

Switchmode power supply

FOX12-XM

MEDICAL

With interchangeable adapter system



Description

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

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

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

Features

- High efficiency: up to 85.5 %
- Low no load power consumption < 90 mW
- Meets DoE efficiency level VI
- CoC version 5 ready
- Ultra-low leakage current $\leq 10 \mu\text{A}$
- IEC 60601-1-2, 4th edition ready
- Wide operating temperature range 0 - 45°C
- Isolation 2x MOPP
- Double housing safety: snapped & welded
- IP42 approved interchangeable plug system as additional accessories
- Also available as version with fixed plugs: FOX-12-FM

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Model Selection: Output Specifications

Article no.	FW Type	Voltage	Current	Power	Ripple voltage*	Efficiency (typ)	No-Load Power
1898124	FW8000M/5	5 V	2200 mA	11.0 W	150 mV pp	79.5 %	< 50 mW
1898125	FW8000M/6	5.9 V	2000 mA	11.8 W	150 mV pp	80.5 %	< 80 mW
1898126	FW8000M/8	7.5 V	1600 mA	12.0 W	150 mV pp	83.0 %	< 80 mW
1898127	FW8000M/9	9 V	1300 mA	11.7 W	150 mV pp	83.2 %	< 60 mW
1898128	FW8000M/12	12 V	1000 mA	12.0 W	150 mV pp	84.5 %	< 80 mW
1898129	FW8000M/15	15 V	800 mA	12.0 W	150 mV pp	85.3 %	< 80 mW
1898130	FW8000M/18	18 V	670 mA	12.1 W	180 mV pp	85.5 %	< 90 mW
1898131	FW8000M/24	24 V	500 mA	12.0 W	240 mV pp	85.0 %	< 95 mW
1898132	FW8000M/48	48 V	250 mA	12.0 W	480 mV pp	85.5 %	< 90 mW

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

Input Specifications		General Specifications		
Input voltage	100-240 V ±10 %	Operating temperature	0..+45°C	
Frequency	50-60 Hz	Operating humidity	10..95 %	
Input current	300-150 mA	Operating altitude	3000 m	
Inrush current (@240 V)	< 35 A	Storage temperature	-40°C..+70°C	
<p>(1): based on calculations at 120 Vac/ 60 Hz & 230 Vac/ 50 Hz, ambient 25°C and 100 % load</p> <p>(2): FRIWO interchangeable mains plug system: see Primary Adapters</p> <p>(3): FRIWO Universal output plug system: see Secondary Adapters</p>	Storage humidity	10..95 %	Turn-on delay	≤ 2 s
	Non-operating altitude	3000 m	Hold-up time	> 5 ms (120 V)
	Atmospheric pressure	70-106 kPa	MTBF calculation	> 50 ms (230 V)
	Output voltage tolerance	±5 %	Housing material	200.000 h acc.
	Line regulation	±1 %	Dimensions	Mil217F ⁽¹⁾
	Load regulation	±4 %	Weight	PC-ABS
			AC input	77.5x31.5x41 mm
		DC output	127 g	
			see page 5 ⁽²⁾	
			see page 6 ⁽³⁾	

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Safety

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

EMC Compliance

Conducted and radiated Emmissions	EN55022, EN55011, FCC15, Class B, EN60601-1-2, IEC60601-1-2 4th Edition				
Immunity	EN55024, EN60601-1-2, IEC60601-1-2 4th Edition				
Harmonics	EN61000-3-2	Class A			
Flicker noise	EN61000-3-3	Yes			
ESD (contact / air)	EN61000-4-2	8 kV / 15 kV	Criteria B 100 V	Criteria B 240 V	
Immunity against radiated field	EN61000-4-3	10 V/m	Criteria A 100 V	Criteria A 240 V	
ETF / Burst	EN61000-4-4	2 kV	Criteria B 100 V	Criteria B 240 V	
Surge	EN61000-4-5	2 kV / 2 kV	Criteria B 100 V	Criteria B 240 V	
Immunity against conducted disturbances	EN61000-4-6	10 V	Criteria A 100 V	Criteria A 240 V	
Voltage dips	EN61000-4-11	0 %	0.5 Cycle	Criteria B 100 V	Criteria A 240 V
		40 %	5 Cycle	Criteria B 100 V	Criteria A 240 V
		70 %	25 Cycle	Criteria B 100 V	Criteria A 240 V
		0 %	5 s	Criteria B 100 V	Criteria B 240 V
Immunity against magnetic field	EN61000-4-8	30 A/m	Criteria A 100 V	Criteria A 240 V	

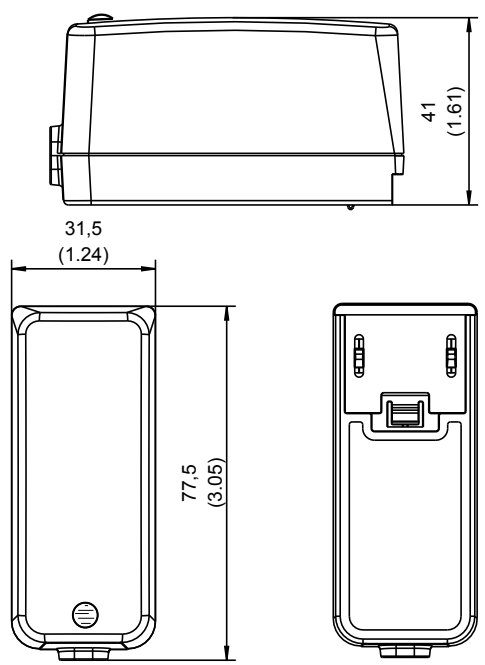
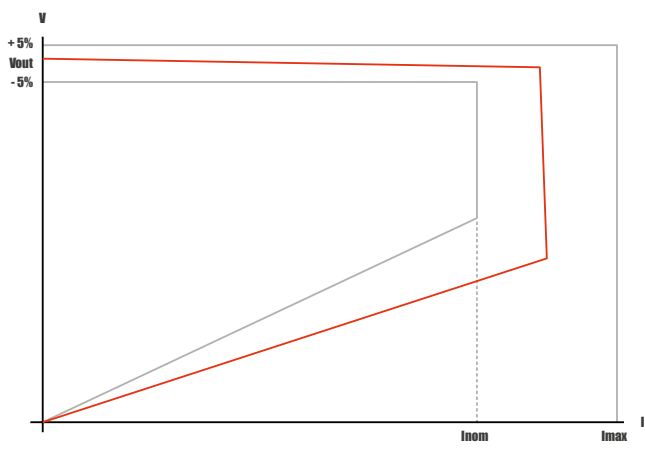
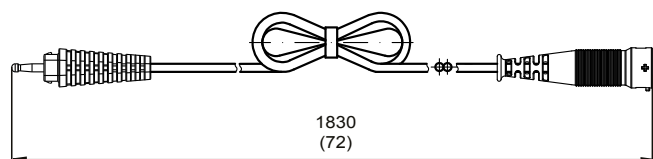
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Drop Test		Vibration	
Standard	IEC 60068-2-32	Standard	IEC 60068-2-6
Surface	Steel	Frequency range	10–500 Hz
Drop height	1 m	Cross-over-frequency	58–62 Hz
Numbers of Drops (total)	3	Displacement amplitude	0.2 mm
		Peak acceleration	3 g
		Number of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

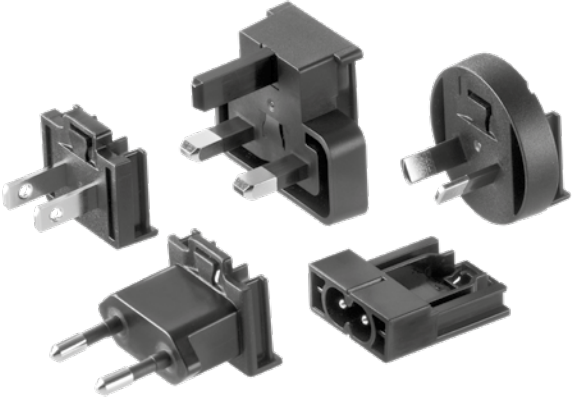
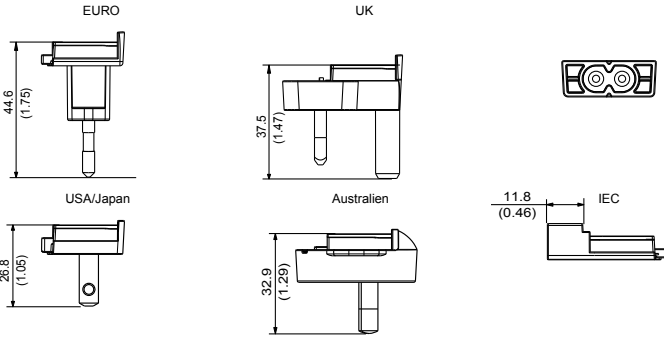
Mechanical Drawings	Output Characteristics
 <p>Alle Abmessungen in Millimeter (Inch), Abweichung ± 0,5 (0.02) All Dimensions in Millimeter (Inch), Deviation ± 0,5 (0.02)</p>	  <p>Alle Abmessungen in Millimeter (Inch), Abweichung ± 0,5 (0.02) All Dimensions in Millimeter (Inch), Deviation ± 0,5 (0.02)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

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Primary Adapters	Mechanical Drawings
	 <p>EURO: 44.6 (1.75) UK: 37.5 (1.47) USA/Japan: 26.8 (1.05) Australien: 32.9 (1.29) IEC: 11.8 (0.46)</p> <p>Alle Abmessungen in Millimeter (Inch), Abweichung ± 0,5 (0.02) All Dimensions in Millimeter (Inch), Deviation ± 0.5 (0.02)</p>

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

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Secondary Adapters

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

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

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