Ultra-stable, high precision (ppm class) fluxgate technology DM Series current transducer for non-intrusive, isolated DC and AC current measurement up to 1800A

CE
RoHS 2011/65/EU
UK CA

Features

Ø45mm aperture enabling large isolated cables and the possibility to measure leakage current at high precision.

1 ppm linearity

10 ppm offset

Current 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

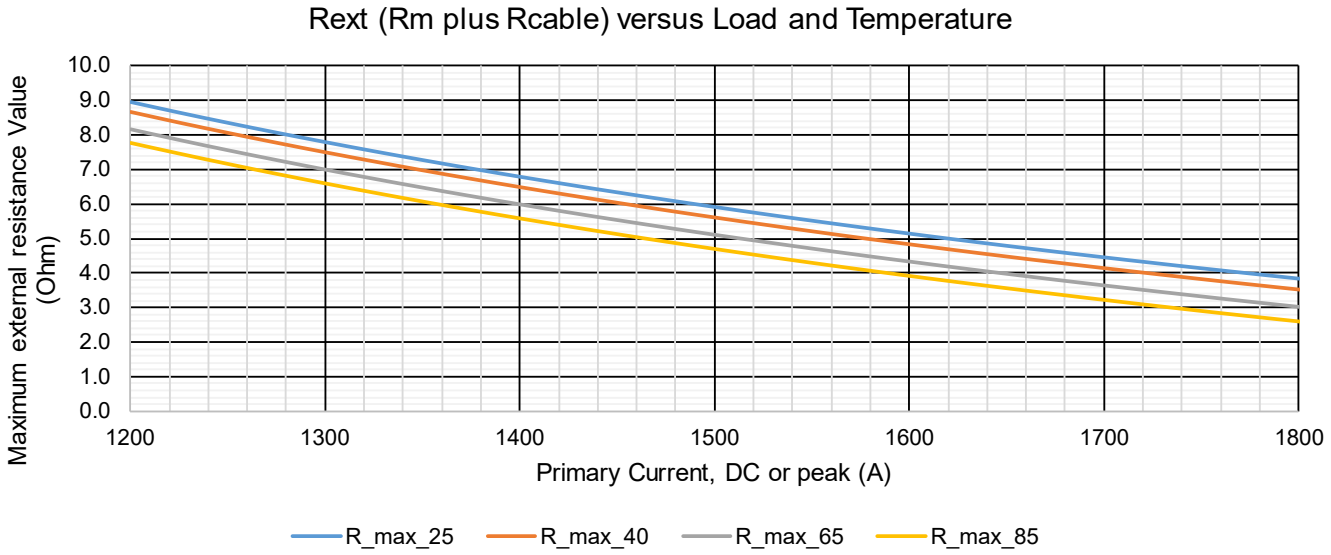
Specification highlights	Symbol	Unit	Min	Typ	Max
Nominal primary AC current	I_{PN} AC	Arms			1200
Nominal primary DC current	I_{PN} DC	A	-1500		1500
Measuring range	$\hat{I}_{PM}$	A	-1800		1800
Primary / secondary ratio	n1 : n2		1:1500		1:1500
Linearity error	ε_L	ppm	-1		1
Offset current (including earth field)	I_{OE}	ppm	-10		10
DC-10Hz Overall accuracy @25°C (= $\varepsilon_L + I_{OE}$)	accε	ppm	-11		11
AC Maximum gain error 10Hz to 3kHz	ε_G	%			±0.01
Operating temperature range	Ta	°C	-40		85
Power supply voltages	Uc	V	±14.25		±15.75

All ppm (or %) values refer to nominal current

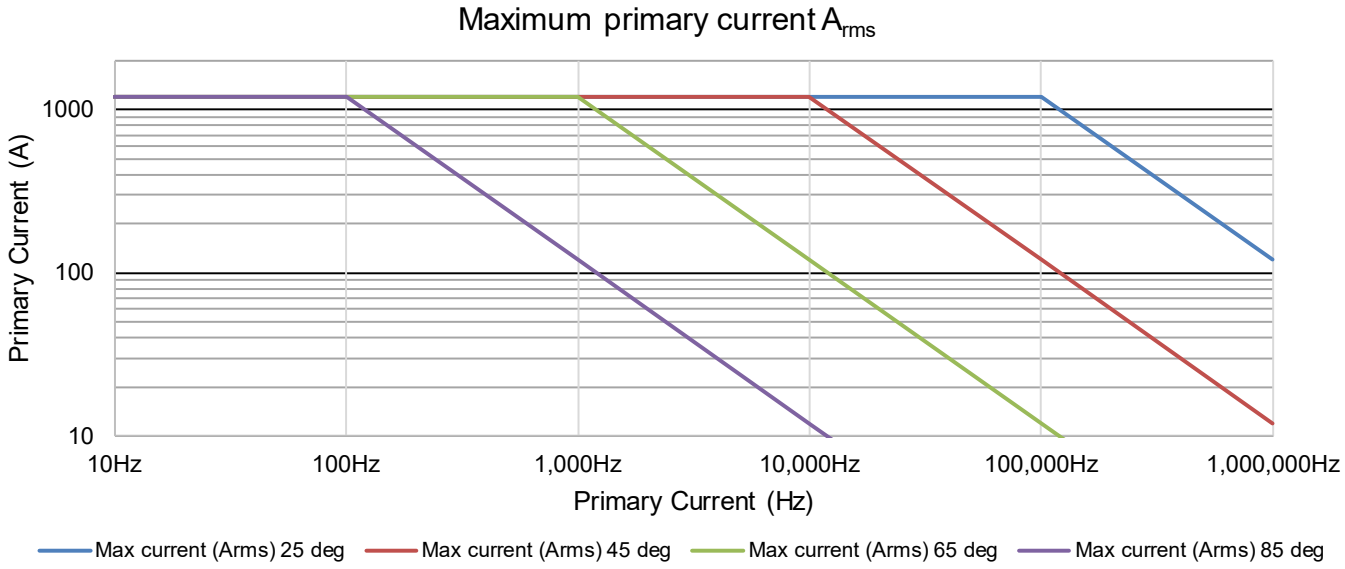
Electrical specifications at Ta=23°C, supply voltage = ± 15V unless otherwise stated

Parameter		Symbol	Unit	Min	Typ.	Max	Comment
Nominal primary AC current		I_{PN} AC	Arms			1200	Refer to fig. 1 & 2 for derating
Nominal primary DC current		I_{PN} DC	A	-1500		1500	Refer to fig. 1 for derating
Measuring range		I_{PM}	A	-1800		1800	Refer to fig. 1 & 2 for derating
Overload capacity		$\hat{I}_{OL}$	kA			5	Non-measured, 100ms
Nominal secondary current		I_{SN}	mA	-1000		1000	At nominal primary DC current
Primary / secondary ratio				1:1500		1:1500	
Measuring resistance		R_M	Ω	0		3	Refer to fig. 1 for details
Linearity error		ε_L	ppm µA	-1 -1		1 1	ppm refers to nominal current µA refers to secondary current
Offset current		I_{OE}	ppm µA	-10 -10		10 10	ppm refers to nominal current µA refers to secondary current
DC-10Hz Overall accuracy @25°C (= ε_L + I_{OE})		accε	ppm	-11		11	ppm refers to nominal DC current
Offset temperature coefficient		TC_{IOE}	ppm/K µA/K	-0.1 -0.1		0.1 0.1	ppm refers to nominal current µA refers to secondary current
Bandwidth		f(-3dB)	kHz	400			Small signal, graphs figure 3
Amplitude error	10Hz –3kHz 3kHz -50kHz 50kHz - 300kHz	ε_G	%			0.01% 1.00% 20.0%	% refers to nominal current
Phase shift	10Hz –3kHz 3kHz -50kHz 50kHz - 300kHz	θ	°			0.01° 0.5° 10°	
Response time to a step current I_{PN}		tr @ 90%	µs		1		di/dt = 100A/µs
Noise	0 - 100Hz 0 - 1kHz 0 - 10kHz 0 - 100kHz	noise	ppm rms			0.05 0.06 0.70 2.0	Measured on secondary current
Fluxgate excitation frequency		f_{Exc}	kHz		31.25		
Induced rms voltage on primary conductor			µV rms			5	
Power supply voltages		Uc	V	±14.25		±15.75	
Positive current consumption		Ips	mA	135	140	145	Add Is (if Is is positive)
Negative current consumption		Ins	mA	120	130	135	Add Is (if Is is negative)
Operating temperature range		Ta	°C	-40		85	
Stability							
Offset stability over time			ppm/month µA/month	-0.1 -0.1		0.1 0.1	ppm refers to nominal current µA refers to secondary current
Offset change with vertical external magnetic field			µA /mT		0.2	0.8	(perpendicular to bus bar) µA refers to secondary current
Offset change with horizontal external magnetic field			µA /mT		0.8	2	(parallel to bus bar) µA refers to secondary current
Offset change with power supply voltage changes			µA /V		0.004	0.04	µA refers to secondary current
Offset change with absolute power supply voltages tracking			µA /V		0.012	0.04	µA refers to secondary current

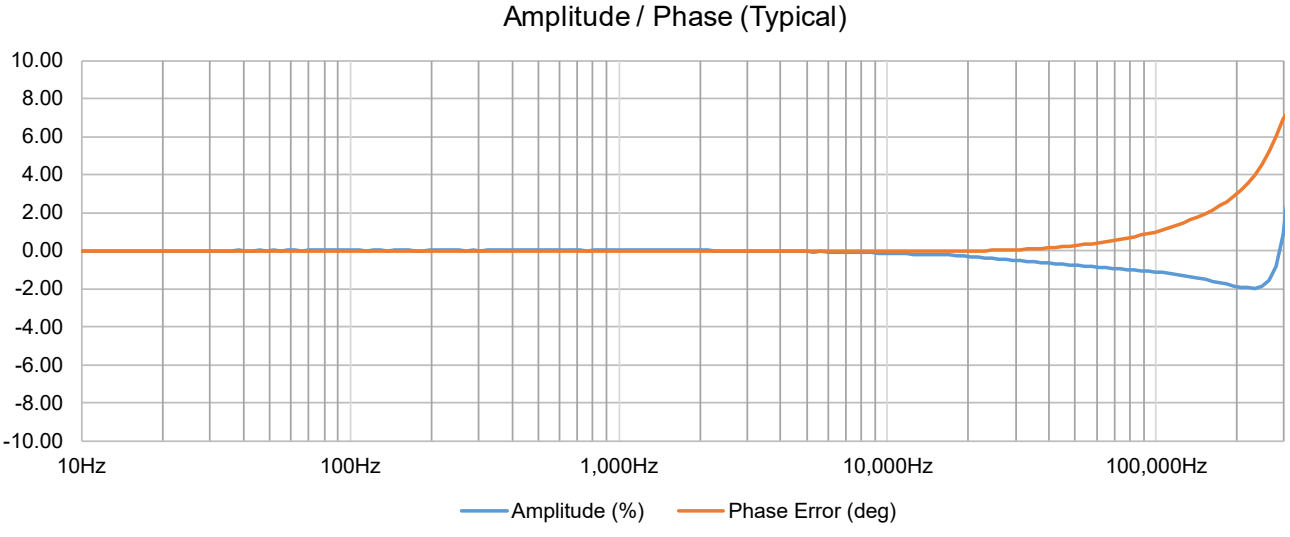
Maximum external resistance value (Fig. 1)



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		85	
Storage temperature range	°C	-40		85	
Relative humidity	%	20		80	Non-condensing
Mass	kg		1.8		
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

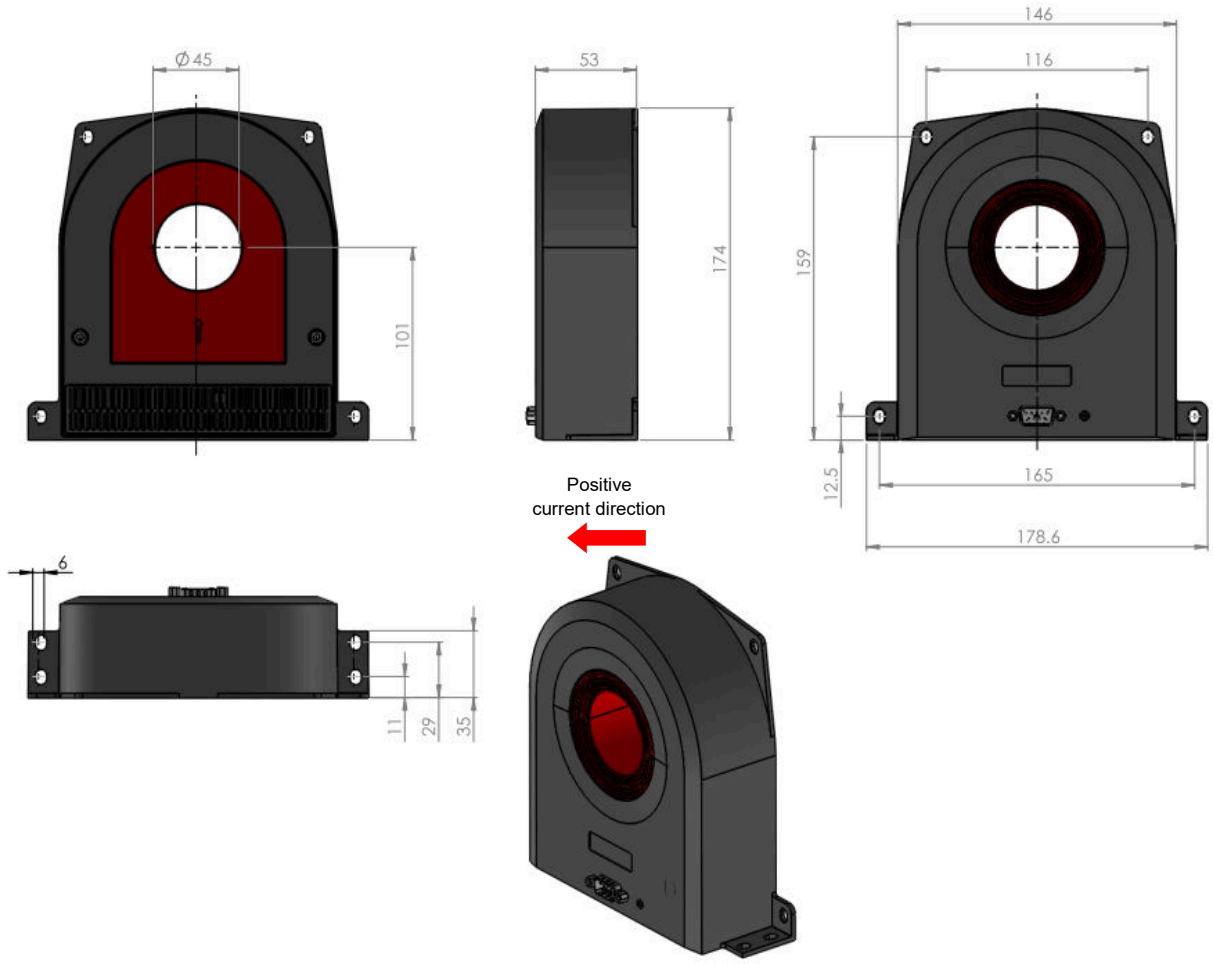
Both DC and AC primary current up to 100% of nominal value can be applied to the current transducers in the above situations without damage to the electronics.

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

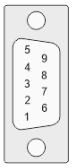
- 4-channel power supplies unit for connection up to 4xDM1200 : DSSIU-4
- 6-channel power supplies unit for connection up to 6xDM1200 : DSSIU-6
- Transducer cables in 5 lengths (2m - 5m - 10m - 15m - 20m): DSUB2 - DSUB5 - DSUB10 - DSUB15 - DSUB20
- Transducer cable 3m for connection to end-user’s power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

  (with access to current output via ϕ4 banana jacks)



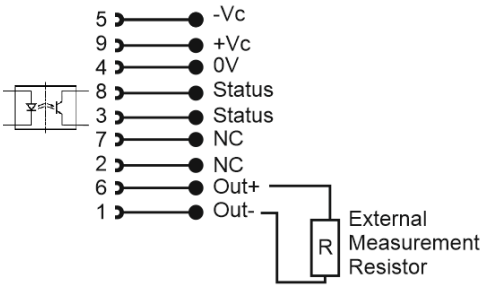
Dimension in mm (general tolerance 0.3mm unless otherwise stated)

Standard DSUB-9 current output



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



Positive current direction

Is identified by an arrow on the transducer body

Mounting

Base plate mounting: 4 slotted holes Ø6 mm

Back plate mounting: 4 slotted holes Ø6 mm

Fastening torque: 6 Nm

Declaration of Conformity

Danisense A/S

Malervej 10

DK-2630 Taastrup

Denmark

Declares that under our sole responsibility that this product is 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/A1:2019

EN 61010-2-030:2021/A11:2021

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

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