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

Mechanical specification

Weight approx.

95 g (UP 6), 130 g (UP 12), 130 g (UP 18),
70 g (UP USB)

Plug connector

AC input: 150 mm cable
150 mm cable (UP 6, UP 12, UP 18)
Spring clip 2 x 2,5 mm² (UP USB)
DC output:
150 mm cable (UP 6, UP 12, UP 18)
USB-socket type A (UP USB)
Customer-specific output voltages
Customer-specific cable length

UP 6 FW 7801



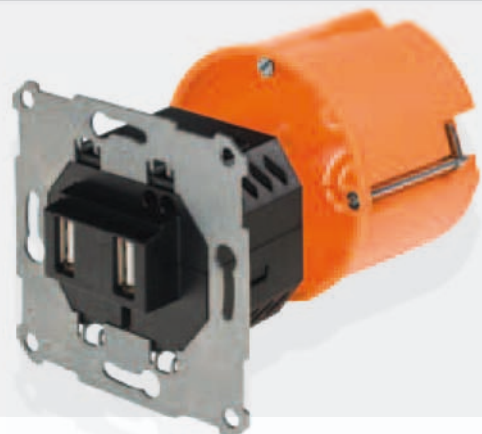
UP 12 FW 7802



UP 18 FW 7803

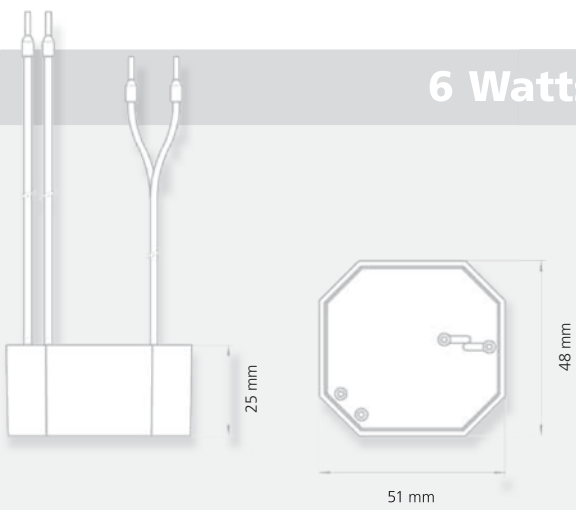


UP USB 153380



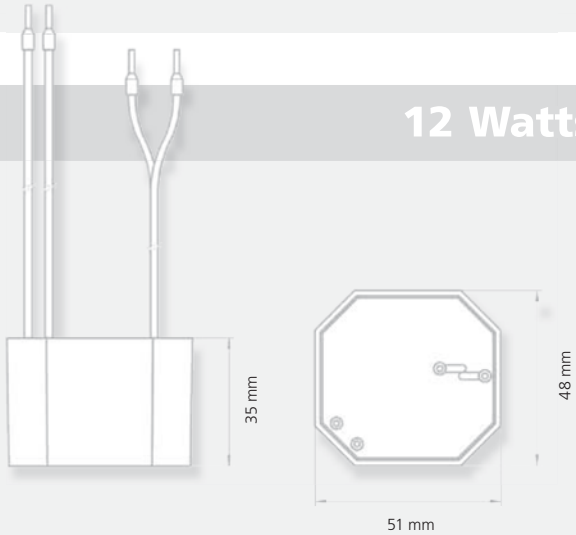
NEW

6 Watts



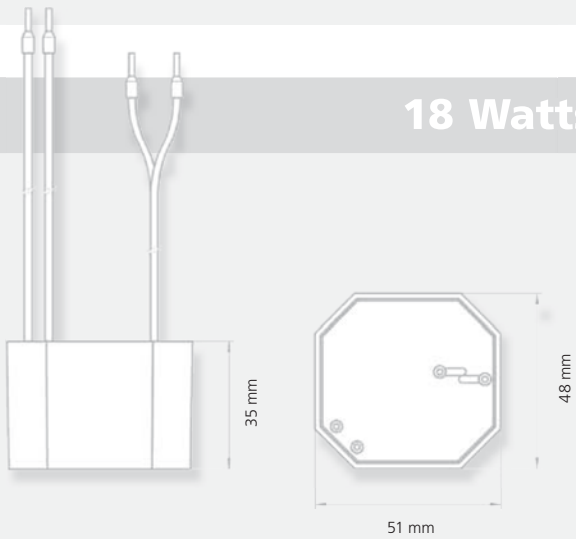
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
4 V	1300 mA	300 mV pp	1891505
6 V	1000 mA	300 mV pp	1891506
9 V	660 mA	300 mV pp	1891507
12 V	500 mA	300 mV pp	1891508
15 V	400 mA	300 mV pp	1891509
18 V	330 mA	300 mV pp	1891510
24 V	250 mA	300 mV pp	1891511

12 Watts



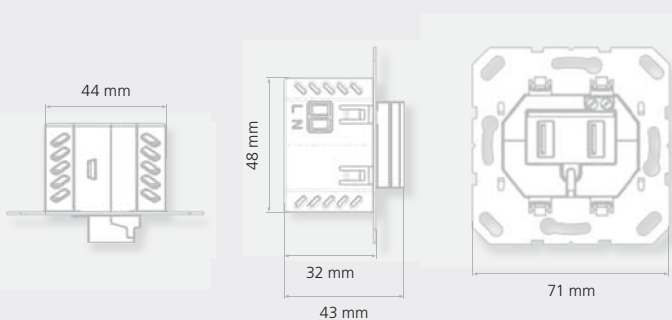
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
12 V	1000 mA		1891767
24 V	500 mA		1891768

18 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
12 V	1500 mA	400 mV pp	1832688
24 V	750 mA	400 mV pp	1891685

7 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	1400 mA	300 mV pp	1891648
Also available without support ring			1894529

Switchmode Power Supplies

Open Frame

All products conform to
61558, 60601-1

Applications

- Laboratory equipment
- Patient lifts
- Label printers
- Measuring equipment
- Laser
- Lighting
- Automation
- Climate chambers
- Electric tools
- Professional kitchen equipment

Characteristics

- Universal input 100 to 240 V AC
- Constant voltage, current limited
- Low standby power
- High efficiency
- Continuously short circuit proof
- Leakage current $\leq 100 \mu\text{A}$
- Small package
- Without active fan

Technical data

Input voltage

100 to 240 V AC ($\pm 10 \%$)

Frequency

50 to 60 Hz

Efficiency

$\geq 87 \%$ typ.

Standby Losses

≤ 0.5 Watts typ.

EMC

Conforms to
EN 55011, EN 55022/B, FCC47 Teil15,
EN 61000-3-2, EN 61000-4-2, EN 61000-4-3,
EN 61000-4-4, EN 61000-4-5, EN 61000-4-6,
EN 61000-4-11

Output voltage tolerance

$\pm 5 \%$

Power factor

≥ 0.9 typ.

Environmental specification

Operating temperature

0 to 70° C

Storage temperature

-20 to +70° C

Humidity

5 % to 95 % non condensing

Input transient susceptibility Complies with IEC 61000 requirements

Safety specification

Standards

Fulfils Class I SELV for the following applications:
IEC 60601, UL 2601, VDE, CE label,
fulfils medical application class B/BF

Reliability specification

MTBF calculation

typ. 200,000 hours at maximum load
and an ambient temperature of 25° C
(in accordance with MIL-HDBK-217)

Mechanical specification

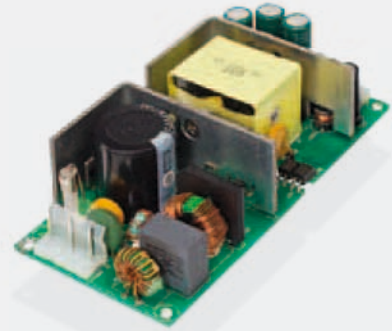
Plug connector

Pin connector, flat-pin plug or contact elements

OF 65 OF65-2



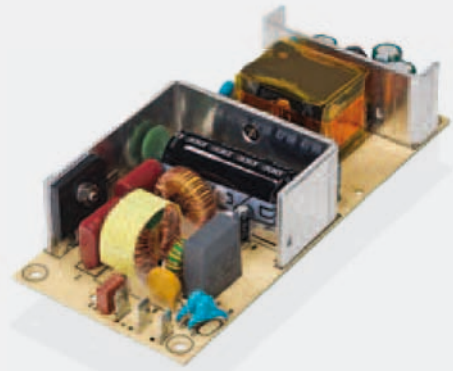
NEW



OF 100 OF100



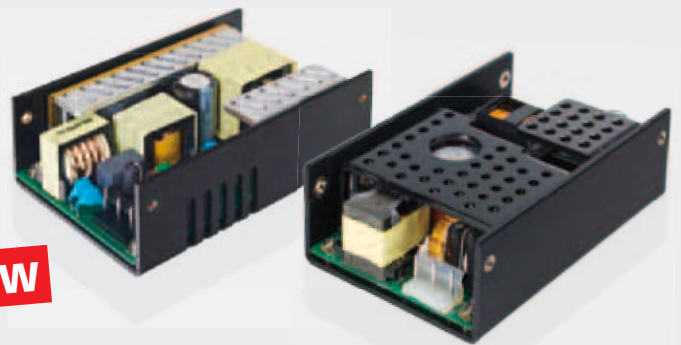
NEW



OF 150 OF150



NEW



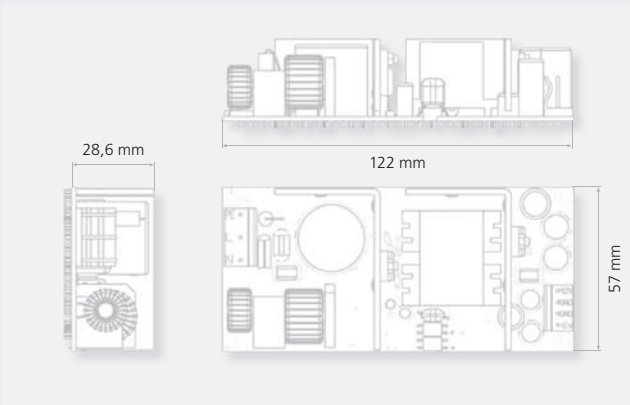
OF 250 OF250



NEW

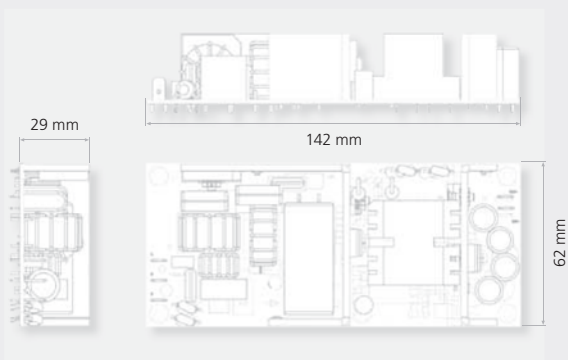


60 Watts



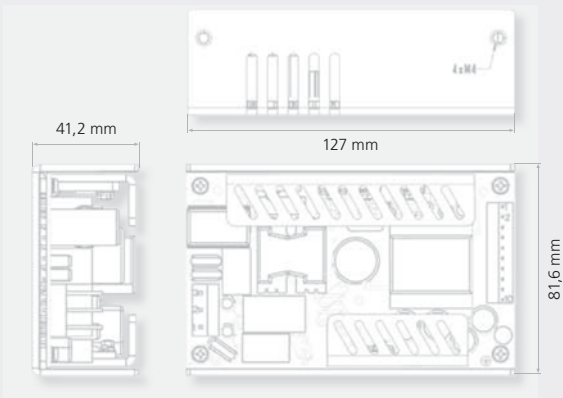
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	1000 mA	75 mV pp	1891628
12 V	5000 mA	200 mV pp	

100 Watts



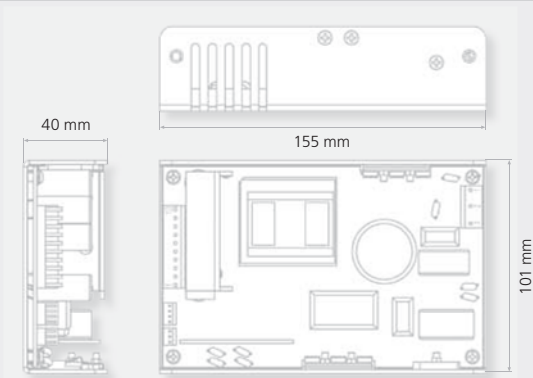
Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
12 V	7500 mA	≤ 150 mV pp	1893590

150 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
12 V	12500 mA	≤ 240 mV pp	1893143
24 V	6250 mA	≤ 120 mV pp	1833612
also available without U-bracket			1891612
48 V	3125 mA	≤ 480 mV pp	1833703

250 Watts



Output data			Worldwide
Voltage	Current	Ripple Voltage	Order No.
5 V	500 mA	50 mV pp	1891705
24 V	10500 mA	240 mV pp	

Switchmode Chargers

Chargers

with exchangeable primary adapters
(MPP 15 and GPP 18/36)

All products conform to
IEC 60335 and IEC 60601-1

Applications

- Medical applications
- Electrical vehicles
- Stair lifts/patient lifts
- Mobile lighting
- Cleaning machines
- Professional photographic technology
- Mobile measuring technology
- Starter batteries
- Diving lamps

Characteristics

- Universal input 100-240 V AC
- Constant voltage, current limited
- Exchangeable primary adapters (MPP and GPP system)
- Low leakage current
- Low standby power
- LED charge indication
- Continuously short circuit proof
- Reverse polarity protection (not MPP 15 Li-Ion)
- 10KNTC, B = 3977 (GPP 18/36)
- Characteristics:
PP 8 = IU0U, MPP 15 = IOIU
GPP 18/36 = IU0

Technical data

Input voltage
Input current

100 to 240 V ($\pm 10\%$)
PP 8 (0.13 – 0.2 A), MPP 15 (0.25 – 0.3 A),
MPP 30 (0.4 – 0.5 A), GPP 18 (0.2 – 0.4 A)
GPP 36 (0.18 – 0.45 A)

Frequency

50 to 60 Hz

Efficiency

75 % at full load

EMC

Conforms to
EN 55011, EN 55022/B, FCC 47 part 15,
EN 61000-3-2, EN 61000-4-2, EN 61000-4-3,
EN 61000-4-4, EN 61000-4-5, EN 61000-4-6,
EN 61000-4-11

Output current tolerance

$\pm 10\%$

Environmental specification

Operating temperature

0 to 40° C at maximum load

Storage temperature

-40 to 70° C

Humidity

5 % to 95 % non condensing

Input transient susceptibility

Complies with IEC 61000 requirements

Safety specification

Standards

Fulfils Class II SELV for the following applications:
IEC 60601-1, IEC 60335-2-29,
UL 1310, UL 2601-1,
VDE, CE label

Reliability specification

MTBF calculation

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

Mechanical specification

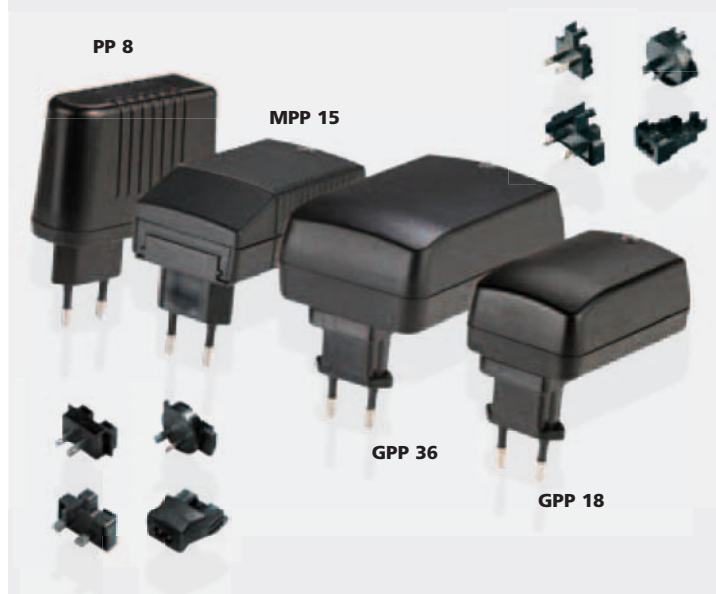
Weight

PP 8 Li-Ion (125 g),
MPP 15 (140 g), MPP 30 (278 g),
GPP 18 (200 g), GPP 36 (320 g)

Plug connector

AC input:
(MPP/GPP) FRIWO exchangeable mains plug system, PP 8 (Euro, USA/Japan, UK)
DC output:
Universal output plug system (page 30)

Li-Ion

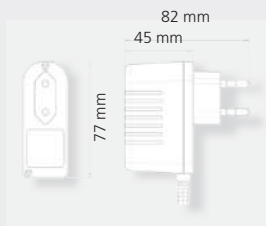


LiFePO₄

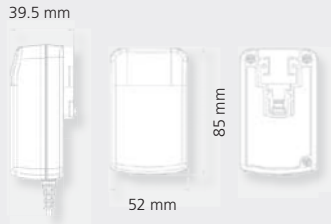


Product	FW Type	Approvals
PP 8 Li-Ion	FW 7574	CE, DVE, GS, C, SPS US
MPP 15 Li-Ion	FW 7219	CE, DVE, GS, C, UL US
GPP 18 Li-Ion	FW 7290	CE, DVE, GS, C, SPS US
GPP 36 Li-Ion	FW 7300	CE, DVE, GS, C, SPS US
GPP 18 LiFePO ₄	FW 7290	CE, DVE, GS, C, SPS US
GPP 36 LiFePO ₄	FW 7300	CE, DVE, GS, C, SPS US

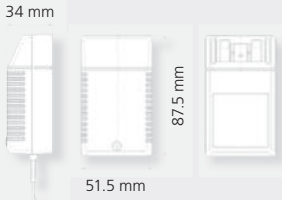
For primary adapters see page 30



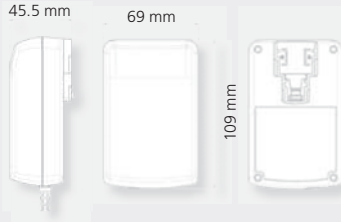
PP 8 Euro



GPP 18

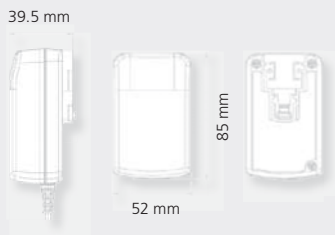


MPP 15

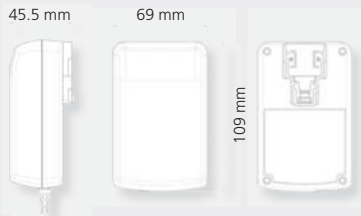


GPP 36

GPP 18



GPP 36



Output data				EURO	USA/Jap.	UK	
Voltage	Current	cells	Capacity	Housing	Order No.	Order No.	Order No.
4.1 V	1000 mA	1	0.8 – 10 Ah	PP 8	1890124	1891148	1891149
4.1 V	600 mA	1	0.8 – 10 Ah	PP 8	1828253	1891150	1891151
4.2 V	1000 mA	1	0.8 – 10 Ah	PP 8	1829906	1891161	1891162
4.2 V	600 mA	1	0.8 – 10 Ah	PP 8	1829804	1891159	1891160
Worldwide							
8.4 V	800 mA	2	0.8 – 5.0 Ah	MPP 15	1826003		
12.6 V	800 mA	3	0.8 – 5.0 Ah	MPP 15	1826004		
16.8 V	800 mA	4	0.8 – 5.0 Ah	MPP 15	1826006		
with NTC							
8.4 V	800 mA	2	0.8 – 5.0 Ah	MPP 15	1826458		
12.6 V	800 mA	3	0.8 – 5.0 Ah	MPP 15	1826459		
16.8 V	800 mA	4	0.8 – 5.0 Ah	MPP 15	1826460		
4.2 V	3000 mA*	1	20 Ah	GPP 18	1832657		
8.4 V	1500 mA*	2	20 Ah	GPP 18	1832658		
4.2 V	4000 mA**	1	1.0 – 20 Ah	GPP 36	1834050		
8.4 V	3500 mA**	2	1.0 – 20 Ah	GPP 36	1834051		
12.6 V	2500 mA**	3	1.0 – 20 Ah	GPP 36	1834052		
16.8 V	2000 mA**	4	1.0 – 20 Ah	GPP 36	1834053		
21.0 V	1600 mA**	5	1.0 – 20 Ah	GPP 36	1834054		

Output data					Worldwide
Voltage	Current	No. of cells	Capacity	Housing	Order No.
3.6 V	3000 mA*	1	20 Ah	GPP 18	1832654
7.2 V	1500 mA*	2	20 Ah	GPP 18	1832655
3.6 V	4000 mA**	1	20 Ah	GPP 36	1834055
7.2 V	3500 mA**	2	20 Ah	GPP 36	1834056
10.8 V	2500 mA**	3	20 Ah	GPP 36	1834057
14.4 V	2000 mA**	4	20 Ah	GPP 36	1834058
18.0 V	1600 mA**	5	20 Ah	GPP 36	1834059

* without NTC 1.5 A
** without NTC 1.6 A

Charge voltage can be adjusted for specific cell packs.
Please observe accu specification.

Switchmode Chargers

Chargers

with exchangeable primary adapters
(MPP 15/30 and GPP 18/36)

All products conform to
IEC 60335 and IEC 60601-1

Applications

- Medical applications
- Electrical vehicles
- Stair lifts/patient lifts
- Mobile lighting
- Cleaning machines
- Professional photographic technology
- Mobile measuring technology
- Starter batteries
- Diving lamps

Characteristics

- Universal input 100–240 V AC
- Constant voltage, current limited
- Exchangeable primary adapters (MPP and GPP system)
- Low leakage current
- Low standby power
- LED charge indication
- Continuously short circuit proof
- Reverse polarity protection (not PP 8 Pb)
- 10KNTC, B = 3977
- Characteristics: Pb = IU0U

Technical data

Input voltage
Input current

100 to 240 V ($\pm 10\%$),
PP 8 (0.13 – 0.2 A),
MPP 15 (0.25 – 0.3 A), MPP 30 (0.4 – 0.5 A),
GPP 18 (0.2 – 0.4 A) GPP 36 (0.18 – 0.45 A)

Frequency
Efficiency
EMC

50 to 60 Hz
75 % at full load
Conforms to
EN 55011, EN 55022/B, FCC 47 part 15,
EN 61000-3-2, EN 61000-4-2, EN 61000-4-3,
EN 61000-4-4, EN 61000-4-5, EN 61000-4-6,
EN 61000-4-11

Output current tolerance

$\pm 10\%$

Environmental specification

Operating temperature

0 to 40° C at maximum load

Storage temperature

-40 to 70° C

Humidity

5 % to 95 % non condensing

Input transient susceptibility

Complies with IEC 61000 requirements

Safety specification

Standards

Fulfils Class II SELV for the following applications:
IEC 60601-1 (NiCd/NiMH only MPP 15)
IEC 60335-2-29, UL 1310, UL 2601-1 (only Li-Ion),
VDE, CE label, CSA

Reliability specification

MTBF calculation

200,000 hours resp. 100,000 hours
(NiCd/NiMH) at maximum load
and an ambient temperature of 25° C
(in accordance with MIL-HDBK-217)

Mechanical specification

Weight approx.

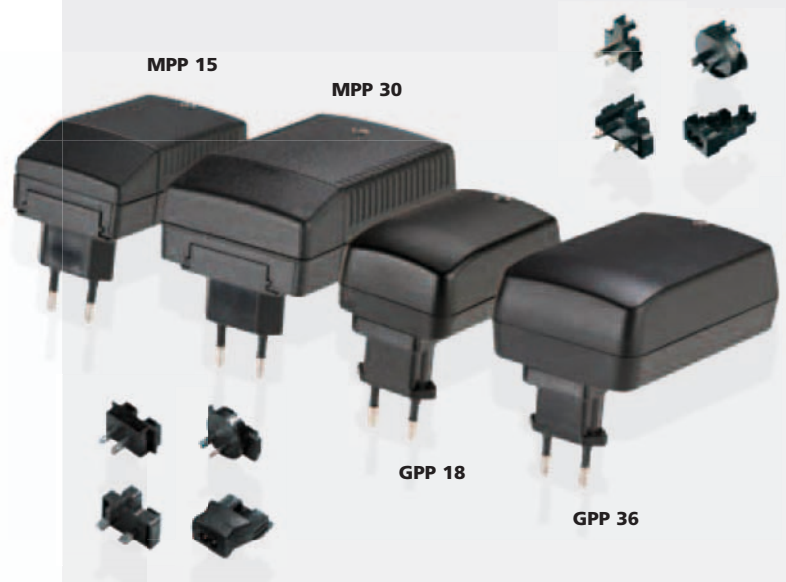
PP 8 Li-Ion (125 g),
MPP 15 (140 g), MPP 30 (278 g),
GPP 18 (200 g) GPP 36 (320 g)

Plug connector

AC input:
(MPP/GPP) FRIWO exchangeable mains plug
system, PP 8 (Euro, USA/Japan, UK)
DC output:
Universal output plug system (page 30)

For primary adapters see page 30

NiCd/NiMH



Pb



Product

FW Type

Approvals

MPP 15
NiCd/NiMH

FW 7219



MPP 30
NiCd/NiMH

FW 7304



GPP 18
NiCd/NiMH

FW 7290



GPP 36
NiCd/NiMH

FW 7300



PP 8
Lead Acid

FW 7118



MPP 15
Lead Acid

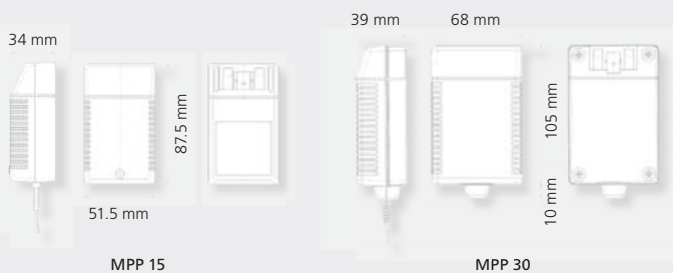
FW 7218



MPP 30
Lead Acid

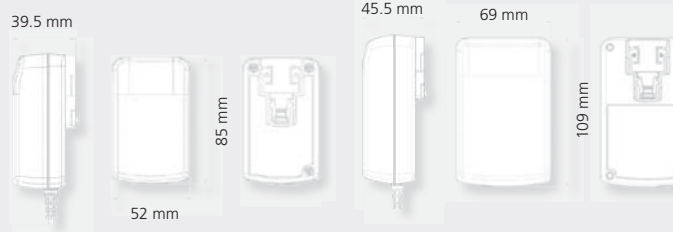
FW 7318





MPP 15

MPP 30



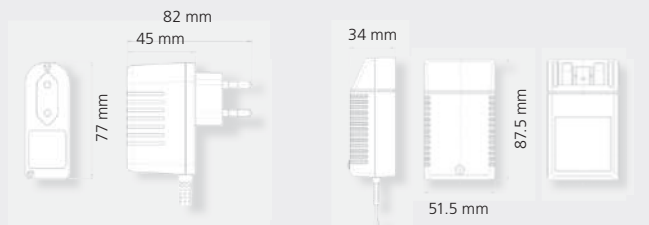
GPP 18

GPP 36

Output data				Switch-off criteria			Worldwide
Capacity	Current	Cells	Housing	TI	TG	-DU	Order No.
3.5 – 7.0 Ah	950 mA	10 – 20	MPP 30	·	·		1811894
2.8 – 7.0 Ah	1000 mA	10 – 12	MPP 30	·	·		1812609
2.5 – 4.5 Ah	1400 mA	8 – 12	MPP 30	·	·		1880408
2.5 – 10.0 Ah	2000 mA	5 – 6	MPP 30	·	·		1818681
1.0 – 10.0 Ah	800 mA	4 – 10	MPP 15	·	·	·	1826002
1.0 – 10.0 Ah	800 mA	4 – 10	MPP 15	·	·		1890127
1.0 – 35.0 Ah	1.5–3.0 A*	2 – 6	GPP 18	·	·	·	1832656
1.0 – 35.0 Ah	1.6–4.0 A**	2 – 12	GPP 36	·	·	·	1834049

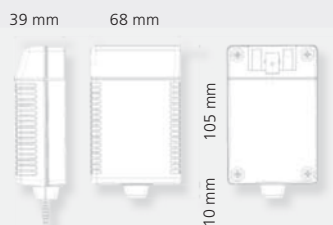
Switch-off criteria: TI = time, TG = T. grad, -DU = -Delta-U

* without NTC 1.5 A
** without NTC 1.6 A



PP 8 Euro

MPP 15



MPP 30

Output data					
Voltage	Current	Zellen	Capacity	Housing	Order No.
6 V	900 mA	3	2.4 – 16.0 Ah	PP 8 EU	1890125
6 V	900 mA	3	2.4 – 16.0 Ah	PP 8 UK	1824106
6 V	900 mA	3	2.4 – 16.0 Ah	PP 8 US	1824107
6 V	1600 mA	3	4.8 – 32.0 Ah	MPP 15	1890126
6 V	3000 mA	3	9.0 – 60.0 Ah	MPP 30	1890129
12 V	500 mA	6	1.5 – 10.0 Ah	PP 8 EU	1824396
12 V	500 mA	6	1.5 – 10.0 Ah	PP 8 US	1825090
12 V	1000 mA	6	3.0 – 20.0 Ah	MPP 15	1890240
12 V	2000 mA	6	6.0 – 40.0 Ah	MPP 30	1890243
24 V	500 mA	12	1.5 – 10.0 Ah	MPP 15	1890241
24 V	1000 mA	12	3.0 – 20.0 Ah	MPP 30	1890130
24 V	1500 mA	12	4.5 – 30.0 Ah	MPP 30	1890222

Charge voltage can be adjusted for specific cell packs.
Please observe accu specification.

Accessories

Primary adapters

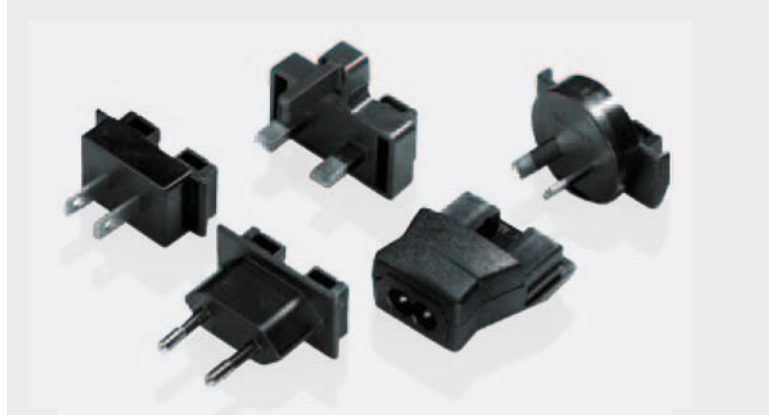
The MPP/GPP line is available with country-specific mains plugs. The products are therefore universally applicable. Not only do the plugs enhance mobility and reliability of the corresponding product, they even facilitate the management of the country versions of power supplies and chargers.

In countries with mains plugs which are not covered by EURO, UK, USA/Japan and Australia mains plug types, the IEC adapter with the 2-pin IEC 320 C8 socket provides a standardized alternative.

Primary adapters GPP system



Primary adapters MPP system

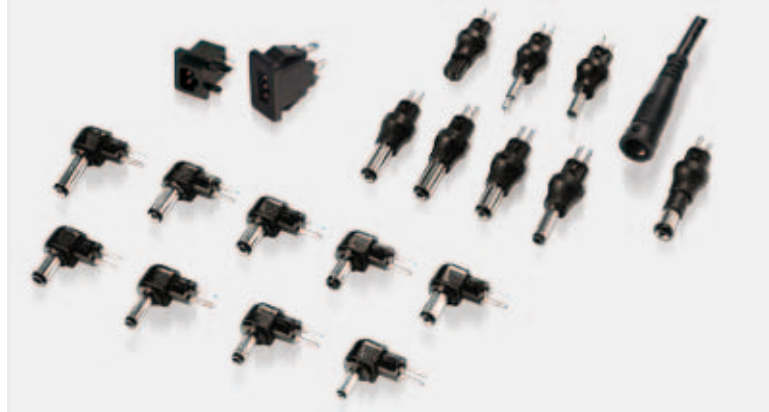


Secondary adapters

All standard units come with a round lead of 1.83 m length and our approved secondary adapter system. Depending on the required output voltage, the wire diameter is between 0.25 mm² (AWG30) and 1,31 mm² (AWG16). FRIWO also offers a broad range of secondary output plugs, including coaxial plugs (acc. to DIN 45323) and jack plugs (acc. to DIN 45318). Polarity is adjustable by reversing connector.

Customer-specific leads are also an option. If necessary, customer-specific flat or round leads can be fitted. Special versions as well as types and dimensions of low voltage plugs are available too.

Secondary adapters

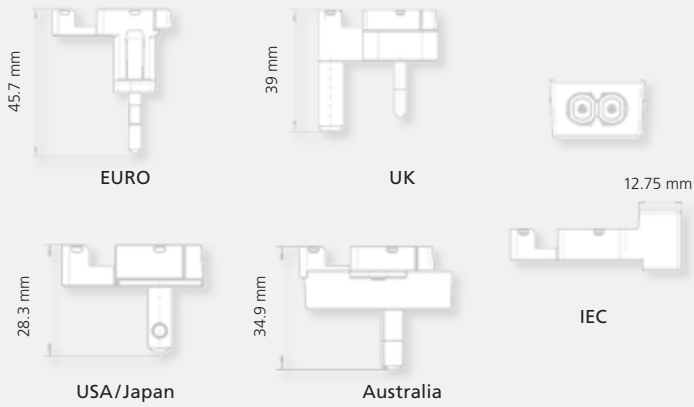


Power cords

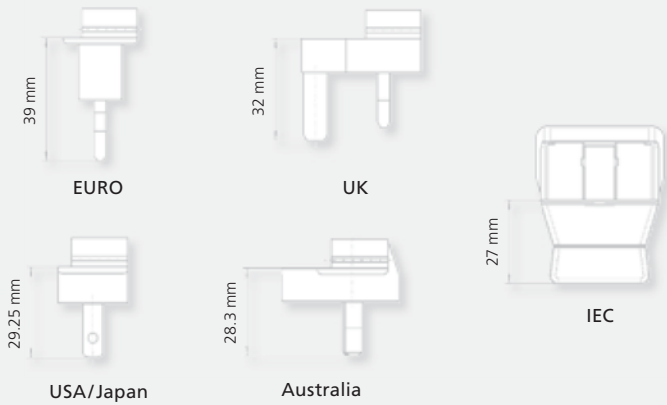
Power cords with 2 contact IEC 320 C7 mains plug provide a specific solution for each country. All power cords are 2 m of length and can be used with our IEC 320 CB socket for the MPP/GPP and DT lines.

Power cords





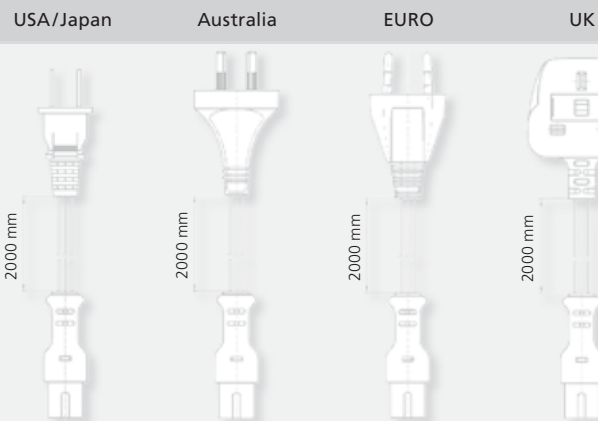
Primary adapter	GPP
Country	Order No.
EURO	1827417
UK	1827420
USA/Japan	1827422
Australia	1827425
IEC	1827428
Korea	1835619
Argentina	1831610
India	1831323
China	1835620
Brasil	1835621



Primary adapter	MPP
Country	Order No.
EURO	1717707
UK	1717618
USA/Japan	1717715
Australia MPP 15	1800496
Australia MPP 6/30	1804237
IEC	1809281
Korea	1832029

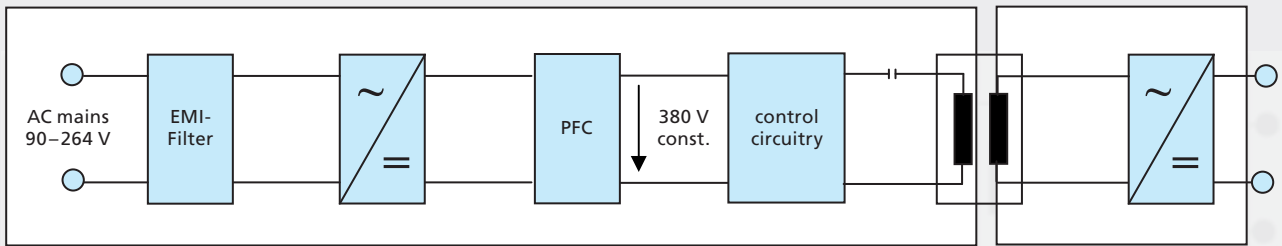
Straight coaxial connectors				Angled coaxial connectors			
Ø out.	Ø in.	Length mm	Order No.	Ø out.	Ø in.	Length mm	Order No.
3.5	1.3	9.5	1807699	3.5	1.3	9.5	1822478
4.0	1.7	9.5	1822557	4.0	1.7	9.5	1822558
4.0	1.7	11.0	1811994	4.0	1.7	11.0	1822482
4.8	1.7	9.5	1822559	4.8	1.7	9.5	1822560
5.5	2.1	9.5	1807700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

Straight jack connectors			Connectors/sockets	
Ø out.	Length mm	Order No.	Description	Order No.
2.5	13	1807704	Texas connector	
3.5	14	1807705	Straight Texas connector	1807706
			Angled Texas connector	1822486
Angled jack connectors			Texas sockets 2-pin	
2.5	13	1822484	Snap in type	1323938
3.5	14	1822485	PCB type	1321609
			Texas sockets 3-pin	
			Snap in type	1327259
			PCB type	1363506



Power cords	
Country	Order No.
EURO	1812274
UK	1812275
USA/Japan	1812276
Australia	1812277

Inductive charging



Block diagram of inductive charger

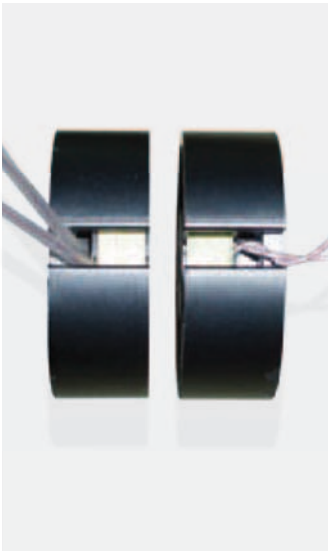
FRIWO not only engineers classic power supplies but also engages in inductive charging. Inductive charging means energy transmission without wiring or electrical contacts between charger and end product.

The benefits of contactless charging are reflected in the improved handling of equipment for daily use (toothbrushes, cell phones). It is also most suited for other applications. The absence of connecting leads or plugs between charger and product allows completely encapsulated systems to be used under water, for medical applications and in potentially explosive areas (e.g. flammable gases).

The development of products often creates new challenges like:

- changed system component requirements
- energy transmission between mechanically separated primary and secondary side
- changed efficiency standards
- disturbances in the alternating magnetic field
- positioning of primary and secondary bobbin
- detection of foreign objects, etc.

FRIWO has managed to cope with these challenges and already supplies notable customers with inductive chargers of 30 Watts max.



EMS

FRIWO – Your service provider for electronic modules and devices

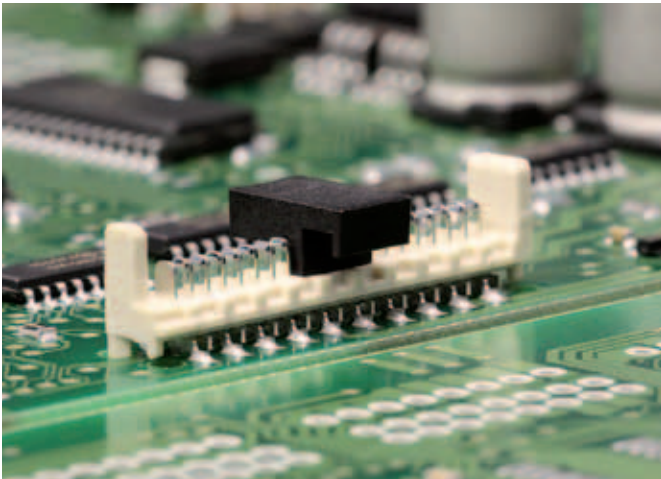


FRIWO takes care of your entire electronic contract manufacture. You turn in your specifications and bill of materials - we do the rest and you get everything from a single source - after prior consultation. Our experienced staff will guide you all the way, from inquiry to production, from testing and packing to delivery. The experts of our strategic and operative purchasing department

engage in worldwide sourcing of the required electronic and mechanical components. Process liability is safeguarded by automatic inspection systems. Voltage and current are trimmed by laser. The quality department is significantly involved and monitors each and every production step.



EMS



Final inspection plays an important role and belongs to FRIWO's core competences. It is supported by in-circuit and functional testing equipment. FRIWO is DIN EN ISO 9001-2000 and DIN EN ISO 14001 2005 certified. Should an automatic production turn out to be impracticable because of product size or weight, FRIWO will immediately switch to manual production. Volume flexibility is also not foreign to us.

The use of lead-free solder has become mainstream to the increasing global trend in environmental issues. FRIWO immediately responded and complies with RoHS „Restriction of the use of certain hazardous substances in electrical and electronic equipment“.

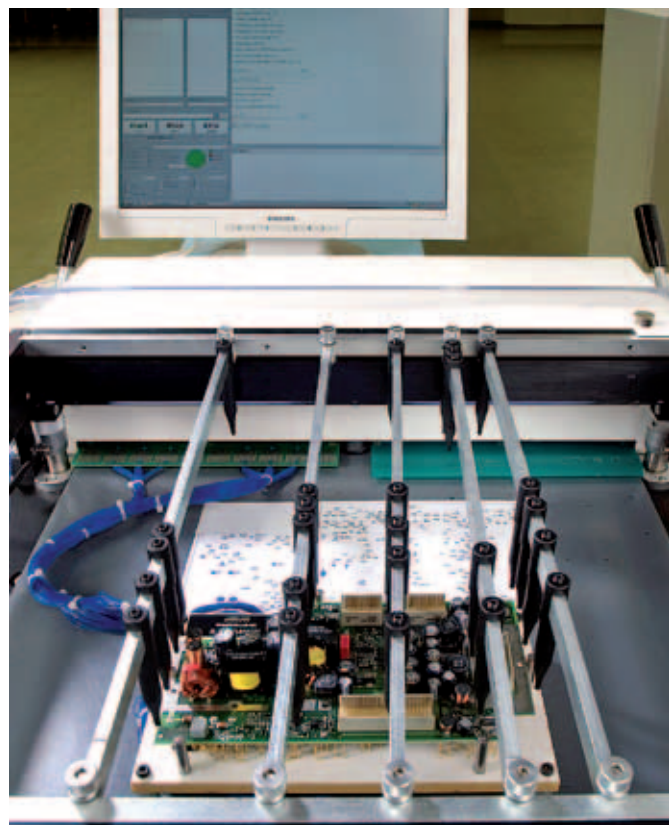
Our EMS service yields important synergies for you which will significantly influence your product's profitability. Outsourcing was once considered just a way to save costs, now there are even more benefits: you can focus on your core competences, and you get extra capacities which help you to avoid bottlenecks or overcapacities. FRIWO offers state-of-the-art equipment and standards which reduce the customer's entrepreneurial risk. No need to invest in new technologies, capital lockup is minimized and liquidity increased.

Your are looking for a partner you can rely on? You have come to the right place!



Service portfolio	
PCB assembly	THT SMT
Placement technology	Adhesive technology Reflow technology Wave soldering Selective soldering
Inspections	Automatic-Optical-Inspection In-circuit test Functional test Special tests (e.g. boundary scan) Safety tests
Protective Coating	
Potting technology	
Assembly	Screwdriving technology Ultrasonics
Prototyping	
Handling of complete subassemblies (outsourcing/insourcing)	
Testing equipment development and construction	
Material management (worldwide)	
Certifications	DIN EN ISO 9001:2000 DIN EN ISO 14001:2005 (September 2011) DIN EN ISO TS 16949 DIN EN ISO 13485 (medical)

Technical Equipment	
SMT assembly 200,000 components/h	Siemens X 3 Siemens X 4 Siemens HF 2 Siemens HF 3 MPM printer Ekra printers Dispenser Gemini 2
THT assembly 90,000 components/h	Universal 8 XT Triple Scan Universal VCD/Sequencer 8
Reflow soldering	SMT QPM (nitrogen)
Wave soldering	SEHO nitrogen plants (lead-free) SEHO air plant ERSA selective soldering
Inspections	AOI systems (EOL, paste AOI, stand-alone) Mitutoyo BHN 506 3D coordinate measuring machine in-circuit/combi testers (Reinhardt KMFT 470) in-circuit/combi testers (SPEA 100 AP) in-circuit/combi testers (SPEA 3030) laser trimmer (general scanning) boundary scan system (Jtag) PC functional testing technology high-voltage and leakage current tester (Sefelec) EMC lab
Potting/Varnishing	Scheugenpflug vacuum potting system Scheugenpflug potting system



Glossary

Type of accu	Lead Acid	NiCd	NiMH	Li-Ion cobalt	Manganese	LiFePO ₄
Cell voltage	2.0 V	1.2 V	1.2 V	3.6 resp. 3.7 V		3.3 V
Energy density [Wh/kg]	30–50	45–80	60–120	110–190	110–120	90–130
Self-discharge ratio per month	5%	20%	30%	2–5%		2–5%
Overload tolerance	high	moderate	low	very low		very low
Charging cycles	200–400	1500	300–500	300–500		1000–2000
Charging method	U = const.	I = const.	I = const.	300–500		U = const.
Charging characteristic	IU0U, IU1a	I0I	I0I	IUa	IUa	IUa
	Phase 1: constant current	Charging criteria: -dV, dT/dt, dU/dt, T _{max}		Phase 1: constant current	Phase 1: constant current	
	Phase 2: constant voltage	Identification and control via microcontroller		Phase 2: constant voltage ± 1 % tolerance	Phase 2: constant voltage ± 1 % tolerance	
	Phase 3: trickle charge					

Abbreviations

PP	= Power Plug
MPP	= Multi Power Plug
GPP	= Global Power Plug
UP	= in-wall
DT	= Desktop
OF	= Open frame
SMT	= Surface Mount Technology
USB	= Universal Serial Bus
EMS	= Electronic Manufacturing Service
LED	= Light Emitting Diode

Cell chemistries

Li-Ion	= Lithium Ion
LiFePO ₄	= Lithium Iron Phosphate
Pb	= Lead Acid
NiCd	= Nickel Cadmium
NiMH	= Nickel Metal Hydride

Ambient temperature

Temperature of inactive air which surrounds the power supply. It is usually measured approx. 10 mm apart from the running power supply.

Class B

Protection against electric shock in due consideration of the leakage current.

Class BF

Like B, but taking into account the so-called „F parts“ which may accidentally come into contact with the patient and which are isolated from other parts.

Class CF

Class with the highest protection.

Current limited

Electronic overload protection which limits the maximum output current to a preset value.

Efficiency

Efficiency is calculated as the ratio of output to input power and is always smaller than 1. To reduce the power loss under the given load prerequisites, the maximum efficiency ratio is aspired. For a power supply it is measured at full load and at nominal input. The difference between input and output is transposed into heat, hence each increase of the efficiency ratio means less thermal stress on the components and therefore a life-cycle increase. Even a minor improvement of the efficiency ratio can have a dramatic impact on the life-cycle.

Standards	Office /IT	Medical	Tools, chargers, toys, household appliances	EMC	Surge	Burst
EU	EN60950-1	EN60601-1	EN60335-1	EN61000/EN55014	EN61000-4-4	EN61000-4-5
USA	UL60950-1	UL60601-1	UL 1310/E60335/UL 697	FCC 47 part 15/EN61000	EN61000-4-4	EN61000-4-5
Canada	C22.2 No. 60950-1	C22.2 No. 60601.1-M90	C22.2 No.223-M91 C22.2 No.173-M1983 (Toys)	FCC 47 part 15/EN61000	EN61000-4-4	EN61000-4-5
China	GB4943	GB9706.1	GB4706	GB4343.1	GB/T17626.4	GB/T17626.5

EMC

The ability of electrical equipment to function satisfactorily in its electromagnetic environment without negative interferences. Power supplies should meet at least two generic standards for EMC:

1. standard for transient emissions (grid-bound interferences emitted by the power supply) and
2. standard for interference immunity (protection against external interferences)

These generic standards comprise a multitude of sub-standards that define threshold values for subdomains (for example certain types of interferences). FRIWO power supplies meet these standards to a higher degree than required to make the most of EMC, and to safeguard a trouble-free service.

Life-cycle

Life-cycle of a power supply. After the end of life power supplies are likely to break down because of worn components.

NTC

A temperature-sensitive resistor with negative coefficient which reduces the resistance as temperature increases. It is therefore also called thermistor. It serves not only the temperature monitoring but also limits the inrush current of power supplies.

Operating temperature

Temperature of still air surrounding the device. It is usually measured approx. 10 mm next to the operated device.

Overvoltage resistance

A circuitry within the power supplies monitors the output. If a preset threshold value is exceeded, the power supply will be turned off.

Short circuit proof

Short circuit proof means that a temporary short circuit can be absorbed without damage.

Single range

Power supplies with single input voltage for the use in the respective countries.

SMT

SMT is a surface mount technology which allows surface mountable components with solderable pads (without wire connectors) to be soldered directly onto a PCB.

Standby losses

Power consumption of a power supply during idle service.

Storage temperature

Temperature range in which a device may be stored (not operated) without being damaged.

Sustained short circuit proof

A short circuit might occur without damaging the output. As soon as the problem is solved, the output will return to normal service.

THT

Stands for „through-hole technology“. Wired components are connected to the PCB by vias and connected by a special THT soldering process.

Voltage controlled

A control loop in the power supply stabilizes the output voltage, independent of all factors (e.g. temperature).

Wide range

Power supplies with wide range input can be operated at different nominal voltages without having to be adjusted (manually or automatically).

FRIWO worldwide

Europe Germany

FRIWO Gerätebau GmbH

Postfach 1164
Von-Liebig-Strasse 11
D-48346 Ostbevern
Tel.: +49 25 32 81 - 0
Fax: +49 25 32 81 - 112
sales@friwo.de
www.friwo.de

Asia China

FRIWO Power Solutions

Technology (ShenZhen) Co. Ltd.
B1 Building, 3rd XinAn Industrial Zone
HangCheng Industrial Zone, XiXiang
BaoAn District, ShenZhen, P.R. China
Postcode: 518102
Tel.: +86 755 33 25 58 88
Fax: +86 755 33 26 02 69
sales.asia@friwo.com.cn
www.friwo.com

FRIWO Shanghai

Rm. 601, Bldg. No. 1,
RongBo Commercial Bldg.
No. 335 XianXia Rd.,
ChangNing District,
Shanghai
Postcode: 200051
Tel.: +86 21 62 35 01 21
Fax: +86 21 62 35 02 89
sales.asia@friwo.com.cn
www.friwo.com

Asia Japan

FRIWO Japan branch

Masuni Dai-ichi Building, 6F
4-6, Shinyokohama, 2-chome, Kohoku-ku,
Yokohama-shi, Kanagawa 222-0033
Japan
Tel.: +81 45 470 - 02 06
Fax: +81 45 470 - 02 07
friwojp@friwojp.com
www.friwo.com

Distributors Europe

Austria

Kellner Netcom GmbH
Siemensstrasse 28
70825 Korntal-Münchingen
Tel.: +49 71 50 9 13 16 - 34
Fax: +49 71 50 9 13 16 - 44
friwo@kellner-netcom.de
www.kellner-netcom.de

Belgium

Alcom electronics NV / SA
Singel 3
2550 Kontich
Tel.: +32 3-458 30 33
Fax: +32 3-458 31 26
info@alcom.be
www.alcom.eu

Finland

Oy Flinkenberg Ab
PL 69 (Mikkelänkallio 3)
02771 Espoo, Finland
Tel.: +358 9 859 911
Fax: +358 9 8599 1306
electronics@flinkenberg.fi
www.flinkenberg.fi

France

CATS S. A.
19 avenue de Norvège - BP342
Villebon Sur Yvette
91958 Courtabœuf cedex
Tel.: +33 1 69 59 21 54
Fax: +33 1 69 59 21 51
friwo.cats@fr.oleane.com
www.cats-france.fr

Germany

Hubert Schroeter KG (Agency)
Schroeter electronic Handels-
gesellschaft mbH (Distribution)
Saseler Bogen 1
22393 Hamburg
Tel.: +49 40 60 00 06 - 0
Fax: +49 40 60 00 06 - 30
info@schroeter-kg.de
www.schroeter-kg.de
info@schroeter-electronic-gmbh.de
www.schroeter-electronic-gmbh.de

Kellner Netcom GmbH
Siemensstrasse 28
70825 Korntal-Münchingen
Tel.: +49 71 50 9 13 16 - 34
Fax: +49 71 50 9 13 16 - 44
friwo@kellner-netcom.de
www.kellner-netcom.de

Ireland

Eltech Ltd.
Rubicon Centre
CIT Campus
Bishopstown
Cork
Tel.: +353 86 255 66 50
eltech@iol.ie
www.friwo.com

Israel

Tamuz Electronics Ltd.
3 Hayozma St. Industrial Zone
Kfar-Saba 44422 Israel
P.O Box 7124, Kfar-Saba 44641 Israel
Tel.: +972 9 76 33 000
Fax: +972 9 76 33 011
info@tamuz-ele.co.il
www.tamuz-ele.co.il

Italy

ELSAP SPA
Viale Famagosta, 61
20142 Milano
Tel.: +39 02 89 12 52 72
Fax: +39 02 89 12 53 04
fbenedetti@elsap.it
www.elsap.it

Distributors North America

Netherlands

Alcom Electronics B.V.
Rivium 1e straat 52
2909 LE Capelle a/d IJssel
Tel.: +31 10-288 25 00
Fax: +31 10-288 25 25
info@alcom.nl
www.alcom.eu

Poland

Elhurt Spółka z o.o.
ul. Galaktyczna 35A
80-299 Gdańsk
Tel.: +48 58 554 0800
Fax: +48 58 554 0807
elhurt@elhurt.com.pl
www.elhurt.com.pl

Russia

ELTECH SPb
10/6 Dvinskaya str.
198035 Saint-Petersburg
Tel.: +7 812 635 50 60
Fax: +7 812 635 50 70
ekaterina.vasilieva@eltech.spb.ru
www.eltech.spb.ru

Scandinavia

AWILCO-MULTIPLEX
Yderholmvej 64
4623 Lille Skensved
Tel.: Denmark: +45 56 56 55 00
Tel.: Sweden: +46 8 59 08 05 74
Fax: +45 56 56 55 05
mail@awilco.dk
www.awilco.dk

Slovakia, Hungary, Czechia, Romania

SOS electronic s.r.o.
Pri prachárni 16
040 11 Košice
Slovensko
Tel.: +421 55 / 786 04 15
Fax: +421 55 / 786 04 45
info@sos.sk
www.soselectronic.sk

Slovenia

IC Elektronika d.o.o.
Vodovodna cesta 100
1001 Ljubljana
Tel.: +386 15 68 01 33
Fax: +386 15 68 91 07
primoz.strajnar@ic-elect.si
www.ic-elect.si

Spain / Portugal

Matrix Electrónica, S.L.
C/Alejandro Sanchez, 109
28019 Madrid - Spain
Tel.: +34 91 56 02 737
Fax: +34 91 56 28 65
matrix@matrix.es
www.matrix.es

Switzerland

NOVITRONIC AG
Thurgauerstrasse 74
8050 Zürich
Tel.: +41 44 306 91 73
Fax: +41 44 306 91 03
energietechnik@novitronic.ch
www.novitronic.ch

Turkey

**RADEL ELEKTRONİK DIŞ TİCARET
VE SANAYİ A.Ş.**
Necatibey Cadessi No. 81
Karaköy / Istanbul
Tel.: +90 21 22 93 84 16
Fax: +90 21 22 93 74 43
arisy@superonline.com

United Kingdom

Haredata Electronics
Unit 6 Stoneacres,
Grimbald Crag Close,
St. James Business Park
Knaresborough, HG 5 8PJ
Tel.: +44 14 23 79 62 40
Fax: +44 14 23 79 62 49
sales@haredata.co.uk
www.haredata.co.uk

USA

PEI-Genesis
2180 Hornig Road
Philadelphia, PA 19116
Tel.: + 1 888 887-9017 USA/Canada
Tel.: + 1 215 673-0400 outside USA/
Canada
Fax: + 1 215 638-8360
phsales@peigenesis.com
www.peigenesis.com

Components Center

11208 Young River
Fountain Valley, CA 92708
Tel.: + 1 800 598 - 04 33
Fax: + 1 714 557 - 73 90
e-sales@componentscenter.com
www.componentscenter.com

Dalis Electronics

3645 East Atlanta Avenue
Phoenix, AZ 85040
Tel.: + 1 800 888 - 14 08
Fax: + 1 602 275 - 05 78
e-sales@componentscenter.com
www.componentscenter.com

Future Electronics

237 Hymus Blvd.
Pointe-Claire, Quebec H9R 50
Tel.: + 1 514 694 - 77 10
Fax: + 1 514 695 - 37 07
eService@futureelectronics.com
www.futureelectronics.com

Components Center

3351 Edward Avenue
Santa Clara, CA 95054
Tel.: + 1 800 776 - 08 10
Fax: + 1 408 988 - 69 31
e-sales@componentscenter.com
www.componentscenter.com

Vale Distribution

2 Linda Lane, Suite B
Vincetown, NJ 08088
Tel.: + 1 800 606 - 82 53
Fax: + 1 609 859 - 87 59
alan@valedistro.com
www.valedistro.com

