Ultra-stable, high precision (ppm class) fluxgate technology DS Series current transducer for non-intrusive, isolated DC and AC current measurement up to 3000A

Features

- Fluxgate, closed loop compensated technology with fixed excitation frequency and second harmonic zero flux detection for best in class accuracy and stability
- Industry standard DSUB 9 pin connection
- Green diode for normal operation indication
- Full aluminum body for superior EMI shielding and extended operating temperature range
- Large aperture ϕ68mm for cables and bus bars
- Calibration / Test winding (100 turns x 0.1A)

Applications:

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

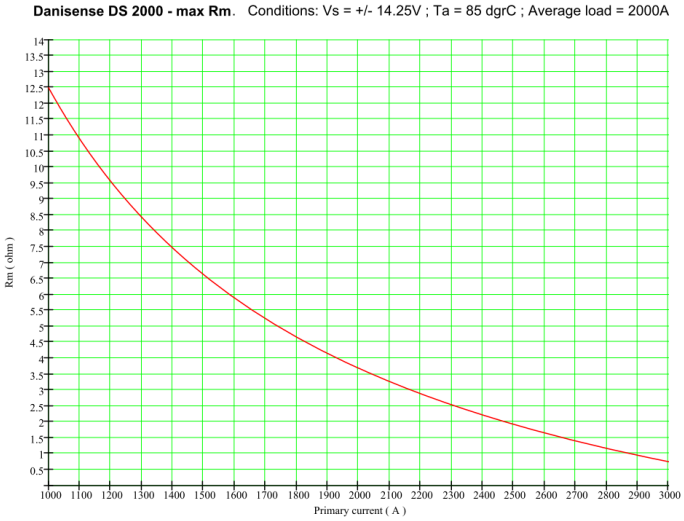
Specification highlights	Symbol	Unit	Min	Typ.	Max
Nominal primary AC current	$I_{PN\ AC}$	Arms			2000
Nominal primary DC current	$I_{PN\ DC}$	A			3000
Mesuring range	$\hat{I}_{PM}$				3000
Primary / secondary ratio	n1 : n2		1:1500		1:1500
Linearity error	ε_{Lin}	ppm	-1		1
Offset current (including earth field)	I_{OFFSET}	ppm	-5		+5
Overall accuracy @25ºC (= ε_{Lin} + I_{OFFSET})	accε	ppm	-6		+6
Maximum gain error DC to 1kHz	$\varepsilon_{G\ DC\text{-}1kHz}$	%			±0.01
Operating temperature range	T_a	ºC	-40		+85
Power supply voltages	Uc	V	±14.25		±15.75

All ppm (or %) values refer to nominal current

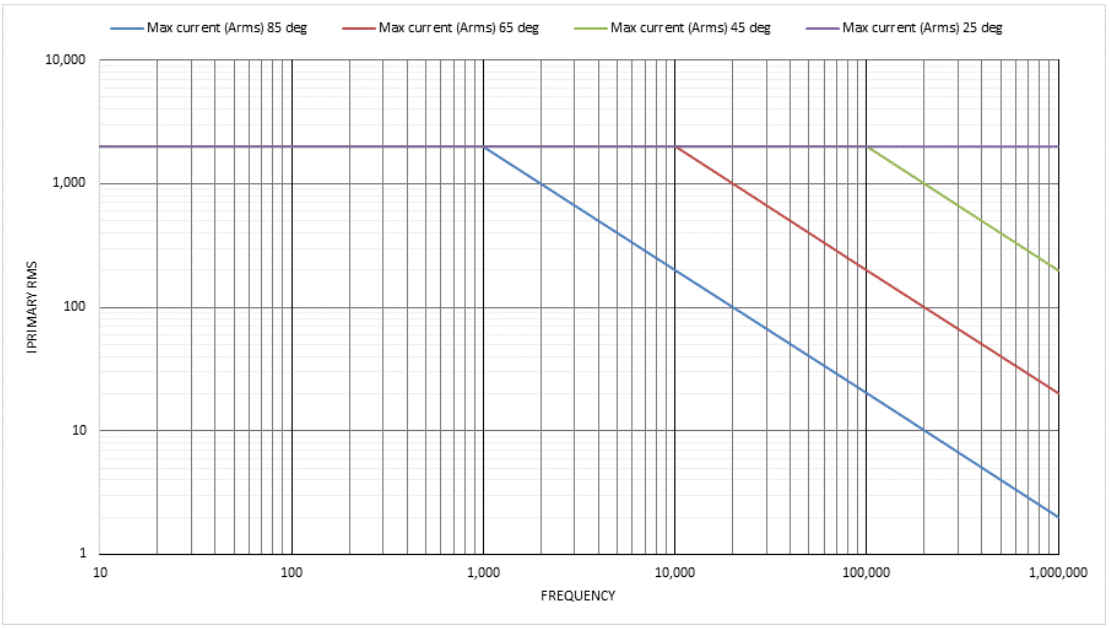
Electrical specifications at Ta=25°C, supply voltage = ± 15V unless otherwise stated

Parameter	Symbol	Unit	Min	Typ.	Max	Comment
Nominal primary AC current	$I_{PN\ AC}$	Arms			2000	Refer to fig. 1 and 2 for derating
Nominal primary DC current	$I_{PN\ DC}$	A			3000	Refer to fig. 1 for derating
Overload capacity	$\hat{I}_{OL}$	A			10000	Non-measured, 100ms
Nominal secondary current	I_{SN}	A	-2		2	At nominal primary DC current
Primary / secondary ratio			1:1500		1:1500	
Measuring resistance	R_M	Ω	0		1	
Linearity error	ε_{Lin}	ppm µA	-1 -1.33		+1 +1.33	ppm refers to nominal current µA refers to secondary current
Offset current (including earth field)	IOffset	ppm µA	-5 -6.67		+5 +6.67	ppm refers to nominal current µA refers to secondary current
Offset temperature coefficient	TCI_{OE}	ppm/K µA/K	-0.03 -0.04		+0.03 +0.04	ppm refers to nominal current µA refers to secondary current
Bandwidth	$f_{(-3dB)}$	kHz	300			
Gain error DC -1kHz 1kHz -10kHz 10kHz - 100kHz	ε_G	%			0.01% 1.50% 3.00%	% refers to nominal current
Phase shift DC -1kHz 1kHz -10kHz 10kHz - 100kHz	θ	°			0.04° 0.50° 3.00°	
Response time to a step current I_{PN}	t_r @ 90%	µs				di/dt = 100A/µs
Noises 0 - 100Hz 0 - 1kHz 0 - 10kHz 0 - 100kHz	noises	µA rms			0.02 0.10 1.20 2.20	Measured on secondary current
Fluxgate excitation frequency	f_{Exc}	kHz		15.63		
Induced rms voltage on primary conductor		µV rms			5	
Power supply voltages	Uc	V	±14.25		±15.75	
Positive current consumption	Ips	mA	160	170	180	Add Is (if Is is positive)
Negative current consumption	Ins	mA	145	155	165	Add Is (if Is is negative)
Operating temperature range	T_a	ºC	-40		+85	
Stability						
Offset stability over time		ppm/year µA/year	-0.12 -0.16		+0.12 +0.16	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	2.0	(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

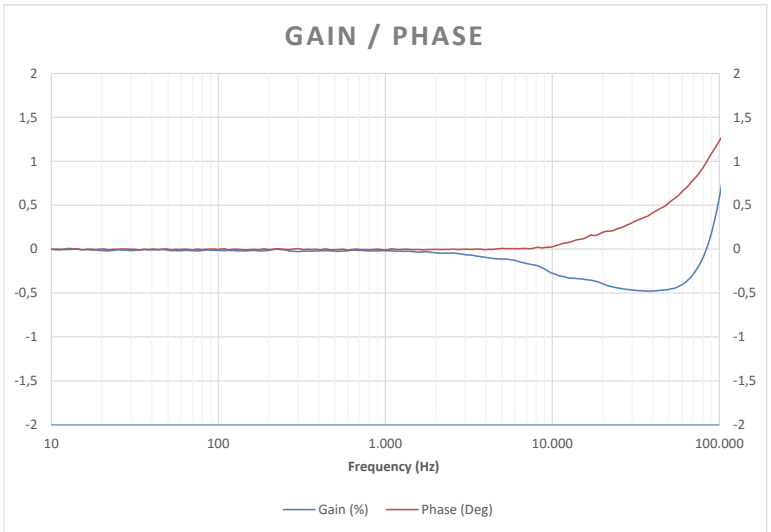
Burden resistor RM and ambient temperature derating



Frequency and ambient temperature derating



Frequency characteristics



Isolation specifications

Parameter	Unit	Value
Clearance	mm	22
Creepage distance	mm	22
Comparative tracking index (CTI)	V	> 600
Rms voltage for AC isolation test, 50/60 Hz, 1 min - Between primary and (secondary and shield) - Between secondary and shield	kV	 14.4 0.2
Impulse withstand voltage (1.2/50µs)	kV	26.3
Rated rms isolation voltage reinforced isolation, overvoltage category III, Pollution degree 2 according to - IEC 61010-1 - EN50780	V	 1500 1500

Absolute maximum ratings

Parameter	Unit	Max	Comment
Primary	kA	10	Maximum 100ms
Power supply	V	±16.5	
Current in calibration winding	mA	150mA	

Environmental and mechanical characteristics

Parameter	Unit	Min	Typ	Max	Comment
Ambient operating temper-ature range	°C	-40		85	
Storage temperature range	°C	-40		85	
Relative humidity	%	20		80	Non-condensing
Mass	kg		6.5		
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)

Calibration winding

The purpose of the calibration winding is to perform a functional test of the transducer while it's is installed in a system.

The calibration winding has 100 turns and is available in the BNC connector. It can handle up to 100mA which is equivalent to 10A primary current.

When the calibration winding is not used it should be left open and unconnected.

Status pins

When transducer is operating in normal condition, the status pins (3 and 8) are shorted.

Status pins properties: - forward direction pin 8 to pin 3, maximum forward current 10mA
- maximum forward voltage 60V, maximum reverse voltage 5V

Products line-up

	Current output	Voltage output 1V	Voltage output 10V
With calibration winding	DS2000ICLA		
Without calibration winding	DS2000IDLA		
Standard R_M (15ppm/K)			
Low drift R_M (2ppm/k)		DS2000UBLA-1HP	DS2000UBLA-10HP

LEMO output connector and other customized options are available upon request

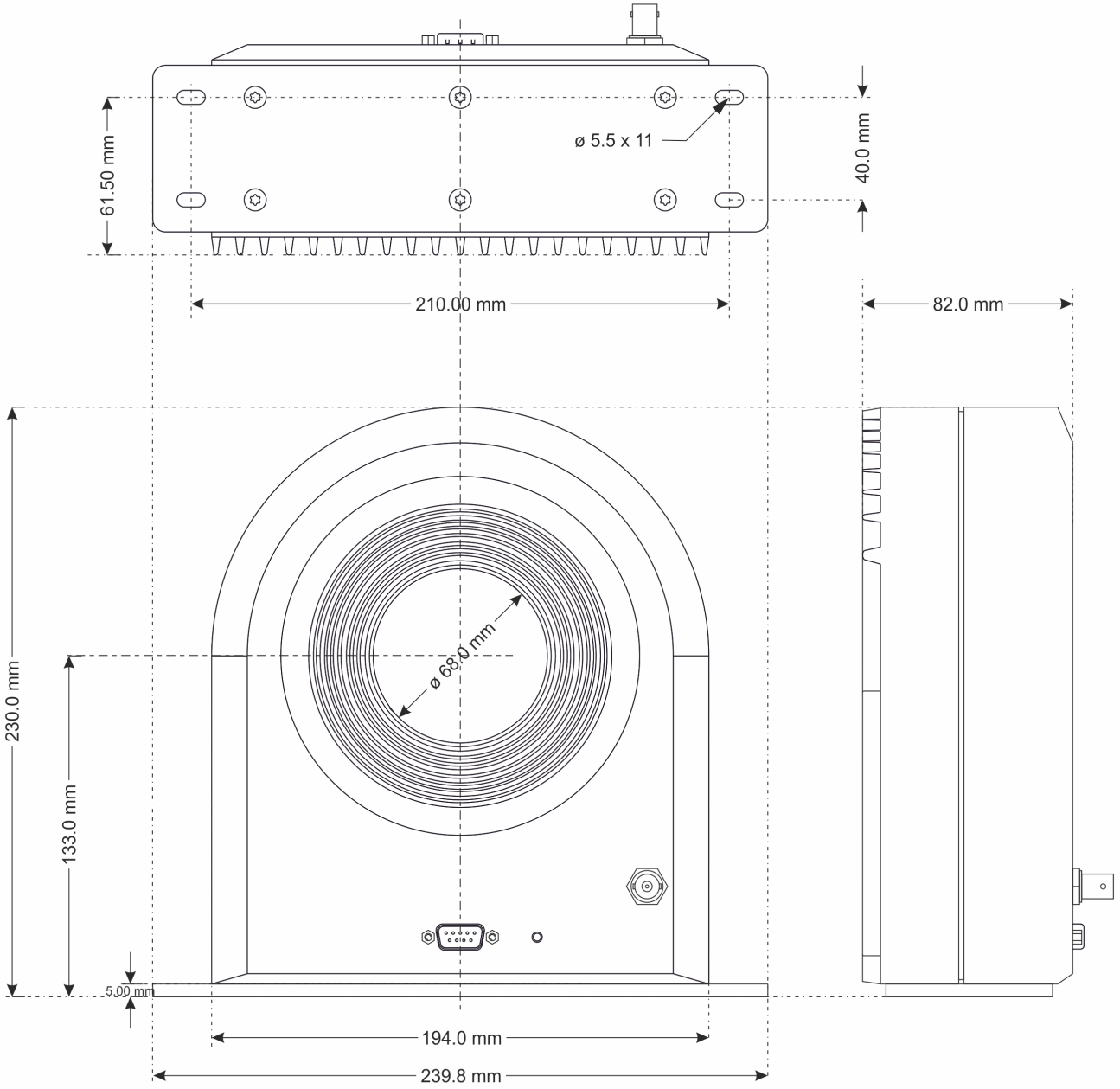
Accessories

- 4-channel power supplies unit for connection up to 4 DS 2000A : DSSIU-4
  Transducer cables in 3 lengths (2m - 5m - 10m): DSUB2 - DSUB5 - DSUB10
- Transducer cable 5m for connection to end-user's power supply: DSUB power cable
  (with access to current output via ϕ4 banana jacks)

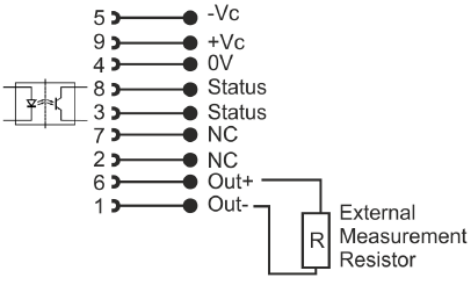
Please visit Danisense homepage for relevant datasheets

DS2000 Dimensions

(general tolerance 0.3mm unless otherwise stated)



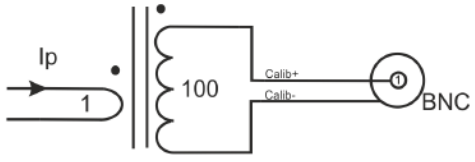
DSUB pin layout



Positive current direction

Is identified by an arrow on the transducer body

Calibration winding connection



Mounting instructions

- Base plate mounting — 4 holes ϕ5.5 x 11, 4 x M5 steel screws / 6N.m
- Bottom direct mounting (after unscrewing the base plate) — 6 holes ϕ4.2 x 7, 6 x M4 steel screw / 4N.m