DDP600-US48-SC-EX

MAIN FEATURES

- Nominal input voltage range (100 – 240 V_{AC})
- Input surge current limiting (<30 A)
- Low earth leakage current (<240 mA)
- High efficiency (up to 93%)
- 48 V_{DC} output voltage
- 480W rated, 800 W peak power (up to 10 s)
- Active PFC, EN61000-3-2 compliant (Class C, >25% load).
- Over temperature, OV, OC and SC protections.
- Enclosed and potted package
- External classified power supply
- RoHS 3 compliant (EU directive 2015/863)

DESCRIPTION

The DDP600-US48-SC-EX is an external, audio / video and information technology rated AC-DC power supply.
The product provides a steady 480 W of regulated DC power through the full 90 to 240 V_{AC} input range, in a 4.92 x 9.45 x 2.36" full potted, IP50, sealed aluminium package.
By converting energy at up to 93% efficiency and thanks to potted PWA encased in a black finished and finned enclosure, the DDP600-US48-SC-EX facilitates thermal management in space constrained environments where only natural convection cooling is allowed.
The product provides 48 V_{DC} regulated output voltage available when AC is asserted through its IEC320-C14 inlet.
It can be installed embedded into a system delivering 480 W up to 45 °C, at V_{IN} > 180 V_{AC} or, externally to a system, delivering 450 W up to 45 °C ambient V_{IN}> 180 V_{AC}.
Protection features include High Breaking capacity fuses on both AC lines, input under voltage lockout (IUV), output over-current (OC), output short-circuit (SC), output over-voltage (OV) and over-temperature (OT).
The DDP600-US48-SC-EX does comply and is certified to IEC/EN/UL 62368-1 standard for Audio / Video and Information Technology equipment as well as KC, CCC, BIS. It meets the EN55032 EMC limits of Class B for conducted and Class A radiated emissions, as well as the IEC/EN 61000-3 / -4 for flicker and harmonic content, and IEC/EN 61000-6-2, EN 55024 for EMC immunity standards.

NOTE: IP50 ingress protection grade could be improved to IP54 using a proper IEC socket and relevant mating part

MARKET SEGMENTS AND APPLICATIONS

- Industrial Process control
- Audio / Video Equipment
- LASER Printing
- Laboratory and Scientific Instruments

Input Specifications

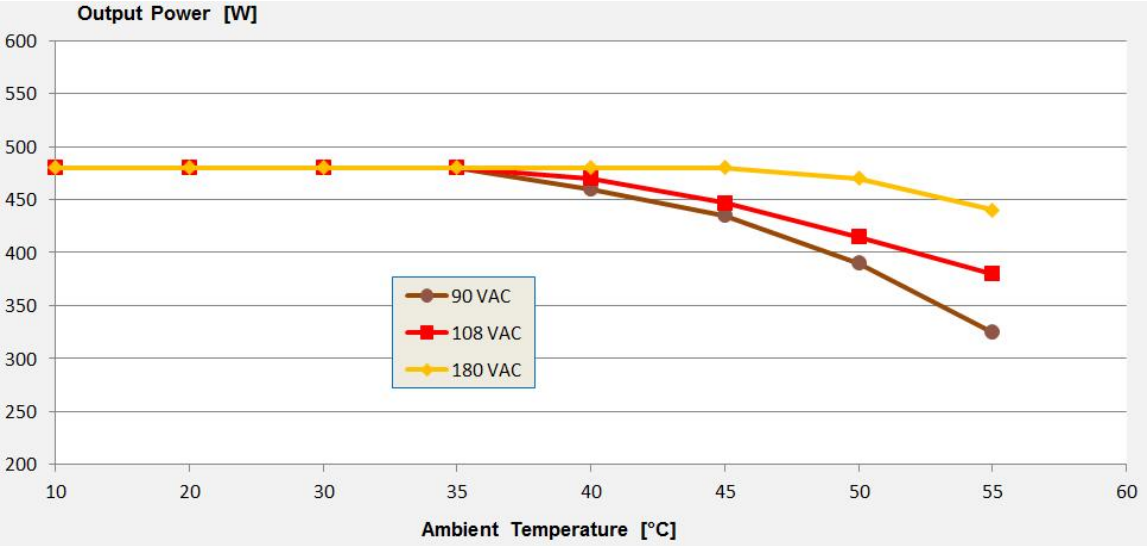
Specification	Test Conditions / Notes	Min.	Nominal	Max.	Units
AC Nominal Voltage Range		-	100-240	-	V_{RMS}
AC Operative Voltage Range	PS starts and operates at 90 V_{AC} at all load conditions	90	-	264	V_{AC}
Input Frequency	440 Hz with reduced PFC and output power rating - Consult factory for details.	-	50/60	-	Hz
Input Current	RMS at 180 V_{AC}, maximum load, 50 / 60 Hz RMS at 90 V_{AC}, maximum load, 50 / 60 Hz	-	-	3.0 6.5	A
Inrush Current (peak)	Cold start, 25 °C ambient, full load				
	115 V_{AC}	-	-	20	A
	230 V_{AC}	-	-	30	
Fusing	High breaking, 10 A, 250 V on each AC lines.	-	-	10	A
Efficiency	At 115 V_{AC}, 20% rated load	-	88	-	
	50% rated load	-	92	-	
	100% rated load	-	91	-	
	At 230 V_{AC}, 20% rated load	-	89	-	%
	50% rated load	-	93	-	
	100% rated load	-	93	-	
Input Power Consumption	Power On, 115 V_{AC}, 60 Hz, no load Power On, 230 V_{AC}, 50 Hz, no load	- -	- -	5 4	W
Power Factor	From 50 to 100% of rated load, 230, 115 V_{AC}, 50 / 60 Hz input voltages.	0.90	-	-	-
THDi	From 50 to 100% rated load, 115, 230, 50 / 60 Hz.	-	-	20	%
Harmonic Current Fluctuations and Flicker	Complies with EN 61000-3-2 at 230 V_{AC}, 50/60 Hz, Class A, D. Complies with EN 61000-3-2 Class C at 230 V_{AC}, 50/60 Hz, >150 W load. Complies with EN 61000-3-3 at nominal voltages and full load.				
Earth Leakage Current	Normal conditions				
	115 V_{RMS}, 60 Hz	-	130	-	µA
	230 V_{RMS}, 50 Hz	-	240	-	
	240 V_{RMS}, 60 Hz (worst case)	-	-	500	

Output Specifications

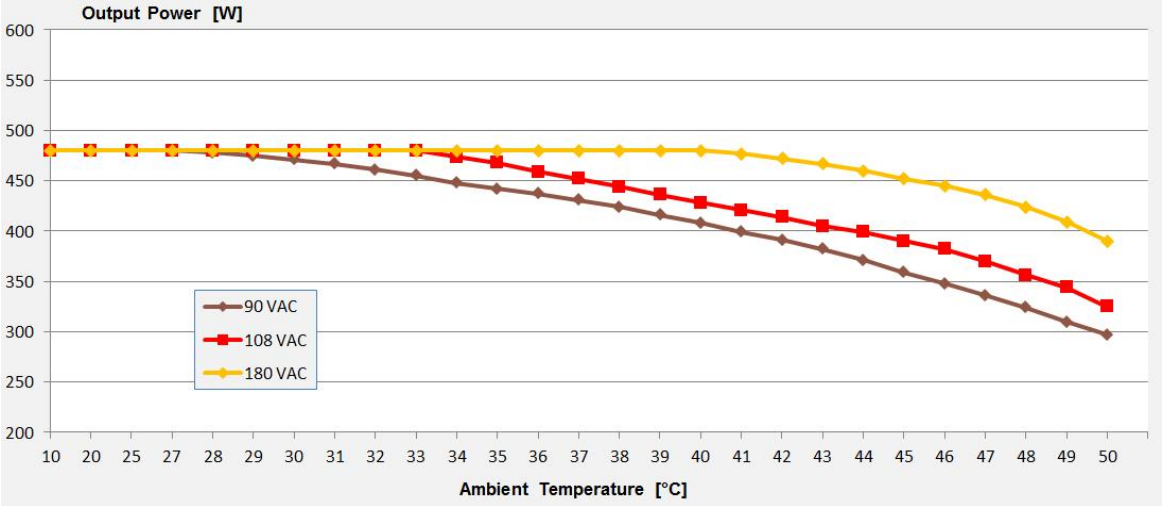
Specification	Test Conditions / Notes	Min.	Nom.	Max.	Units
Output Voltage	±0.7% set point accuracy, at 1 A load.	-	48	-	V
Output Power Rating	Convection cooling (See graphs below) Peak for 10 s	- -	- -	480 800	W
Load-Line-Cross Regulation	V_{AC}: 90 – 240 V_{RMS}	-	-	±2	$\%V_{NOM}$
Transient Response Voltage Deviation	25% load changes at 1 A/µs At 560 µF load / I_{OUT}> 1.25 A	-	-	±5	$\%V_{NOM}$
Ripple and Noise	Rated load, Peak-to-peak, 20 MHz BW. (100 nF ceramic, 10 µF tantalum at load)	-	-	1	$\%V_{NOM}$
Start-up Rise Time	90 < V_{IN} < 240, any load conditions.	10	-	100	ms
Start-up Delay	V_{OUT} in regulation after AC is applied (≥90 V_{AC})	-	-	2050	ms
Turn-on Overshoot		-	-	10	$\%V_{NOM}$
Hold-up Time	At nominal V_{IN} at 450 W load	16	-	-	ms
Minimum Load		0	-	-	A
Maximum Load Capacitance		-	-	8000	µF

OUTPUT POWER DE-RATING CURVES

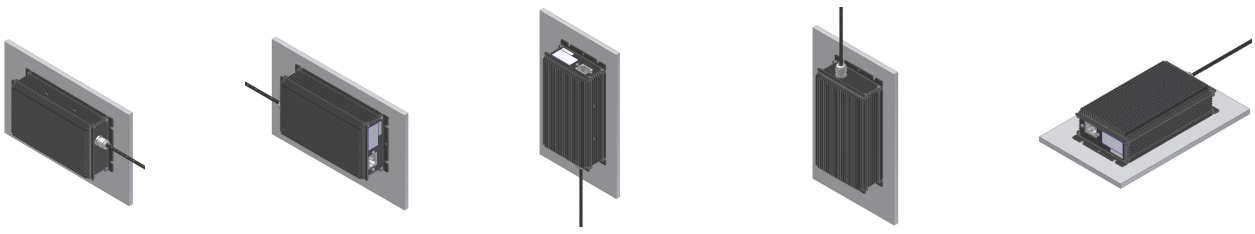
OUTPUT POWER DE-RATING FOR INTERNAL INSTALLATION – IEC320-C14 INLET POWER MAXIMUM RATING LIMITING



OUTPUT POWER DE-RATING FOR EXTERNAL INSTALLATION – HEATSINK MAXIMUM 70 °C ALLOWED TEMPERATURE LIMITING



Note: The de-rating curves are effective regardless the orientation of the power supply, either installed into a system or hosted externally.



Protection Features

Specification	Test Conditions / Notes	Min.	Nominal	Max.	Units
Input Under Voltage	Auto-recovering, hiccup mode.	58	65	75	V_{AC}
Input Fuse	High breaking, 10A, 250V on L and L1.	-	-	10	A
Over Current	At nominal input voltages				
	>10 s: Hiccup mode, auto-recovering	13.5	-	16.5	A
	<10 s: Hiccup mode, auto-recovering	16.8	-	19.5	A
Short Circuit	At nominal input voltages Hiccup mode, auto-recovering	-	-	-	
Over Voltage	Power shut down, latch off	120	-	145	$\%V_{NOM}$
Over Temperature (on primary stage)	Shut down, latch off.	-	-	-	°C
Over Temperature (on secondary side)	Hiccup mode, auto-recovering.	-	-	-	°C
Isolation: Input-to-Output	Reinforced	5660	-	-	V_{DC}
		4000	-	-	V_{AC}
	Production tested at 4242 V_{DC}				
Isolation: Input-to-Earth	Basic	2121	-	-	V_{DC}
		1500	-	-	V_{AC}
	Production tested at 2121 V_{DC}				
Isolation: Output-to-Earth	Functional	100	-	-	V_{DC}
Equipment Protection Class		Class I			

ENVIRONMENTAL SPECIFICATIONS

Specification	Test Conditions / Notes	Min	Nominal	Max	Units
Operating Temperature Range	See de-rating curves and conditions in the Output Specifications section	-20	-	55	°C
Storage Temperature		-40	-	85	°C
Humidity	RH, Non-condensing Operating.	-	-	90	%
	Non-operating			95	%
Operating Altitude	ITE rating	-	-	5000	m
Shock	EN 60068-2-27 Operating: Half sine, 30 g, 18 ms, 3 axes, 6x each (3 positive and 3 negative). Non-Operating: Half sine, 50 g, 11 ms, 3 axes, 6x each (3 positive and 3 negative).				
Vibration	EN 60068-2-64 Operating: Sine,10 – 500 Hz, 1 g, 3 axes, 1 oct/min., 60 min. Random, 5 – 500 Hz, 0.02 g^2/Hz, 1 g_{RMS}, 3 axes, 30 min. Non-Operating: 5 – 500 Hz, 2.46 g_{RMS} (0.0122 g^2/Hz), 3 axes, 30 min.				
MTBF	Telcordia Issue 2 Case 3 (Part Stress) 40 °C ambient, 80% Duty Cycle, Max load, V_{AC} nominal worst	450.000	-	-	Hours
Useful Life	100 V_{AC}, 80% load (350 W), 40 °C ambient	-	4	-	Years

ELECTROMAGNETIC COMPATIBILITY (EMC) – EMISSIONS

Phenomenon	Conditions / Notes	Standard	Equipment/Performance Class
Conducted	115, 230 V_{RMS}. Maximum load.	EN 55032 (ITE) EN 55011 (ISM) FCC Part 15	B
Radiated	At 10 m distance	EN 55032 (ITE) EN 55011 (ISM) FCC Part 15	A[1]
Line Voltage Fluctuation and Flicker	At 20%, 50% and 100% maximum load. Nominal input voltages	EN 61000-3-3	
Harmonic Current Emission	230 V_{AC} input voltage, 50 / 60 Hz	EN 61000-3-2	A, D
	230 V_{AC} 50 / 60 Hz, >150 W load	EN 61000-3-2	C

[1] Class A performance shall be verified on the power supply once installed in the finished system.

ELECTROMAGNETIC COMPATIBILITY EMC) – IMMUNITY

Phenomenon	Conditions / Notes	Standard	Test Level	Criteria
	Reference standards for ITE Reference standard for Industrial/IMS equipment	EN 55024 EN 61000-6-2		
ESD	15 kV air discharge, 8 kV contact, at any point of the system.	EN 61000-4-2	4	A
Radiated Field	10 V/m, 80-1000 MHz, 1 KHz 80% AM.	EN 61000-4-3	3	A
Electric Fast Transient	±2 kV on AC power port for 1 minute	EN 61000-4-4	3	A
Surge	±1 kV line to line; ± 2 kV line to earth on AC power port	EN 61000-4-5	3	A
Conducted RF Immunity	10 V_{RMS}, 0,15-80 MHz, 1 kHz 80% AM	EN 61000-4-6	3	A
Dips and Interruptions	200 – 240 V_{AC}:			
	Drop-out to 0% for 10 ms	EN61000-4-11		A
	Dip to 40% for 5 cycles (100 ms)	EN61000-4-11		A
	Dip to 70% for 25 cycles (500 ms)	EN61000-4-11		A
	Drop-out to 0% for 5 s	EN61000-4-11		B
	100 – 127 V_{AC}:			
	Drop-out to 0% for 10 ms	EN 61000-4-11		A
	Dip to 40% for 5 cycles (100 ms)	EN 61000-4-11		A (de-rate to 150 W)
	Dip to 70% for 25 cycles (500 ms)	EN 61000-4-11		A (de-rate to 400 W)
	Drop-out to 0% for 5 s	EN 61000-4-11		B

SAFETY AGENCIES APPROVALS

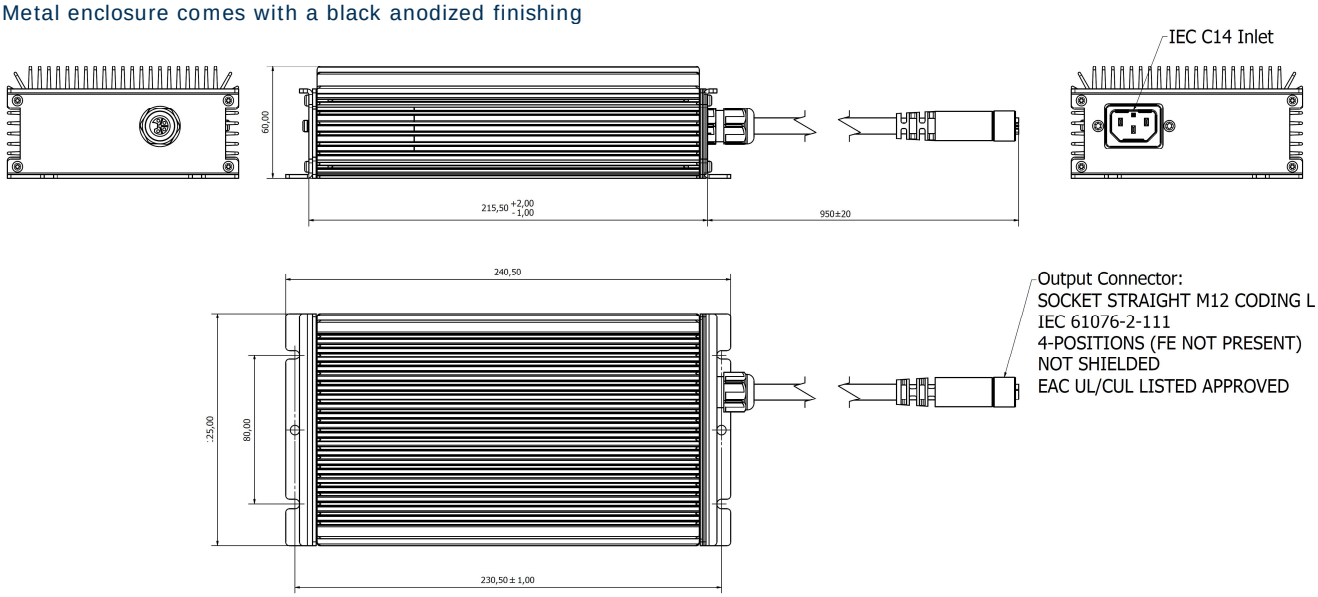
Certification Body	Safety Standards and file numbers	Category
CSA/UL ($_{C}$UL$_{US}$ Listed)	UL 62368-1 CSA C22.2 No. 62368-1	Audio Video and Information Technology Equipment
IEC IECEE CB Certification	IEC/EN 62368-1	
KTR	KC 62368-1	
CCC	GB 17625.1-2012; GB 4943.1-2022; GB/T 9254.1-2021	
BIS	IS 13252(Part 1):2010/ IEC 60950-1: 2005	
CE	Directive 2014/35/EU: Electrical Safety: Low Voltage electrical equipment (LVD)	Audio Video and Information Technology Equipment
	Directive 2014/30/EU: Electromagnetic Compatibility (EMC)	
	Directive 2015/863/EU: RoHS 3	
UKCA	EN IEC 62368-1 Low Voltage electrical equipment (LVD)	Audio Video and Information Technology Equipment
	EN 55011, EN 55032, EN 55035 EN IEC 61000-6-2, EN IEC 61000-3-2, EN 61000-3-3, Electromagnetic Compatibility (EMC)	
	Directive 2015/863/EU: RoHS 3; S.I. 2012/3032	

OUTLINE DRAWING

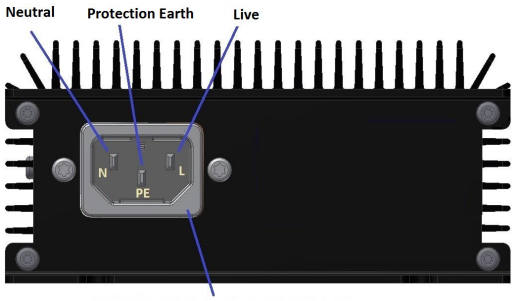
Overall dimensions: 125.0 x 240.5 x 60.0 mm (4.92 x 9.47 x 2.36 in)

Weight: 2.8 kg (6.17 lb)

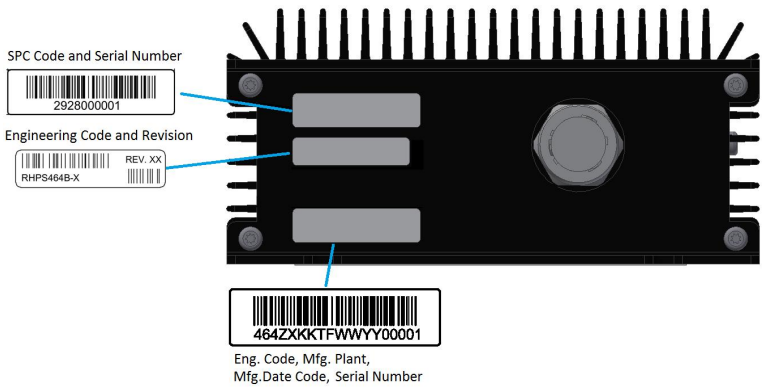
Metal enclosure comes with a black anodized finishing



INPUT CONNECTION AND LABELS

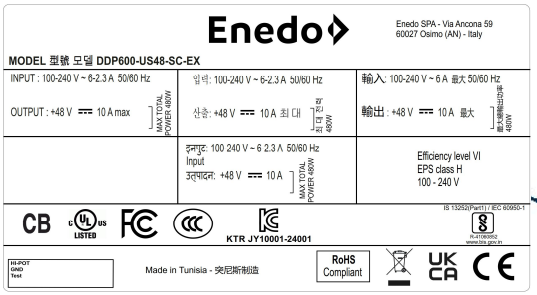


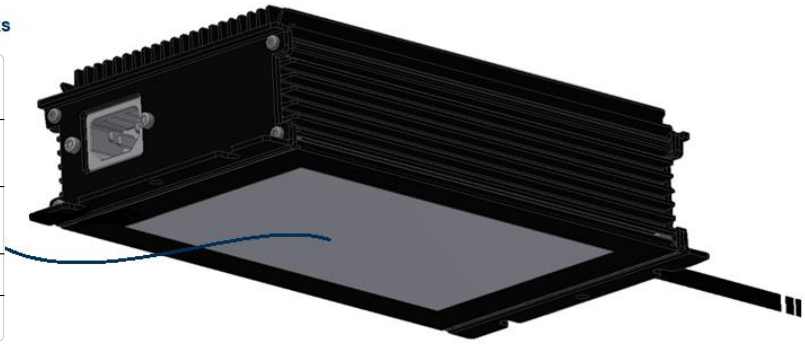
SCHURTER 6100.4110 (UL TYPE 6100-41)
CONN, IEC APPLIANCE INLET C14, 10A, 250V
SNAP-IN, PANEL THK=1mm
OR
INALWAYS 0711-2-PN-10 (UL TYPE 0711-2)
CONN, IEC APPLIANCE INLET C14, 10A, 250V
SNAP-IN, PANEL THK=1mm
OR
K&B 42R033112100 (UL TYPE GST3)
CONN, IEC APPLIANCE INLET C14, 10A, 250V
SNAP-IN, PANEL THK=1mm



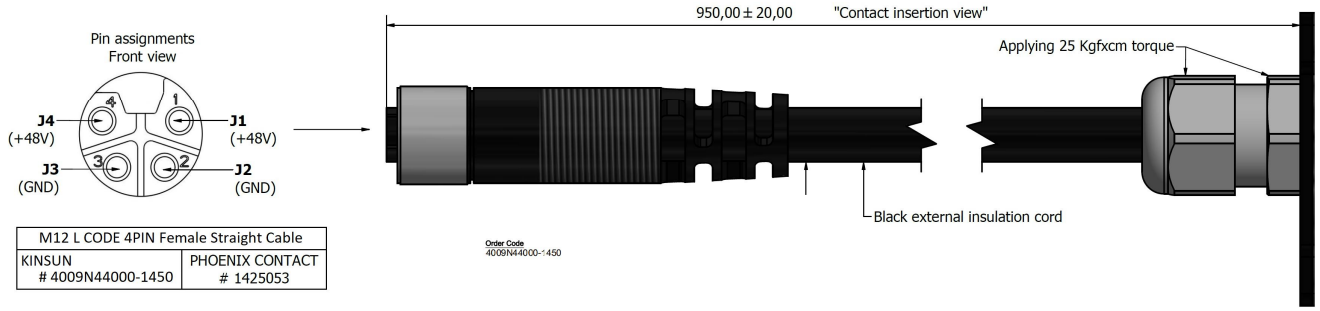
Eng. Code, Mfg. Plant,
Mfg.Date Code, Serial Number

Descriptive Label:
Manufacturer, Part Number, Electrical Ratings, Safety Marks





OUTPUT CONNECTION AND PIN OUT



M12 L CODE 4PIN Female Straight Cable	
KINSUN # 4009N44000-1450	PHOENIX CONTACT # 1425053

REVISION HISTORY

Rev.	Date	Originator	Comments
00	April 12th, 2021	S. Mancini	· First release
01	May 31st, 2021	M. Petritoli	· Remote On / Off signal removed · +5V_{SB} removed · Isolation Output-to-Earth reduced to functional level (100 V_{DC}) · Radiated emissions downgraded to Class A since the lack of a common ground base plate · Output connector LEMO/REDEL (CAH.M04.NYM.C72N) replaced by Amphenol (M12S-04-AFFS-SC8). · Descriptive label changed · Safety certifications and marks updated, now only CB and cULus referred to IEC 62368-1. Norma Oficial Mexicana (NOM) and Bureau of Indian Standard (BIS) certificates and marking on hold. · EU Low Voltage Directive updated to 2014/35/EU
02	October 5th, 2021	M. Petritoli	· Output connection and Pin Out updated introducing new M12 straight power connector NorComp or equivalent · Removed BIS (India) and NOM (Mexico) safety mark from Safety Agency Approval chapter
03	September 22nd, 2022	M. Petritoli	· Outline drawing updated · Output DC cable Updated including only the two homologated M12 L-Code connectors (E-Tek, Phoenics) · Over current limit reference corrected · Load regulation note removed since the new output cord gauge · Surge limits aligned to the industrial standard
04	December 14th, 2022	M. Petritoli	· Nominal output voltage range downgraded to 100-240 V (originally 250 V max) · Input operating frequency limited to 40 or 50 Hz · DC input voltage specification removed since deemed out of scope · Shock and Vibration immunity specification added · Description Label updated · IEC C14 inlet socket homologated sources specified · Output connector M12 L Code original manufacturer specified
05	July 2nd, 2024	M. Petritoli	· Korean safety mark and file No. added · Descriptive label updated including now KC safety mark · Product traceability labels updated · Datasheet disclaimer note removed · Safety certification bodies and standards specified · UKCA Declaration of Conformity specified