DR5000IM

Ultra-stable, high precision (ppm class) fluxgate technology DR Series current transducer for non-intrusive, isolated DC and AC current measurement up to 8000A

Features

Linearity error maximum 1 ppm

4mm banana jack for secondary current

Transducer core optimized for high level of immunity against external magnetic fields

Operating temperature

Transducer head 0-70°C

Electronics 0-45°C

Turns ratio 1:2500

Aperture diameter 150 mm

2U 19" Control unit with universal mains supply 100V-240V

Applications:

MPS for particles accelerators

Stable power supplies

Precision drives

Batteries testing and evaluation systems

Power measurement and power analysis

Current calibration purposes

Specification highlights	Symbol	Unit	Min	Typ	Max
Nominal primary AC current	I_{PN} AC	Arms			5000
Nominal primary DC current	I_{PN} DC	A	-8000		8000
Measuring range	$\hat{I}_{PM}$	A	-8000		8000
Primary / secondary ratio	n1: n2		1:2500		1:2500
Linearity error	ε_L	ppm	-1		1
Offset current (including earth field)	I_{OE}	ppm	-3		3
DC-10Hz Overall accuracy @25°C (= $\varepsilon_L + I_{OE}$)	accε	ppm	-4		4
AC Maximum gain error 10Hz to 1kHz	εG	%			± 0.05
Operating temperature range	Ta	℃	0		70

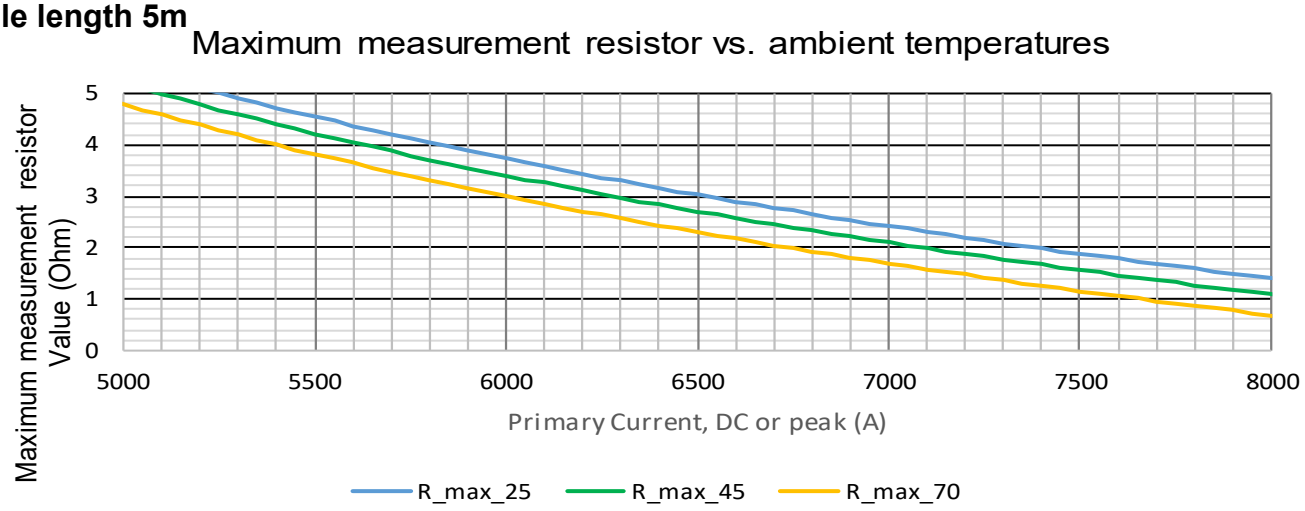
All ppm (or %) values refer to nominal current

Electrical specifications at Ta=23°C

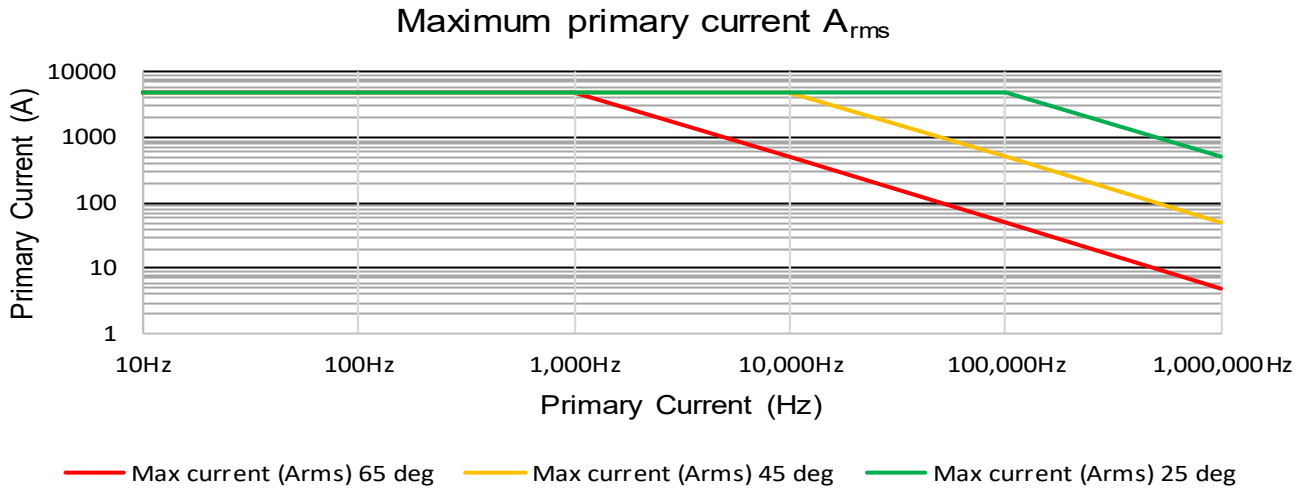
Parameter	Symbol	Unit	Min	Typ.	Max	Comment
Nominal primary AC current	I_{PN} AC	Arms			5000	Refer to fig. 1 & 2 for derating
Nominal primary DC current	I_{PN} DC	A	-8000		8000	Refer to fig. 1 for derating
Measuring range	I_{PM}	A	-8000		8000	Refer to fig. 1 & 2 for derating
Overload capacity	$\hat{I}_{OL}$	kA			20	Non-measured, 100ms
Nominal secondary current	I_{SN}	mA	-3200		3200	At nominal primary DC current
Primary / secondary ratio			1:2500		1:2500	
Measuring resistance	R_M	Ω	0		1	Refer to fig. 1 for details
Linearity error	ε_L	ppm µA	-1 -3.2		1 3.2	ppm refers to nominal current µA refers to secondary current
Offset current (including earth field)	I_{OE}	ppm µA	-3 -9.6		3 9.6	ppm refers to nominal current µA refers to secondary current
DC-10Hz Overall accuracy @25°C (= εL + IOE)	accε	ppm	-4		4	ppm refers to nominal DC current
Offset temperature coefficient	TC_{IOE}	ppm/K µA/K	-0.1 -0.32		0.1 0.32	ppm refers to nominal current µA refers to secondary current
Bandwidth	f(-3dB)	kHz	100			Small signal, graphs figure 3
Amplitude error 10Hz – 1kHz 1kHz - 5kHz 5kHz - 30kHz	εG	%			0.05% 1.50% 15.00%	% refers to nominal current
Phase shift 10Hz – 1kHz 1kHz - 5kHz 5kHz - 30kHz	θ	°			0.05° 0.5° 3°	
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			0.10 0.70 5.00 7.00	Measured on secondary current
Fluxgate excitation frequency	f_{Exc}	kHz		7.82		
Induced rms voltage on primary conductor		µV rms			10	
Mains input voltage AC		V_{AC}	90		295	50/60Hz
Mains input voltage DC		V_{DC}	127		417	
Control Unit ambient temperature		℃	0		45	
Transducer head temperature		℃	0		70	Refer to fig. 1 for derating
Stability						
Offset stability over time		ppm / month uA/month	-0.1 -0.32		0.1 0.32	ppm refers to nominal current µA refers to secondary current
Offset change with vertical external magnetic field		µA /mT			8	(perpendicular to bus bar) µA refers to secondary current
Offset change with horizontal external magnetic field		µA /mT			8	(parallel to bus bar) µA refers to secondary current

Measurement resistor RM and ambient temperature derating (Fig. 1)

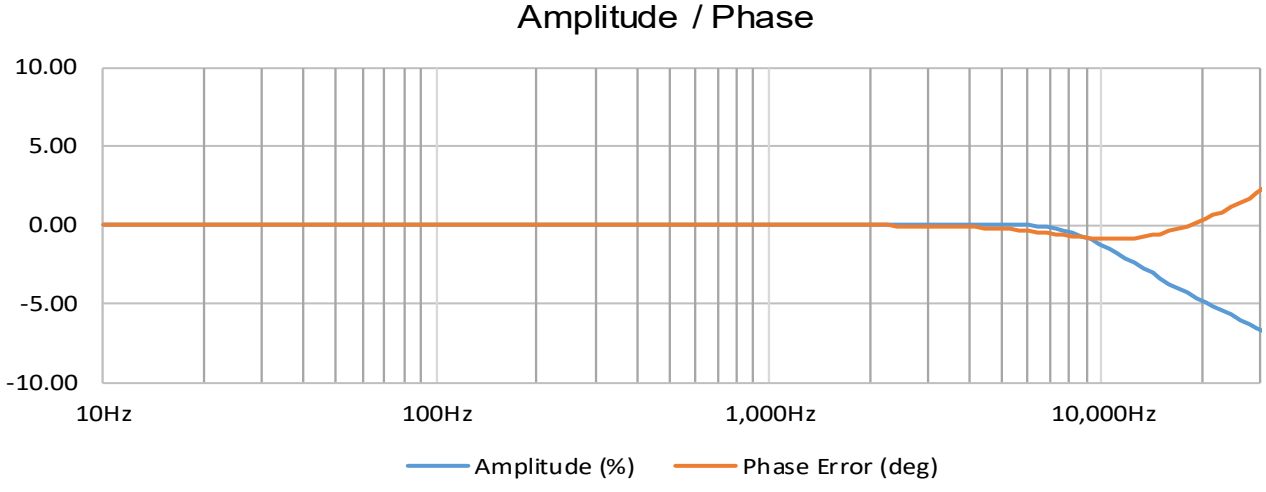
Cable length 5m



Frequency and ambient temperature derating (Fig. 2)



Frequency characteristics (Fig. 3)



Isolation specifications

Parameter	Unit	Value
Rated isolation voltage rms, reinforced isolation IEC 61010-1 standard and with following conditions - Overvoltage category III -Pollution degree 2	kV	3
Rms voltage for AC isolation test, 50/60 Hz, 1 min - Between primary and (secondary and shield) - Between secondary and shield	kV	 23.7 0.2
Impulse withstand voltage	kV	43.5
Creepage distance / Clearance	mm	60 / 60
Comparative Tracking Index	CTI	600

Absolute maximum ratings

Parameter	Unit	Max	Comment
Primary current	kA	20	Maximum 100ms
Primary current	kA	8	Continous

Environmental and mechanical characteristics

Parameter	Unit	Min	Typ	Max	Comment
Ambient operating temperature range	°C	0		45	Control unit
Ambient operating temperature range	°C	0		70	Transducer head
Storage temperature range	°C	-40		85	
Relative humidity	%	20		80	Non-condensing
Mass	kg		17 6		Transducer Head Control Unit
Connections	4mm banana Jacks				
Standards	EN 61326-1 EMC EN 61010-1:2010 Safety				

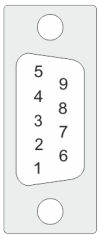
Advanced Sensor Protection Circuits “ASPC”

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

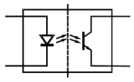
Both DC and AC primary current up to 100% of nominal value can be applied to the current transducers in the above situations without damage to the electronics.
Please notice that the sensor core can be magnetized in all above cases, leading to a small change in output offset current (less than 10ppm)

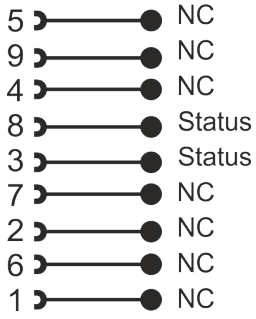
DSUB-9 Status Output



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

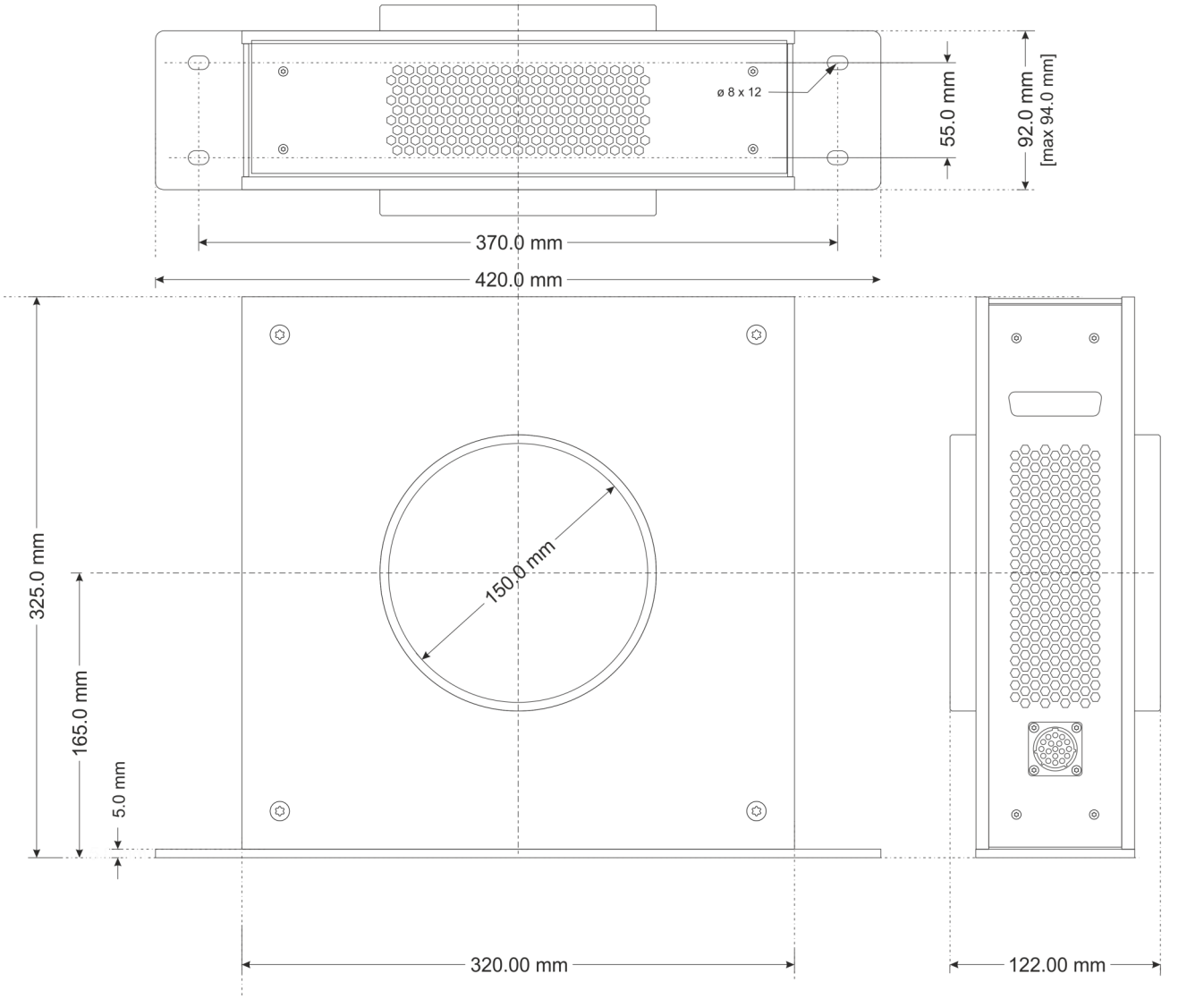
Status pin properties.
- Forward direction pin 8 to pin 3
- Maximum forward current 10mA
- Maximum forward voltage 60V
- Maximum reverse voltage 5V





DR5000 Transducer Head Dimension

General tolerances ±0.3mm



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