DM1200UB-10V

Ultra-stable, high precision (ppm class) fluxgate technology DM Series current transducer for non-intrusive, isolated DC and AC current measurement up to 1320A

Features

- Ø45mm aperture
- 15 ppm linearity,
- 10 ppm offset
- 10V output
- Fluxgate, closed loop compensated technology with crystal driven excitation frequency for increased stability
- Industry standard DSUB 9 pin connection
- Full aluminum body for superior EMI shielding and extended operating temperature range

Applications:

- Power measurement and power analysis
- Stable power supplies
- MPS for particles accelerators
- Gradient amplifiers for MRI devices
- Precision drives
- Batteries testing and evaluation systems
- Current calibration purposes

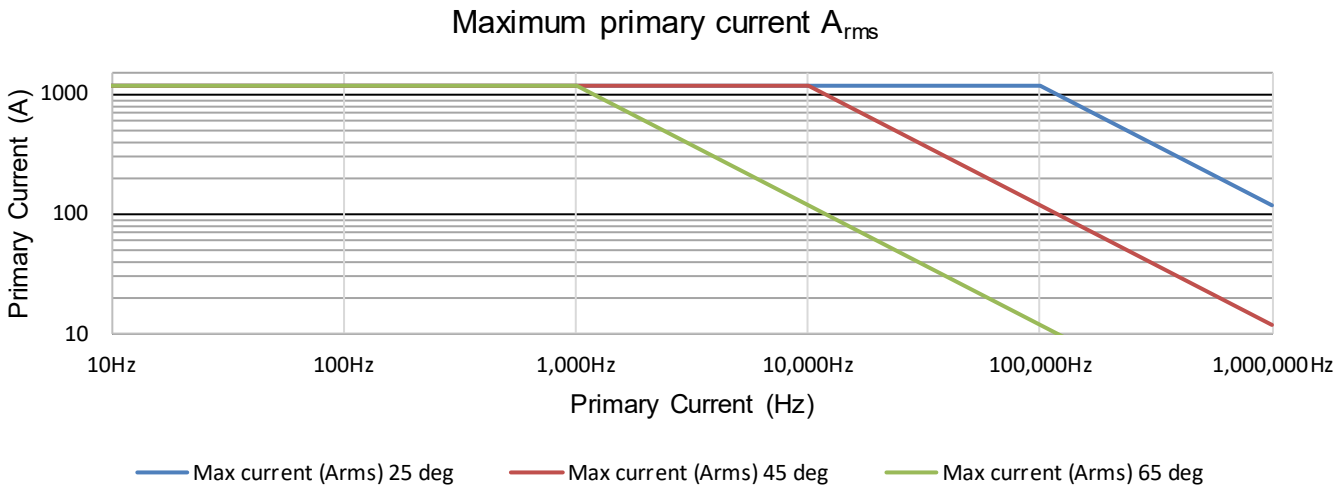
Specification highlights	Symbol	Unit	Min	Typ.	Max
Nominal primary AC current	I_{PN} AC	Arms			850
Nominal primary DC current	I_{PN} DC	A	-1200		1200
Nominal output voltage	V_{out}	V	-10		10
Measuring range	I_{PM}	A	-1320		1320
Primary / secondary ratio		V/kA	8.3333		8.3333
Linearity error (Best fit)	ε_L	ppm	-15		15
Offset Voltage (including earth field)	V_{OE}	ppm	-10		10
Ratio error	ε_C	ppm	-10		10
DC-10Hz Overall accuracy @25°C (=V_{OE}+ε_L + I_{OE})	accε	ppm	-35		35
AC Maximum gain error 10Hz to 1kHz					100ppm(0.01%)
Bandwidth (3dB)	f_{3dB}	kHz	300		
Operating temperature range	Ta	°C	-40		65
Power supply voltages	Uc	V	±14.25		±15.75

All ppm (or %) values refer to nominal current

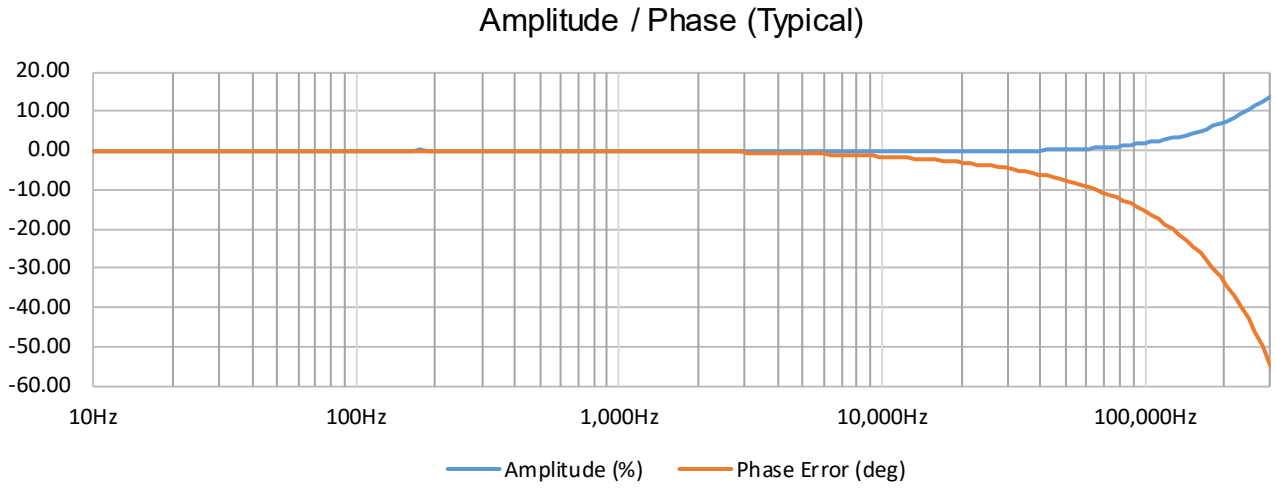
Electrical specifications at Ta=23°C, supply voltage = ± 15V unless otherwise stated

Parameter	Symbol	Unit	Min	Typ.	Max	Comment
Nominal primary AC current	I_{PN} AC	Arms			850	Refer to fig. 2 for derating
Nominal primary DC current	I_{PN} DC	A	-1200		1200	
Measuring range	I_{PM}	A	-1320		1320	Refer to fig. 2 for derating
Overload capacity	$\hat{I}_{OL}$	A			1500	Non-measured, 100ms
Nominal voltage output	V_O	V	-10		10	At nominal primary DC current
Primary / secondary ratio		V/kA	8.3333		8.3333	
Linearity error	ε_L	ppm	-15		15	ppm refers to nominal current
Bandwidth (3dB)	f_{3dB}	kHz	300			Small signal, graphs figure 3
Response time to a step current IPN	tr@90%	µs		1		di/dt = 100A/µs
Amplitude error 10Hz – 3kHz	εG	%			0.01	refers to nominal current
3kHz - 50kHz					1.00	
50kHz-300kHz					20.00	
Phase shift 10Hz – 3kHz	θ	°			0.50	
3kHz - 50kHz					8.00	
50kHz-300kHz					60.00	
Noise 0 - 100Hz	noise	ppm rms			0.15	refers to nominal current
0 - 1kHz					0.2	
0 - 10kHz					0.3	
0 - 100kHz					2	
Noise 0 - 100Hz	noise	ppm p-p			0.8	refers to nominal current
0 - 1kHz					1	
0 - 10kHz					1.7	
0 - 100kHz					8	
Fluxgate excitation frequency	f_{Exc}	kHz		31.25		
Power supply voltages	Uc	V	±14.25		±15.75	
Positive current consumption	Ips	mA	135	140	145	Add Vo*0.08 (A)
Negative current consumption	Ins	mA	120	130	135	Add Vo*0.08 (A)
Operating temperature range	Ta	°C	-40		65	
Offset error						
Initial	V_{OE}	ppm	-10		10	ppm refers to nominal DC current
Versus temperature	TC_{VOE}	ppm/K	-0.1		0.1	ppm refers to nominal DC current
Versus time	V_{OE}/time	ppm/ month	-0.3		0.3	ppm refers to nominal DC current
Versus supply voltage		ppm/V	-0.1		0.1	ppm refers to nominal DC current
Ratio Error						
Initial @23°C	ε_C	ppm	-10		10	ppm refers to primary current
Versus temperature	$TC\varepsilon_C$	ppm/K	-1		1	ppm refers to primary current
Versus time	ε_C/time	ppm/ month	-3		3	ppm refers to primary current

Frequency and ambient temperature derating (Fig. 2)



Frequency characteristics (Fig. 3)



Isolation specifications

Parameter	Unit	Value
Clearance	mm	12
Creepage distance	mm	12
Comparative tracking index (CTI)		> 600
Rms voltage for AC isolation test, 50/60 Hz, 1 min - Between primary and (secondary and shield) - Between secondary and shield	kV	 5.7 0.2
Impulse withstand voltage (1.2/50µs)	kV	10.4
Continous working voltage with uninsulated wire • Non mains • CAT II (DC and rms) • CAT III (DC and rms) Insulated wire • Non mains • CAT II (DC and rms) • CAT III (DC and rms)	V	 1000 600 300 2000 1000 1000
Transient voltage with uninsulated wire • Non mains • CAT II • CAT III Insulated wire • Non mains • CAT II • CAT III	V	 4500 6000 6000 6000 6000 8000

Caution: Do not connect the transducer to signals or use for measurements within Measurement Category IV, or for measurements on MAINs circuits or on circuits derived from Overvoltage Category IV which may have transient overvoltages above what the product can withstand. The product must not be connected to circuits that have a maximum voltage above the continuous working voltage, relative to earth or to other channels, or this could damage and defeat the insulation. The product can only withstand transients up to the transient overvoltage rating without breakdown or damage to the insulation. An analysis of the working voltages, loop impedances, temporary overvoltages, and transient overvoltages in the system must be conducted prior to making measurements.

Caution: When using insulated wires all wiring must be insulated for the highest voltage used.

Absolute maximum ratings

Parameter	Unit	Max	Comment
Primary	kA	4.5	Maximum 100ms
Power supply	V	±16.5	

Environmental, safety and mechanical specifications

Parameter	Unit	Min	Typ	Max	Comment
Altitude	m			2000	
Usage					Designed for indoor use
Transient voltages					Up to overvoltage category III
Poution Degree				2	
Ambient operating temperature range	°C	-40		65	
Storage temperature range	°C	-40		65	
Relative humidity	%	20		80	Non-condensing
Mass	kg		2.0		
Connections	DSUB9 male and BNC connector				
Standards	IEC61010-2-30, IEC61326-1 EMC and EC61010-1:2010 3rd Edition				
External devices	External devices connected to current transducers must comply with the standards IEC61010-1, IEC60950 or IEC62368-1 and be energy-limited circuitry				
Cleaning	The transducer should only be cleaned with a damp cloth. No detergent or chemicals should be used.				
Temperature	When multiple primary turns are used or high primary currents are applied the temperature around the transducer will increase, please monitor to ensure that the maximum ratisngs are not exceeded. It is recommended to have minimum 1mm^2 per ampere in the primary busbar.				

Advanced Sensor Protection Circuits “ASPC”

Developed to protect the current transducer from typical fault conditions:

- Unit is un-powered and secondary circuit is open or closed
- Unit is powered and secondary circuit is open or interrupted

Both DC and AC primary current up to 100% of nominal value can be applied to the current transducers in the above situations without damage to the electronics.

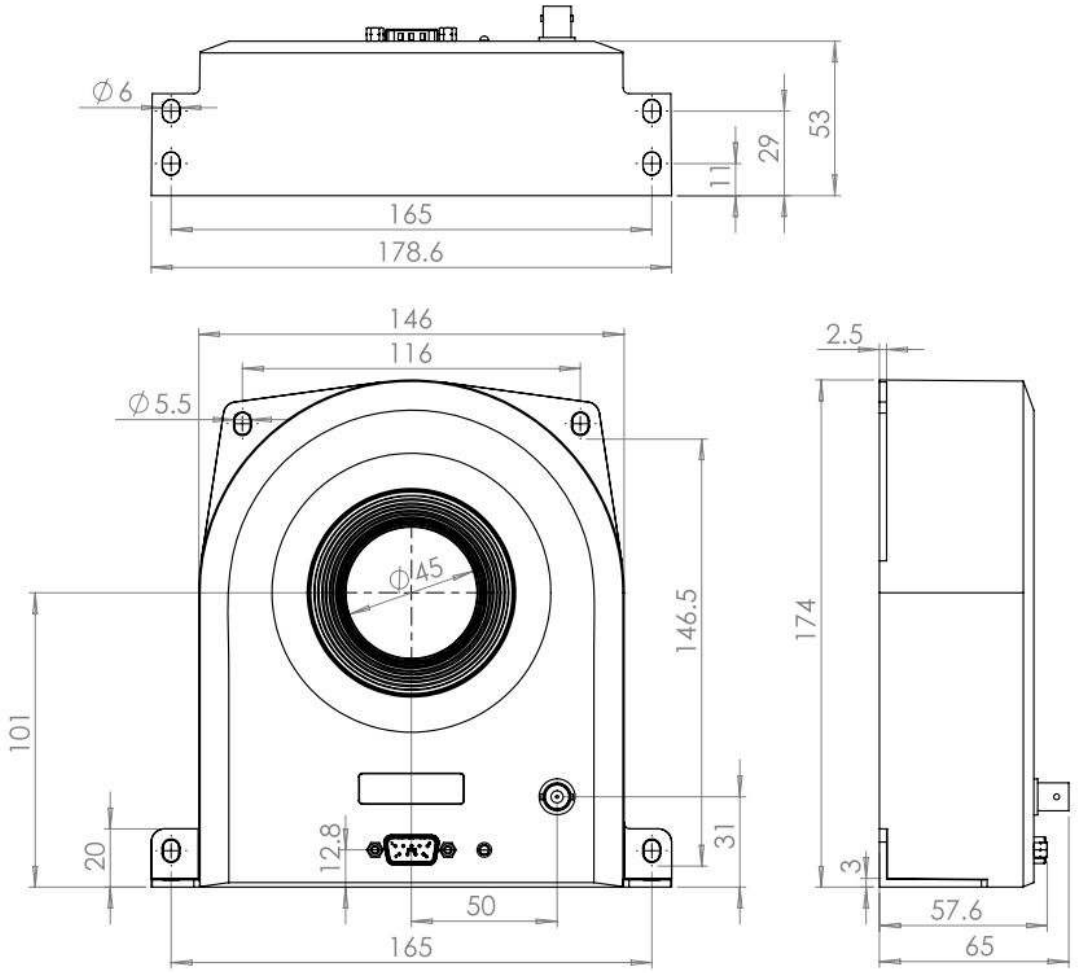
Please notice that the transducer core can be magnetized in all above cases, leading to a small change in output offset current (less than 10ppm)

Accessories

- 4-channel power supplies unit for connection up to 4xDM1200 : DSSIU-4
- 6-channel power supplies unit for connection up to 6xDM1200 : DSSIU-6
- Transducer cables in 5 lengths (2m - 5m - 10m - 15m - 20m): DSUB2 - DSUB5 - DSUB10 - DSUB15 - DSUB20
- Transducer cable 3m for connection to end-user’s power supply: Transducer cable for lab PS

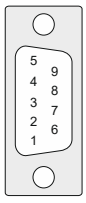
  (with access to current output via ϕ4 banana jacks)

Please visit Danisense homepage for relevant datasheets



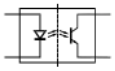
DSUB pin layout

DSUB-9 pinout & BNC connection

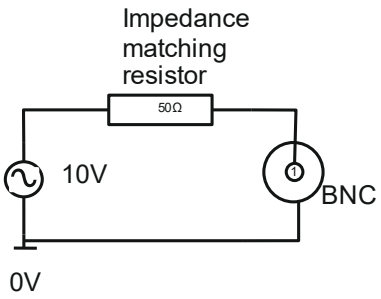


When sensor is operating in normal condition the status pins are shorted.

Status pin properties.
- Forward direction pin 8 to pin 3
- Maximum forward current 10mA
- Maximum forward voltage 60V
- Maximum reverse voltage 5V



5	-Vc
9	+Vc
4	0V
8	Status
3	Status
7	NC
2	NC
6	Do not use
1	Do not use



Positive current direction

Is identified by an arrow on the transducers red isolation piece in the center

Mounting

Base plate mounting: 4 slotted holes Ø6 mm

Back plate mounting: 4 slotted holes Ø6 mm

Fastening torque: 6 Nm

Intended use:

The DS1200UB-10V is designed to measure current up to 1320A, and be powered by a DSSIU-4-1U or DSSIU-6-1U.

Instruction for use:

1. Do not power up the device before all cables are connected.
2. Only use Danisense cables to ensure correct impedance levels.
3. Place the primary conductor through the apperture of the transducer
4. If the DSSIU-4(6)-1U is intended for desk use, mount the rubber feet which are part of the package.
5. If the DSSIU-4(6)-1U is intended for Rack mounting, use the screw kit for mounting and do not mount the rubber feet.
6. Connect a DSUB cable between DSSIU-4(6)-1U and each sensor
7. Connect a low impedance amperemeter, measuring resistor or power analyzer on the secondary output (4mm red and black connectors)
8. Ensure that no calibration connectors are attached when measuring primary current. Always avoid to create a calibration short circuit, between + and — calibration connection.
9. There is a risk of electrical shock if an uninsulated busbar with high voltages is touching the metal enclosure of the transducer. Please ensure before powering up the system that no primary busbar can touch the metal enclosure.
10. When all connection are secured - connect mains power
11. Apply primary current

Safety Instructions:

DO NOT TRY TO DISASSEMBLE THE UNIT.

If the green transducer diode is not operating when the system is powered up, disconnect power and contact Danisense for further instruction.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Declaration of Conformity

Danisense A/S

Malervej 10

DK-2630 Taastrup

Denmark

Declares that under our sole responsibility the products listed in Appendix A are in conformity with the provisions of the following EC Directives, including all amendments, and with national legislation implementing these

directives:

Directive 2014/30/EU

Directive 2014/35/EU

And that the following harmonized standards have been applied

EN 61010-1 (Third Edition):2010, EN 61010-1:2010

EN 61010-2-030:2010

EN 61326-1:2013

All DANISENSE products are manufactured in accordance with RoHS directive 2011/65/EU. Annex II of the RoHS directive was amended by directive 2015/863 in force since 2015, expanding the list of 6 restricted substances (Lead, Hexavalent Chromium, PBB, PBDE and Cadmium)

Danisense follows the provision in EN 63000:2018

Appendix A describes the products covered by this Declaration of Conformity.

Place		Date
Taastrup, Denmark	Henrik Elbæk	2022-03-15