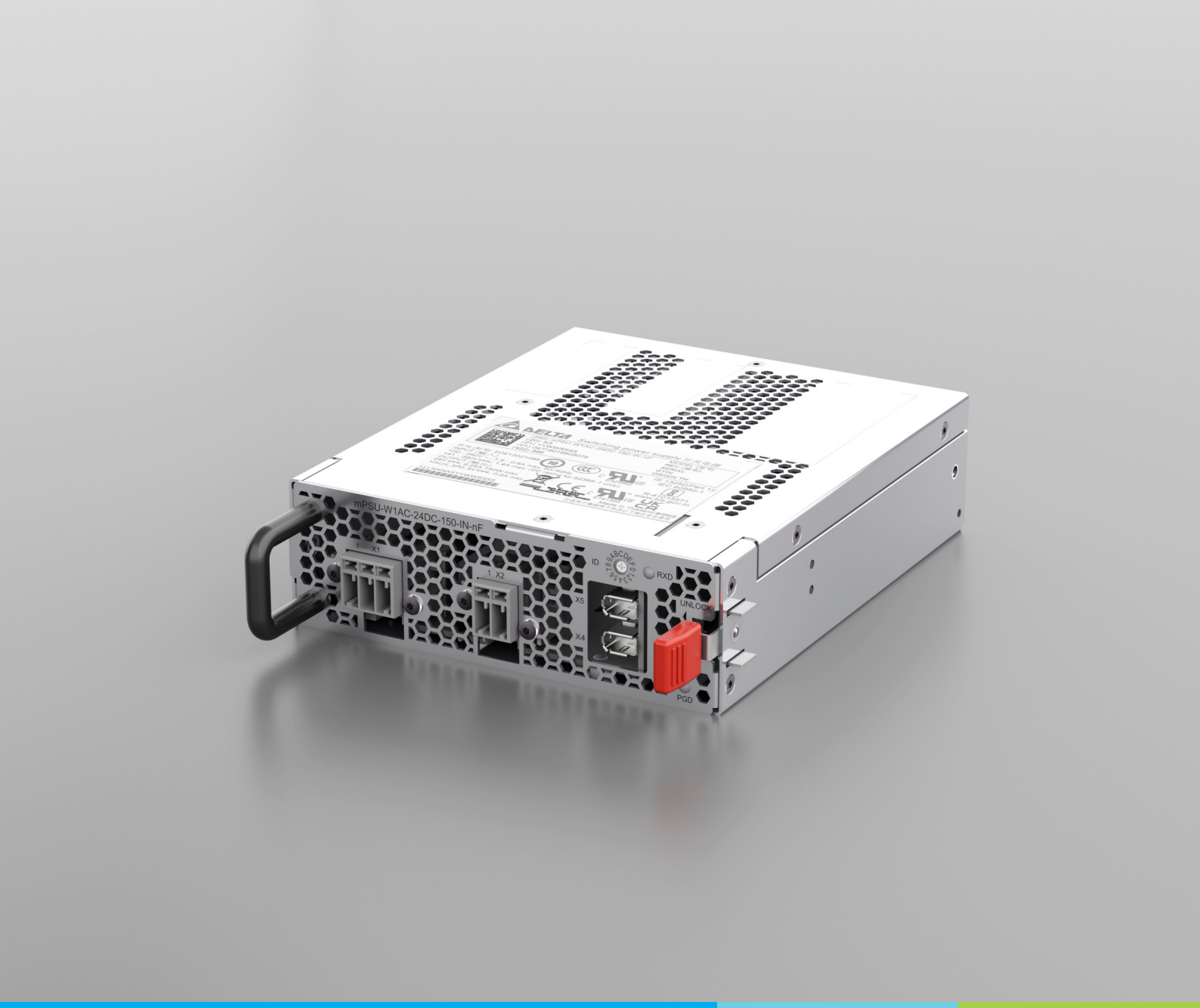


Medical Power Supply Unit

mPSU-W1AC-xxDC-150-IN-nF

Datasheet

Table of Contents

1. Overview

1.1. Highlights & Features

- Safety approvals supporting a broad range of medical and industrial applications
- Wide operating AC & DC input range, dual pole fusing
- Wide adjustable output range, 20% boost current for 10 sec.
- Industry standard housing format, identical mechanical shelf interface, 1U (40,6mm) x 5” (127mm) with scaling in depth
- Various protections ensure safe and reliable operation
- Integrated decoupling protects output from back feeding currents
- Remote controllable and diagnosable via 0V/5...24V signal, via LED, CANopen, Modbus RTU over RS485
- Pre-equipped fans, fanless operation, low output noise are additional features
- Multiple units can be connected in parallel and/or series configuration

1.2. General Description

The mPSU is a modular family of superior power supplies for medical and industrial applications. It covers a power range from 150 W to 1500 W and includes the frequently requested 24 V and 48 V outputs. With its wide input and output range, the mPSU can be used universally in a variety of applications. An additional 20% boost current for 10 seconds supports the startup of heavy loads.

All models are powered by a single-phase AC or DC supply. A three-phase, 600-W variant complements the offering. An external upstream fuse is required for three-phase models.

The devices are all designed in a standard 1U format with an identical mechanical shelf interface. The depth of the devices increases with output power.

Support for CANopen and Modbus RTU via RS485 allows for seamless integration into end application control and enables device parametrization, as well as the exchange of data for device supervision.

1.3. Safety Standards

E191395 E325662 IS 13252(Part 1)/ IEC 60950-1 R-41015571 www.bis.gov.in Delta Energy Systems (Germany) GmbH Tscheulinstr. 21, 79331 Teningen

2. Model Variants

2.1. Model Information

mPSU						
Model Information						
Model Number	Order/Part Number	GTIN	Rated Input Voltage Ranges		Rated Output Voltage	Rated Output Current
			[Vac]	[Vdc]	[Vdc]	[A]
mPSU-W1AC-24DC-150-IN-nF	EOE12021088	4718018503074	100 to 240	141 to 380	24	6.25
mPSU-W1AC-48DC-150 1)	–	–	–	–	–	–

1) Upon request

2.2. Family Model Numbering

mPSU						
Family Model Numbering						
Model Family	Input Type	Input Voltage	Output Voltage	Output Power	Feature	Reserved
		[V_{AC}]	[V_{DC}]	[W]		
mPSU	**W1AC**	**1AC: 100 to 240**	**24**	**150**	**(default)**	–
	W2AC	1AC: 208 to 277	36	300	IN (low noise)	–
	W3AC	3AC: 380 to 480	48	600	nB (no Busses)	–
	380DC	–	–	1000	nF (no Fans)	–
	760DC	–	–	1500	–	–

2.3. Available Models

mPSU						
Available Models						
Model Family	Input Supply	Output Voltage	Output Power	Output Current	Feature	Reserved
		[V_{DC}]	[W]	[A]		
mPSU-W1AC-24DC-150-IN-nF	**1AC**	**24**	**150**	**6.25**	**IN - nF**	**–**
mPSU-W1AC-24DC-300	1AC	24	300	12.50	–	–
mPSU-W1AC-24DC-600	1AC	24	600	25.00	–	–
mPSU-W3AC-24DC-600 1)	3AC	24	600	25.00	–	–
mPSU-W3AC-24DC-600-V2 2)	3AC	24	600	25.00	–	–
mPSU-W1AC-24DC-1000	1AC	24	1000	41.00	–	–
mPSU-W1AC-48DC-1000	1AC	48	1000	20.80	–	–
mPSU-W1AC-48DC-1500	1AC	48	1500	31.30	–	–

1) Factory Set Point for DC Output Voltage: 24.72 V_{DC}
2) Factory Set Point for DC Output Voltage: 26.00 V_{DC}

3. Components of the mPSU

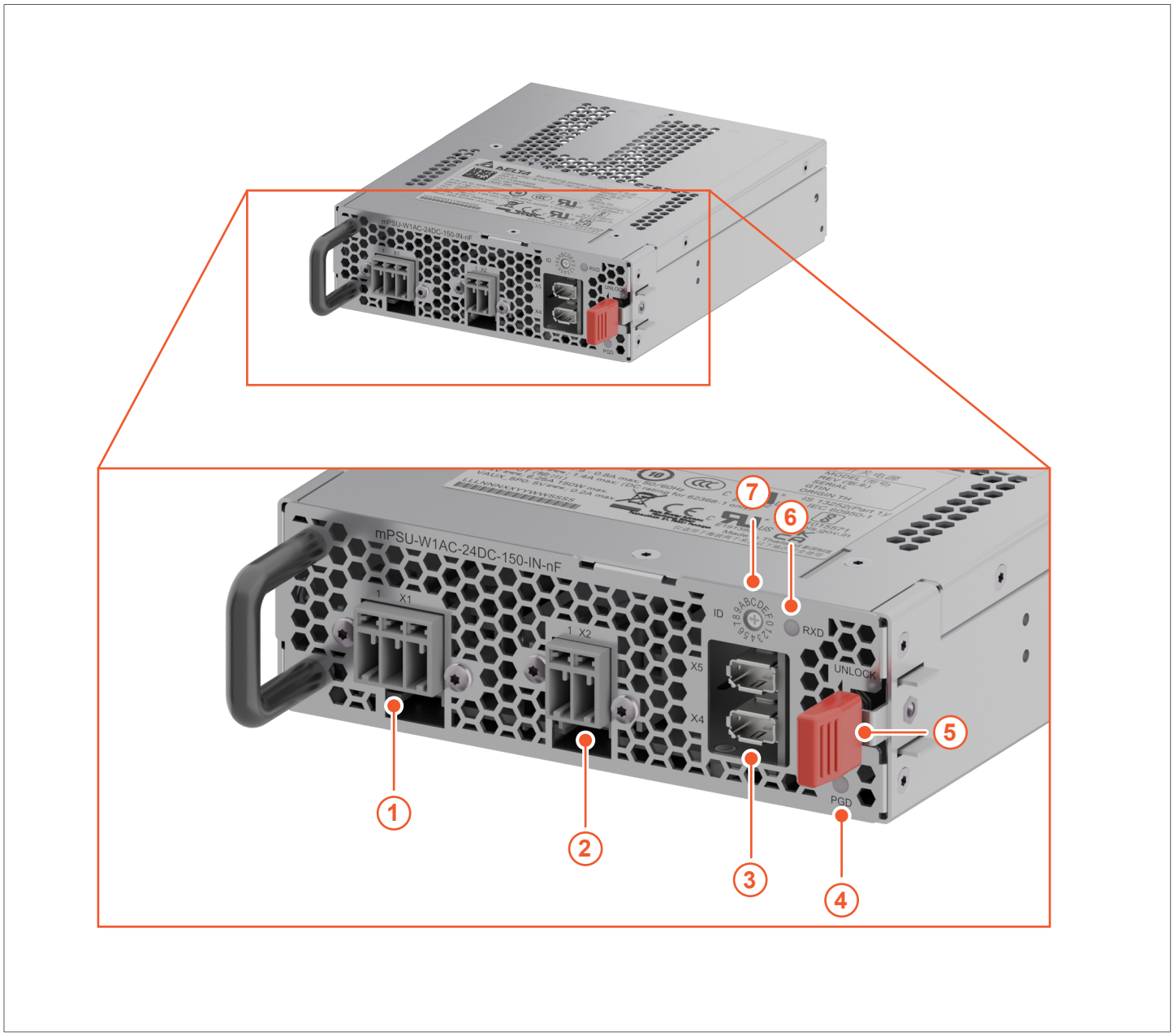


Fig. 1: Components of the mPSU

1 AC/DC input connector (X1)
2 DC output connector (X2)
3 2 x PMI interface (X4 + X5)
4 PGD LED (green); ON when Power Good
5 Unlock lever
6 RXD LED (green); ON when CANopen or Modbus RTU is detected
7 Rotary switch to set the CANopen node ID or Modbus RTU ID

4. AC/DC Input Connector (X1)

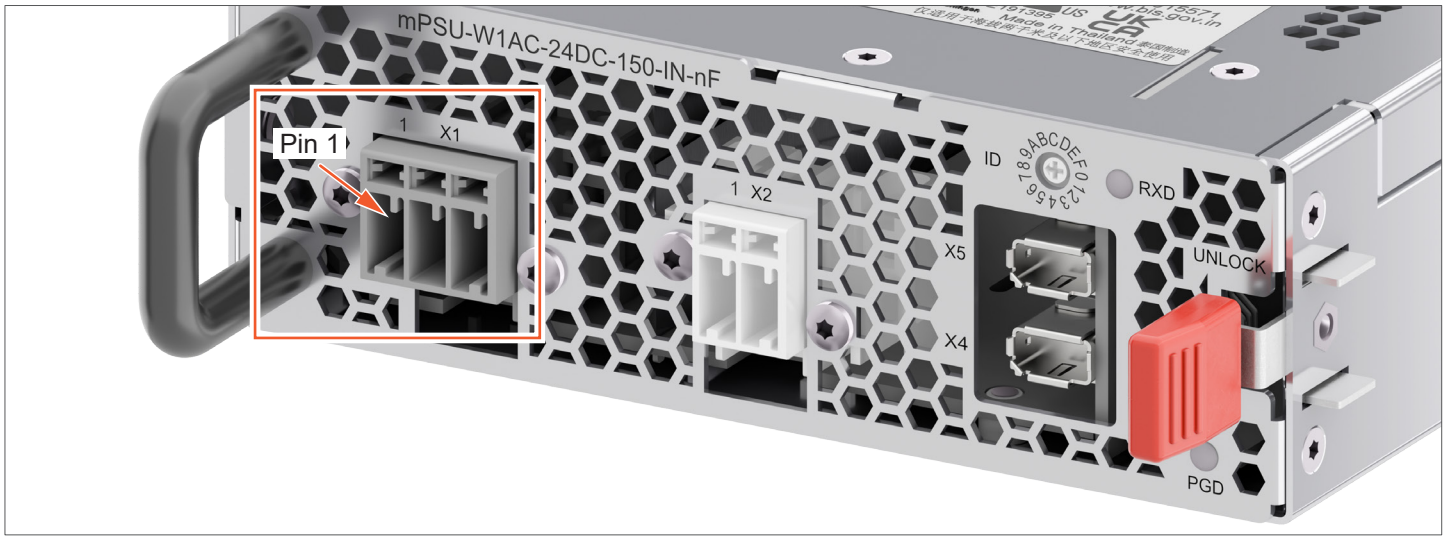


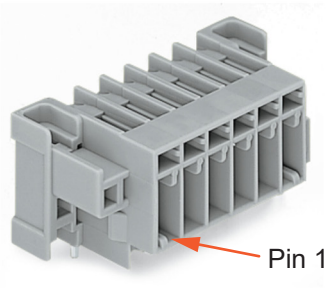
Fig. 2: AC/DC Input Connector (X1)

4.1. Input Ratings / Characteristics (X1)

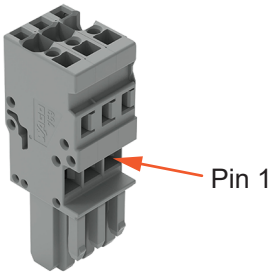
Model Number	mPSU-W1AC-24DC-150-IN-nF	mPSU-W1AC-48DC-150-IN-nF
Input Ratings / Characteristics (X1)		
Nominal AC Input Voltage	100 to 240 V_{AC}	
AC Input Voltage Range [1)]	90 to 264 V_{AC}	
AC Input Voltage Range [2)]	85 to 264 V_{AC}	
Nominal Input Frequency	50 to 60 Hz	
Input Frequency Range	47 to 63 Hz	
Nominal DC Input Voltage	141 to 380 V_{DC}	
DC Input Voltage Range [1)]	127 to 418 V_{DC}	
DC Input Voltage Range [2)]	120 tos 418 V_{DC}	
Input AC Current	1.9 A @ 100 V_{AC} / 0.8 A @ 240 V_{AC}	
Efficiency 100% Load @ 230 Vac	min. 90%	–
AC Standby Power Consumption	< 1.2 W / 6 W (INH_E / INH_T)	
	acc. to Inhibit selection, further details see section PMI	
Max Inrush Current / Fusing Integral	< 20 A_{peak} at 240 V_{AC} / < 20 A^2s	
Power Factor	≥ 0.8 (75 to 100% $P_{out\ nom}$)	
Hold Up Time	≥ 20 ms @ P_{out}, $V_{out\ nom}$	
Input Fuse	Dual Pole Fusing 8 A	

1) Without output power derating
2) Derating to 80% of Nominal Output Power @ 85 Vac / @ 120 Vdc Input Voltage

4.2. AC/DC Input Connector (X1)

Model Number	mPSU-W1AC-xxDC-150-IN-nF
Connector (X1)	**mPSU**
Connector Type	Male connector
Manufacturer	Wago X-COM
Manufacturer Part Number	769-663/004-000
Product Image [1]	

1) The image can show a different pin count.

Model Number	mPSU-W1AC-xxDC-150-IN-nF	
Connector (X1)	**External Counter Part**	
Connector Type	Female connector	Locking lever [1]
Manufacturer	Wago	Wago
Manufacturer Part Number	769-103	769-431
Product Image [2]		

1) Placed at pin 2 + 3
2) The image can show a different pin count.

Model Number	mPSU-W1AC-xxDC-150-IN-nF
Pin Assignment (X1)	
X1.1	PE [1]
X1.2	IN_N / N
X1.3	IN_L / P

1) PE connector pin is connected to metal housing

5. Main DC Output Connector (X2)

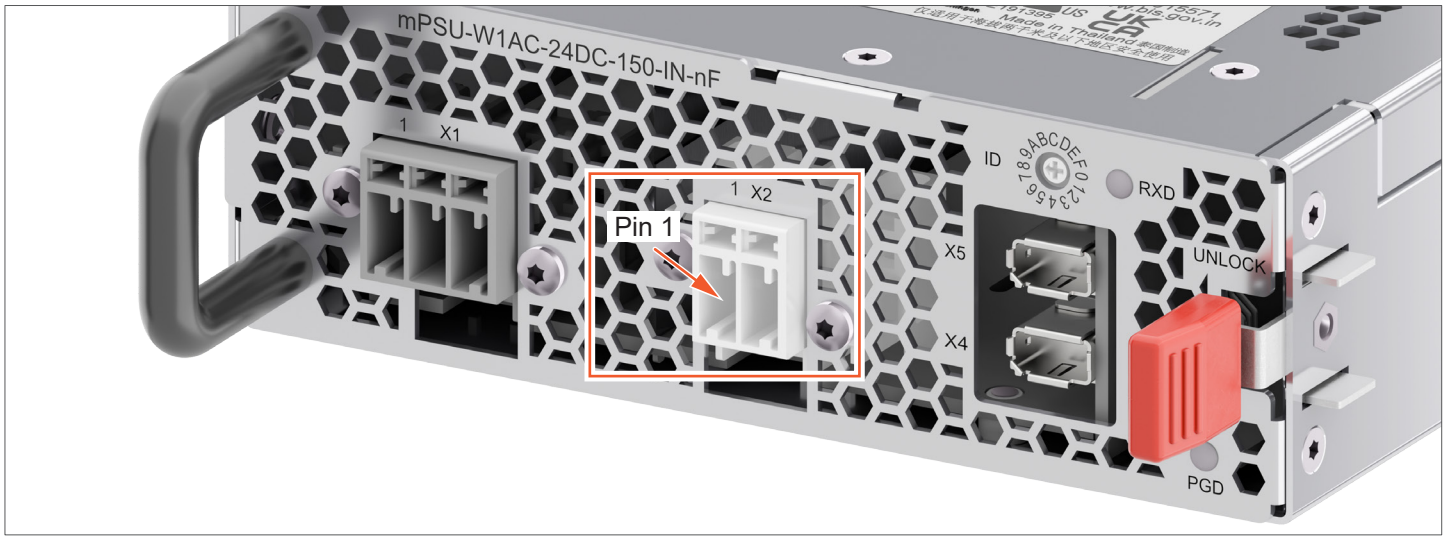


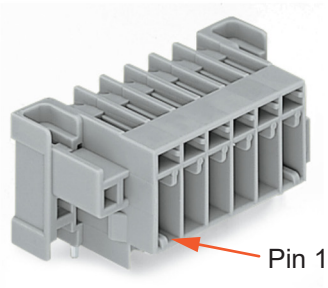
Fig. 3: Main DC Output Connector (X2)

5.1. Output Ratings / Characteristics (X2)

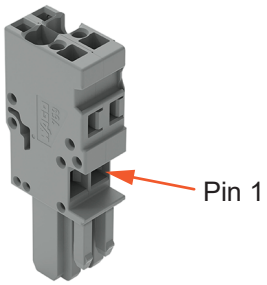
Model Number	mPSU-W1AC-24DC-150-IN-nF	mPSU-W1AC-48DC-150-IN-nF
Output Ratings / Characteristics (X2)		
Nominal Output Voltage	**24 V_{DC}**	**48 V_{DC}**
Factory Set Point	24.72 V_{DC}	–
Output Voltage Adjustment Range	19.2 to 28.8 V_{DC}	–
Nominal Output Current	6.25 A	–
Current Limitation Adjustment Range	1.56 to 6.25 A	–
Boost Max Range 10 s Time Limit	7.5 A	–
Constant Current Operation Range	CC @adjusted limit to 80% $V_{out\ nom}$	–
Output Power (natural cooling horizontal position)	150 W	–
Output Voltage Accuracy (Load, Line, Drift, Setpoint & Readback)	±3%	–
Output Current Accuracy (Load, Line, Drift, Setpoint & Readback)	-0 / (4% * I_{out} + 0.0625 A)	–
PARD (20 MHz) 10 µF Tan and 1 µF ceramic capacitor	15 mV_{PP}	–
Ripple & Noise Diff. / Common Mode [1)]		
at T_a = 0 to +50 °C (+32 to +122 °F)	15 / 40 mV_{PP}	–
at T_a = -20 to 0 °C (-4 to +32 °F)	15 / 60 mV_{PP}	–
at T_a = +50 to +70 °C (+122 to +158 °F)	15 / 55 mV_{PP}	–
Start-up Time (50% Load, 10 µF)		–
Power Input or INH_E Off → On	< 2.5 s	
INH_T or INH_Bus Off → On	< 0.2 s	–
Dynamic Response		–
25% → 75% → 25% Load Steps	+2/-3%	–
0% → 100% → 0% Load Steps	+2/-7%	–
Capacitive Load	minimum 10 mF	–

1) Refer to application note for more details

5.2. Output Connector (X2)

Model Number	mPSU-W1AC-xxDC-150-IN-nF
Connector (X2)	**mPSU**
Connector Type	Male connector, 2-pin
Manufacturer	Wago X-COM
Manufacturer Part Number	769-662/004-000
Image [1]	

1) The image can show a different pin count.

Model Number	mPSU-W1AC-xxDC-150-IN-nF	
Connector (X2)	**Counter Part**	
Connector Type	Female connector	Locking Lever
Manufacturer	Wago X-COM	Wago X-COM
Manufacturer Part Number	769-103	769-431
Image [1]		

1) The image can show a different pin count.

Model Number	mPSU-W1AC-xxDC-150-IN-nF
Pin Assignment (X2)	
X2.1	OUT_N
X2.2	OUT_P

6. Protection and Isolation

Model Number		mPSU-W1AC-xxDC-150-IN-nF	
Protection and Isolation			
Input to Output & PMI	OUT_N – PE	-60 to +3 V_P	2x MOPP [1], reinforced insulation
	PMI_GND – PE	-60 to +60 V_P	
Input to Output & PMI [2]	OUT_N – PE	-120 to +60 V_P	2x MOOP [3], reinforced insulation
	PMI_GND – PE	-60 to +60 V_P	
Input to Protected Earth (PE)		–	1x MOPP [1], basic Insulation
Output to PE	OUT_N – PE	-60 to +3 V_P	1x MOPP, 1x MOOP
		-120 to +60 V_P	
PMI to PE	PMI_GND – PE	-60 to +60 V_P	1x MOPP
Permissible ext. output offset voltage	OUT_N – PE	-60 to +3 V_P	no derating in isolation
	OUT_N – PE	-120 to 60 V_P	derating in I/O isolation to 2x MOOP
Isolation Test Voltage	Input to Output & PMI	4.0 kVac / 5.6 kV_{DC}	
	Input to PE	1.5 kVac / 2.1 kV_{DC}	

1) Means of patient protection
2) For 2 and more in series connected PSUs, refer to 7 “Parallel and Serial Connection”, p. 10.
3) Means of operator protection

7. Parallel and Serial Connection

Up to 4 Power Supplies can be connected in parallel (4P) without the need for external OR-ing diodes for decoupling. But when more than 2 PSUs are connected in parallel, external fusing is required in the system. This is to protect the power output circuitry against backward over current from other PSUs in case of a first fault condition (output short circuit) of any single PSU.

Up to 4 Power Supplies can be connected in series (4S) if the combined output voltage is less than 120Vdc with respect to Protective Earth. Please note the limitation to 2x MOOP (instead of MOPP) if combined output voltage exceeds 60Vdc.

Please refer to the application note for further details for parallel and serial connection capabilities.

8. PMI – Power Management Interface (X4, X5)

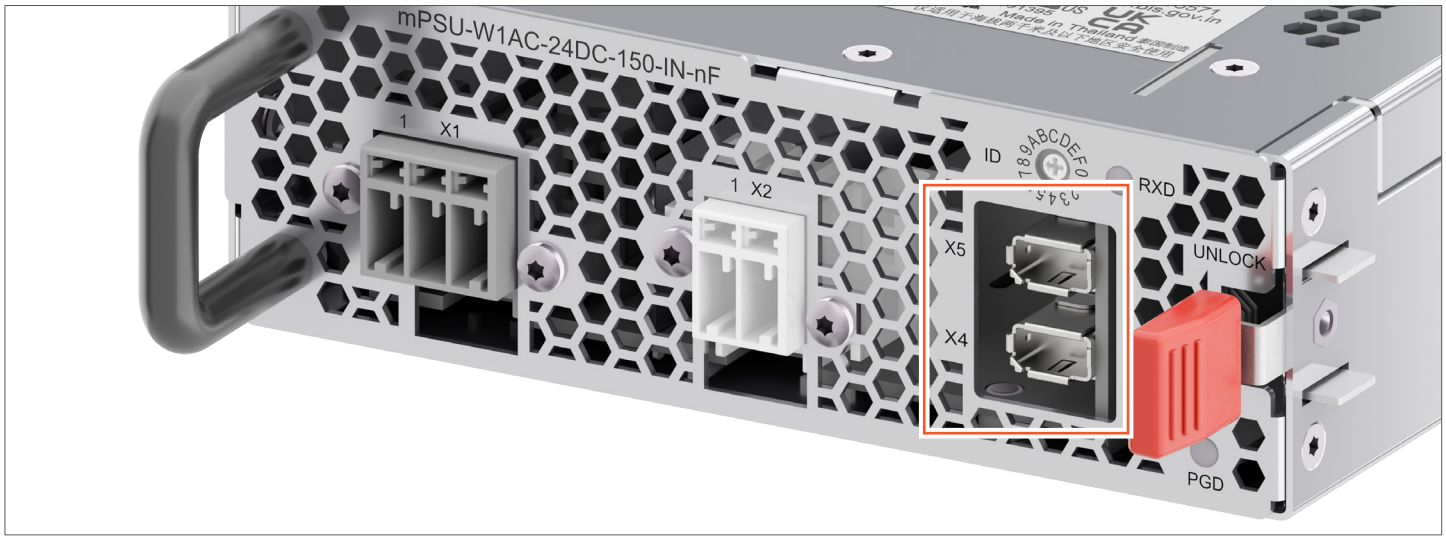


Fig. 4: PMI interface (X4, X5)

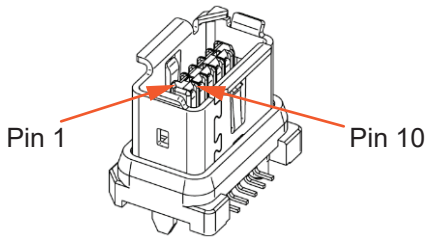
The Power management Interface (PMI) provides connectors X4 and X5 with parallel connected signals for CANopen, Modbus RTU over RS485 and analog signals for Inhibit, Power Good and Aux Supply.

8.1. Ratings / Characteristics (X4, X5)

Model Number		mPSU-W1AC-xxDC-150-IN-nF
Protection and Isolation (X1)		
Auxiliary Voltage Level		5 V_{DC} ± 3%
Auxiliary Static Current		minimum 200 mA_{DC}
Auxiliary Static Current Protection		1500 mA_{DC} / self-recovery
Auxiliary Capacitive Load		1000 µF
Inhibit	Main Output ON	0 to +0.1 mA @ +0.8 V / 0 to -0.1 mA @ -0.8 V
	Main Output OFF	+1.0 to +10 mA @ +2.0 V / -1.0 to -10mA @ -2.0 V +1.0 to 13 mA @ +32 V / -1.0 to -13 mA @ -32 V **OR** CANopen CiA 453 **OR** Modbus RTU
INH_T_P (X4.6/5.6) positive vs INH_E_P (X4.7/5.7)	INH_T	Faster Turn ON/OFF Time
INH_E_P (X4.7/5.7) positive vs INH_T_P (X4.6/5.6)	INH_E	Better Standby Efficiency
Power Good PGD_P (X4.4/5.4) and PGD_N (X4.5/5.5)	Green LED ON	0 to -1.0 V @ I_{sink} = -100 mA / 0 to +2.0 V @ I_{sink} = +100 mA 0 to 0.4 V @ I_{sink} = +2.0 mA **OR** CANopen CiA 453 **OR** Modbus RTU
	Green LED OFF	The input voltage disappears. The output voltage falls outside the ±8% tolerance band around the set value. An overtemperature warning occurs and the system shuts down. 0 to -1.0 V @ I_{sink} = -100 mA / +32 to 60 V @ I_{sink} = 10 µA **OR** CANopen CiA 453 **OR** Modbus RTU
Supported Cable Length		Minimum 40 m (131 ft)
CANopen protocol	CiA 301	Application layer and communication
	CiA 302	General definitions and program download
	CiA 453	Power supplies

Model Number		mPSU-W1AC-xxDC-150-IN-nF
Protection and Isolation (X1)		
CANopen data rates	Selectable by command	50 / 125 / 250 / 500 kbit/s (default)
Modbus RTU – RS485 protocol	RTU	Remote Terminal Unit; parameters correspond to CiA 453 parameter table
Modbus RTU – RS485 data rates	Selectable by command	9.6 / 19.2 / 38.4 / 57.6 / 115.2 kBaud (default)

8.2. PMI Connector (X4, X5)

Model Number	mPSU-W1AC-xxDC-150-IN-nF
Connector (X4, X5)	**mPSU**
Connector Type	Male connector (according to IEC 61076-3-124)
Manufacturer	Hirose
Manufacturer Part Number	e.g. IX80G-B-10P
Key	B
Image	

Model Number	mPSU-W1AC-xxDC-150-IN-nF
Connector (X4, X5)	
Connector Type	Female connector (according to IEC 61076-3-124)
Manufacturer	Hirose
Manufacturer Part Number	e.g. IX40G-B-10S-CV(7.0)
Key	B
Image [1)]	

Model Number		mPSU-W1AC-xxDC-150-lN-nF
Pin Assignment (X4, X5)		
X4.1	X5.1	CAN_H
X4.2	X5.2	CAN_L
X4.3	X5.3	VAUX_5P0
X4.4	X5.4	PGD_P
X4.5	X5.5	PGD_N
X4.6	X5.6	INH_T_P
X4.7	X5.7	INH_E_P
X4.8	X5.8	PMI_GND
X4.9	X5.9	RS485_AY
X4.10	X5.10	RS485_BZ
X4.SLD	X5.SLD	Housing

9. Mechanical

Model Number	mPSU-W1AC-xxDC-150-lN-nF
Mechanical	
Case Chassis	SECC Zink plated steel
Case Cover	SECC Zink plated steel
Dimensions (L x W x H)	see section 16.1 “Dimensions”, p. 17
Unit Weight	0.9 kg (2.0 lb)
Indicators	RXD LED green: CANopen or Modbus RTU communication; PGD LED green: Power Good
Controls	Rotary Switch 16 positions setting CANopen / Modbus RTU node ID
Cooling System	Natural convection
Terminals	See chapters 4 “AC/DC Input Connector (X1)”, p. 6, 5 “Main DC Output Connector (X2)”, p. 8, 8 “PMI – Power Management Interface (X4, X5)”, p. 11
Locking / Screw mounting	Latch Lock Lever and M3 mounting thread holes in mPSU enclosure sidewalls

10. Environment

Model Number		mPSU-W1AC-xxDC-150-IN-nF
Environment		
Surrounding Air Temperature	Operating	100% Power: -20 to +50 °C (-4 to +122 °F); 50% Power: +50 to +70 °C (+122 to +158 °F)
	Storage	-40 to +85 °C (-40 to +185 °F)
Power De-rating		sec section 17 “Curves”, p. 18
Relative Humidity	Operating	20 to 90% (non-condensing)
	Storage	5 to 95%
Altitude	Operating	3000 m (9842 ft)
Shock Test	Non-Operating	IEC 60068-2-27: 50 G, 11 ms, 3 shocks in each direction
Vibration	Non-Operating	IEC 60068-2-6: 2.09 G_{rms}, 5 - 500 Hz, 20 minutes per side (3 planes)
Over Voltage Category		CAT II (IEC 60664-1)
Pollution Degree		II

11. Protections

Model Number	mPSU-W1AC-24DC-150-IN-nF	mPSU-W1AC-48DC-150-IN-nF
Protections		
Overvoltage	< 32.0 V_{DC} shut down and latch	–
Over Current / Short Circuit [1)]	Limit to adjustable value of constant current (CC Mode) with up to +5% tolerance	
Over Load [1)]	Thermal Hiccup in CC mode when thermal shutdown is reached	
Over Temperature [1)]	Shut off main output, auto recovery with 10 k temperature hysteresis	

1) Thermal hiccup cycling stops after 2 minutes, restart after INH (Inhibit) cycle possible

12. Reliability Data

Model Number		mPSU-W1AC-xxDC-150-IN-nF
Reliability Data		
MTBF (Mean Time Between Failures)	SN29500	> 700.000 h @ T_a = +25 °C (+77 °F)
		> 350.000 h @ T_a = +40 °C (+104 °F)

13. Safety Standards / Directives

Model Number	mPSU-W1AC-xxDC-150-IN-nF
Safety Standards / Directives	
Medical	
IEC 60601-1:2005+AMD1:2012+AMD2:2020	CB File SI-11650
ANSI/AAMI ES60601-1:2005 & A1:2012 & A2:2021	UL File E325662
CAN/CSA C22.2 No. 60601-1:14/A2-2022	UL File E325662
Industrial	
IEC 62368-1:2018	CB File SI-11693, CE Label
UL 62368-1 ed.3	UL File E191395
CSA C22.2 NO. 62368-1:19	UL File E191395
CCC GB4943.1	CCC File 2024010907725518
BIS IS 13252(Part 1):2010	CRS Mark
Materials	
European Directive 2011/65/EU (RoHS2) and Directive 2015/863/EU (RoHS3)	Certificate of Compliance, statements for Exemptions
REACH EU regulation EC 1907/2006	Certificate of Compliance, statements for Exemptions
California Proposition 65 & California Safe Drinking Water and Toxic Enforcement Act of 1986	Certificate of Compliance

14. EMC

Model Number		mPSU-W1AC-xxDC-150-IN-nF	
EMC			
Emissions (CE & RE)	CISPR 11	Class B	

Immunity	Standard		Critera
Electrostatic Discharge	IEC 61000-4-2	8 kV, Contact/15 kV, Air	A
Radiated Field	IEC 61000-4-3	3 V/m, 80 MHz – 2.7 GHz, 80% AM @ 1 kHz	A
Electrical Fast Transient / Burst	IEC 61000-4-4	2 kV/100 kHz RPF, AC main	A
		1 kV/100 kHz RPF, I/O ports	A
Surge	IEC 61000-4-5	2 kV, CM, AC main	A
		1 kV, DM, AC main	A
Conducted	IEC 61000-4-6	3 V, 0.15 – 80 MHz	A
		6 V, ISM bands	A
Power Frequency Magnetic Fields	IEC 61000-4-8	30 A/m, 50/60 Hz	A
Voltage Dips and Interruptions	IEC 61000-4-11	0%, 0.5 cycle	A
		0%, 1 cycle	A
		70%, 25/30 cycles	B
		0%, 250/300 cycles	B
Harmonic Current Emission	IEC 61000-3-2	Class A	
Voltage Fluctuation and Flicker	IEC 61000-3-3	$P_{st} \leq 1.00$ / $P_{lt} \leq 0.65$	

15. Block Diagram

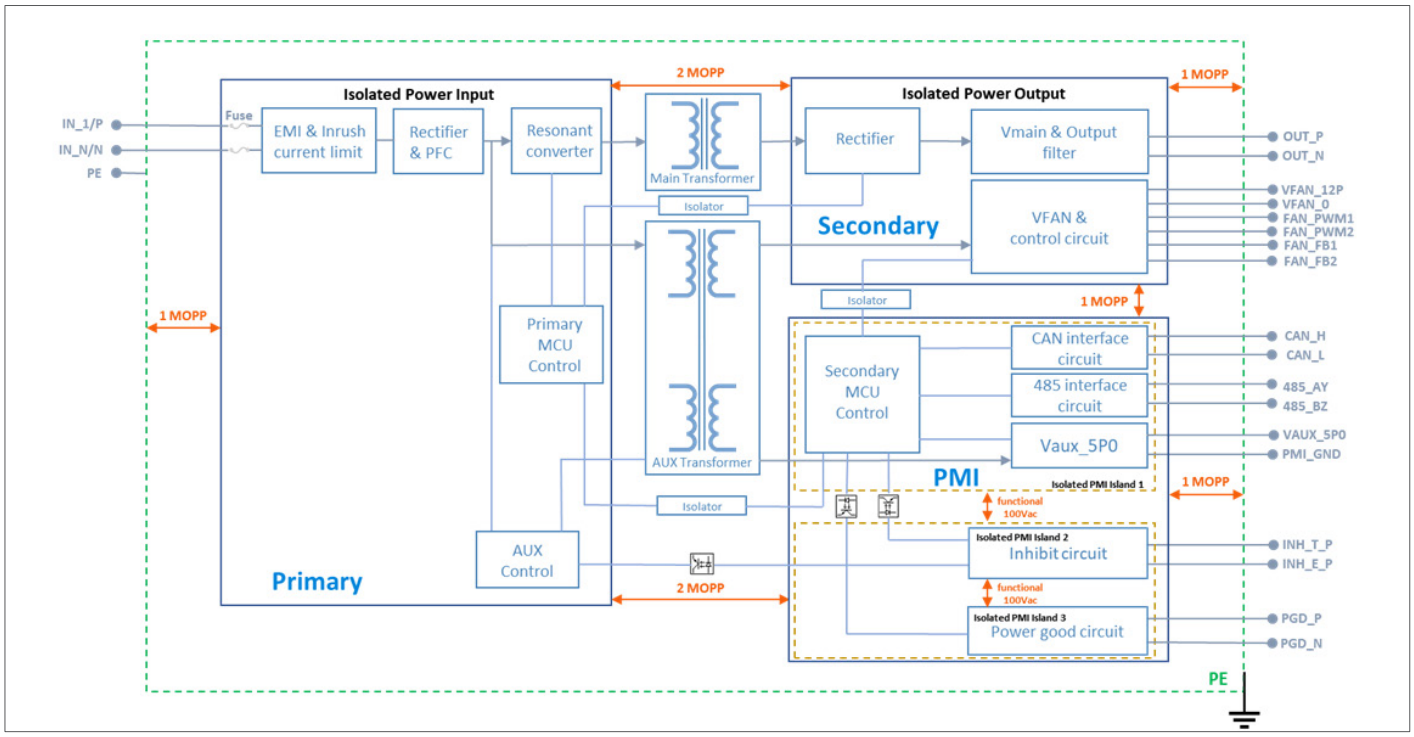


Fig. 5: Block Diagram

16. Dimensional and Mounting Orientation

16.1. Dimensions

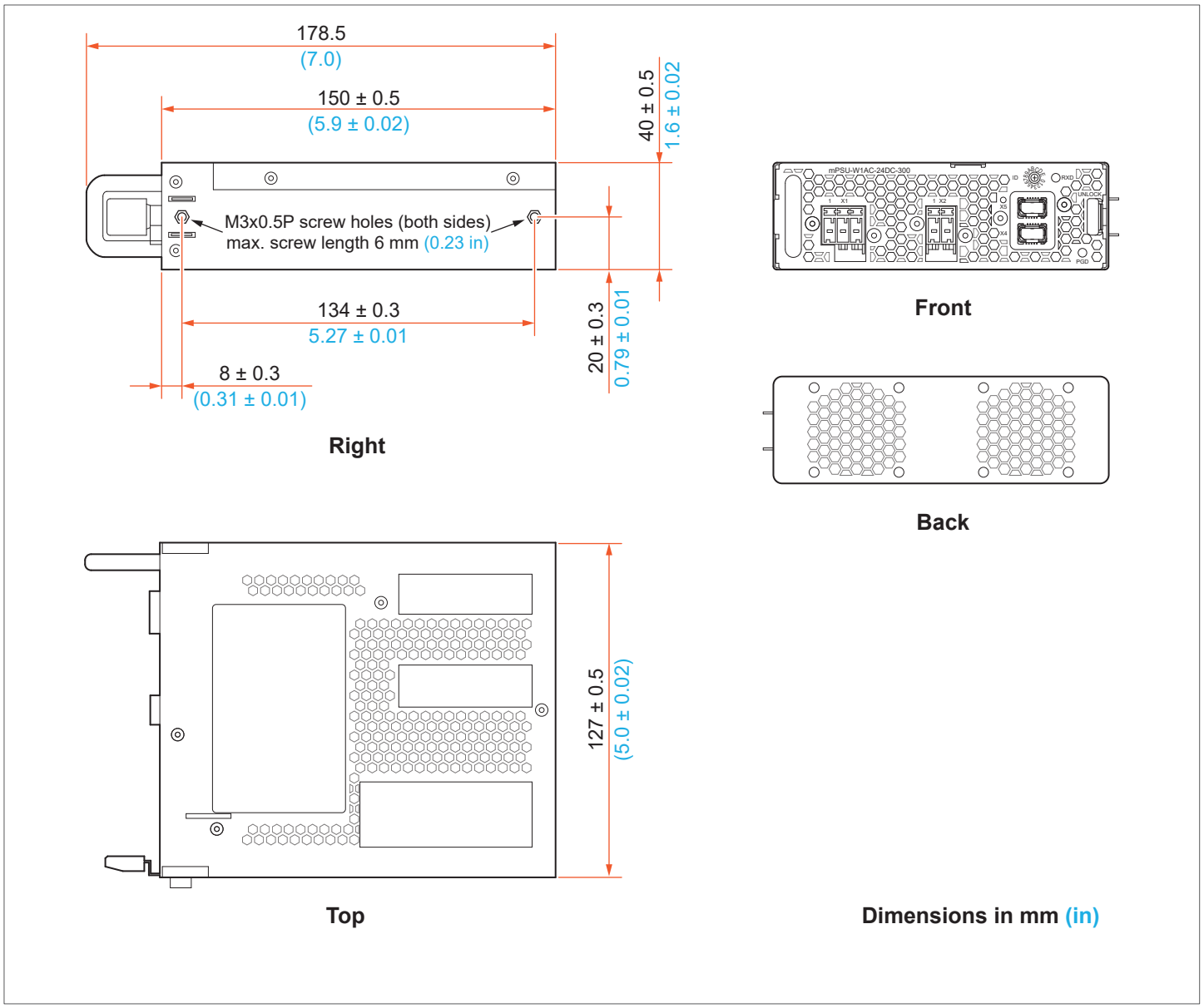


Fig. 6: Dimensions

16.2. Mounting orientations

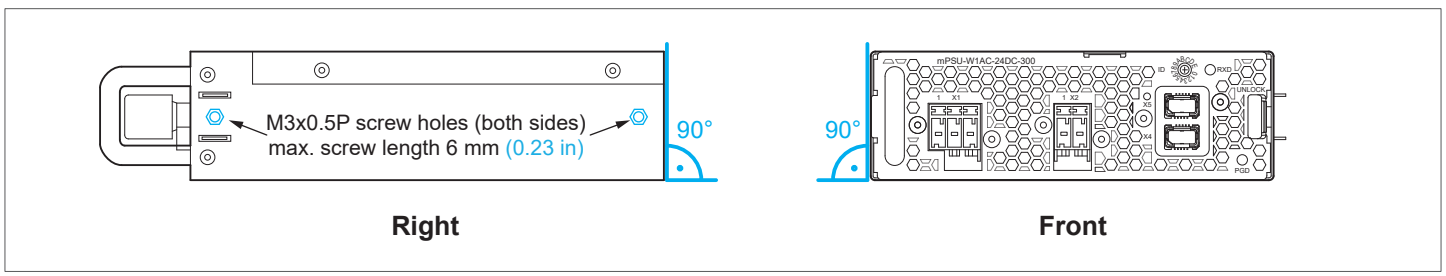


Fig. 7: Mounting orientations

17. Curves

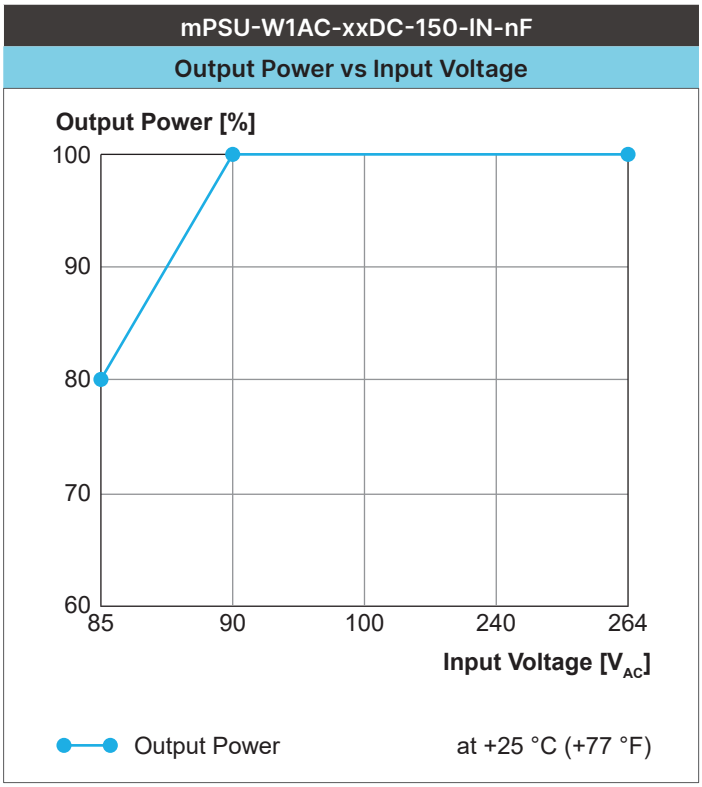


Fig. 8: Output power versus input voltage

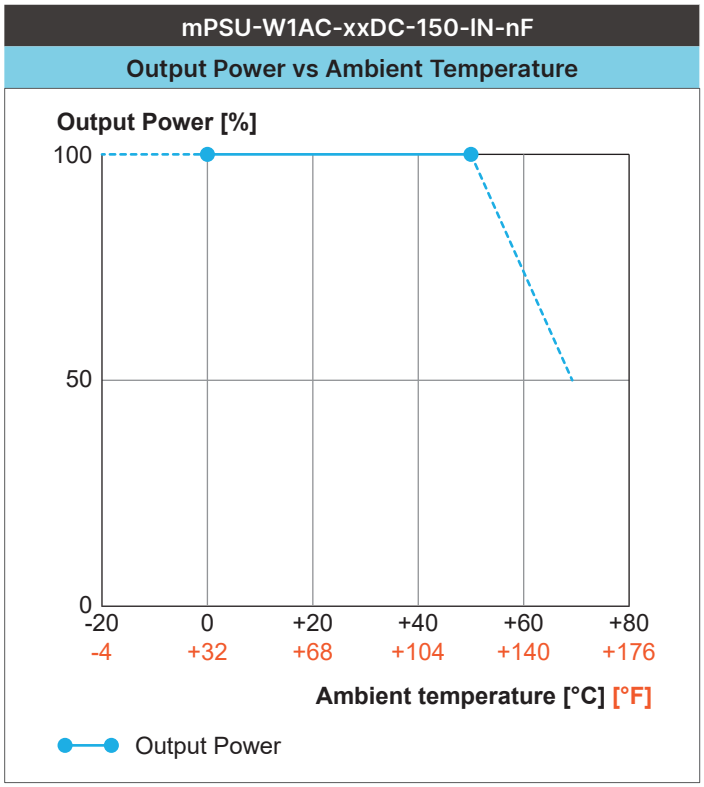


Fig. 9: Output power versus ambient temperature

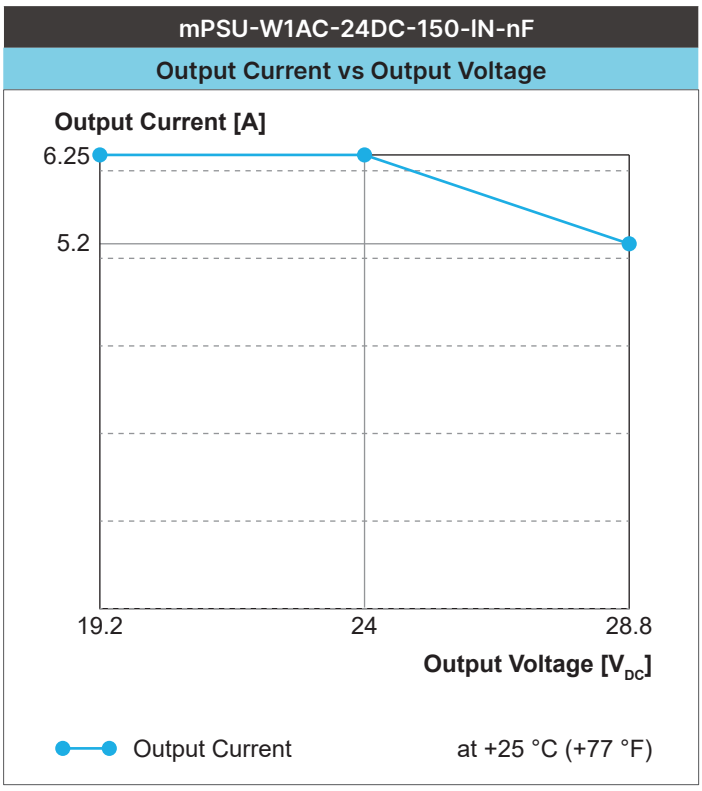


Fig. 10: Output current versus output voltage for W1AC-**24**DC

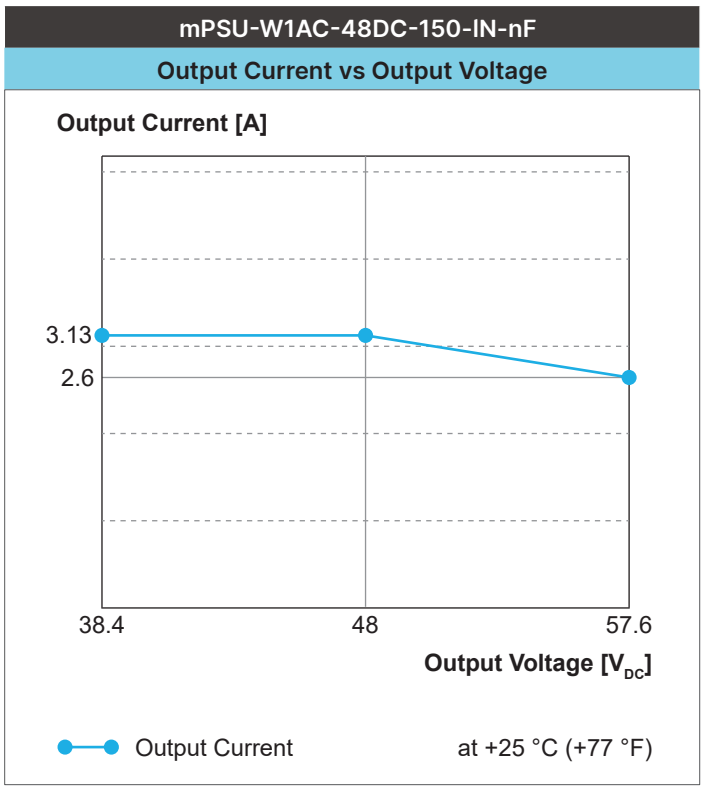


Fig. 11: Output current versus output voltage for W1AC-**48**DC

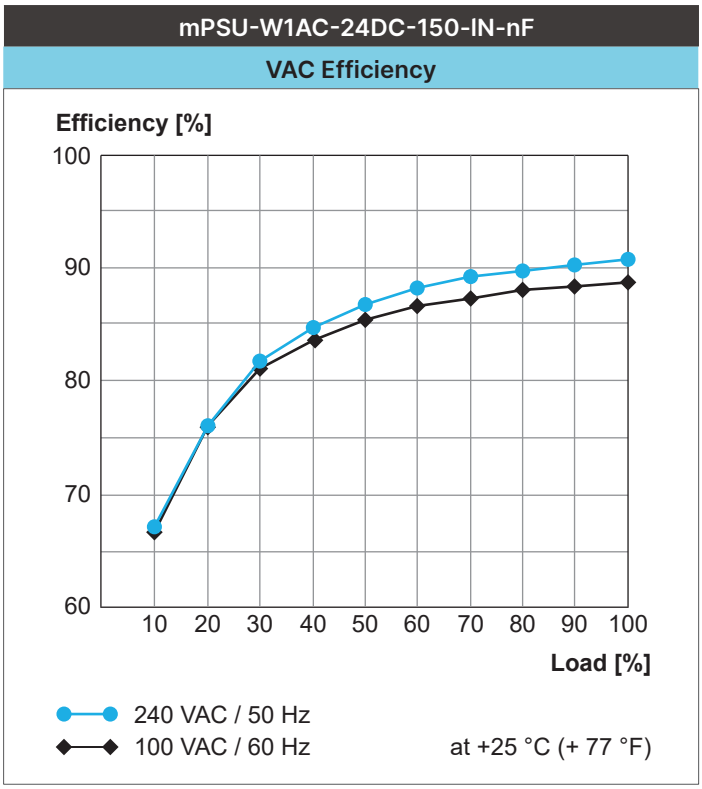


Fig. 12: VAC Efficiency for W1AC-**24**DC

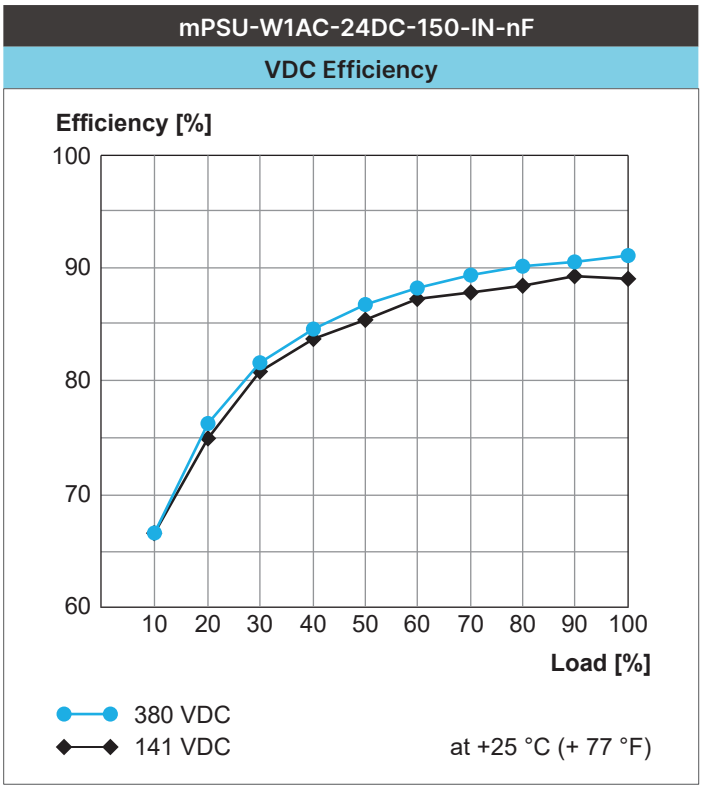


Fig. 13: VDC Efficiency for W1AC-**24**DC

18. Important Legal Information

Delta provides all information in the datasheets on an "AS IS" basis and does not offer any kind of warranty through the information for using the product. In the event of any discrepancy between the information in the catalogue and datasheets, the datasheets shall prevail (please refer to www.DeltaPSU.com for the latest datasheets information). Delta shall have no liability of indemnification for any claim or action arising from any error for the provided information in the datasheets. Customer shall take its responsibility for evaluation of using the product before placing an order with Delta.

Delta reserves the right to make changes to the information described in the datasheets without notice.

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