

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

BNC with 1V/2000A output

Full aluminum body for superior EMI shielding and extended operating temperature range

Large aperture  $\phi 68\text{mm}$  for cables and bus bars

**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

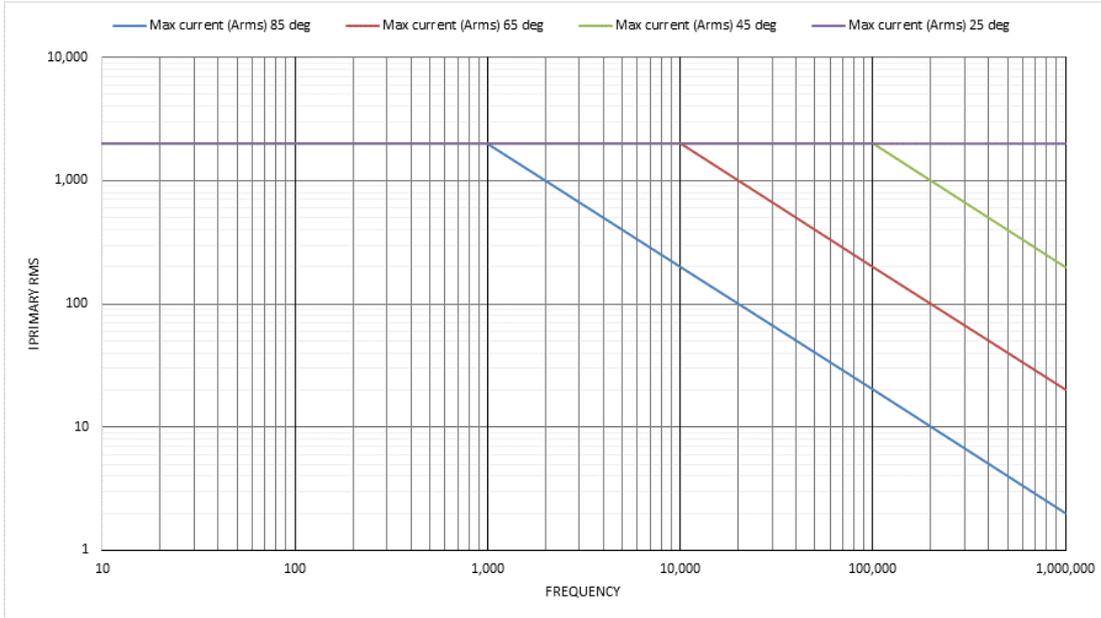
Specification highlights	Symbol	Unit	Min	Typ.	Max
Nominal primary AC current	IPN AC	Arms			2000
Nominal primary DC current	IPN DC	A			3000
Measuring range	$\hat{I}_{PM}$				3000
Primary / secondary ratio	V/A		1V/2000A		1V/2000A
Linearity error	$\epsilon_{Lin}$	ppm	-20		20
Offset current (including earth field)	IOFFSET	ppm	-15		+15
Overall accuracy @25°C (= $\epsilon_{Lin}$ + IOFFSET)	acc $\epsilon$	ppm	-6		+6
Maximum gain error DC to 1kHz	$\epsilon_{G DC-1kHz}$	%			$\pm 0.01$
Operating temperature range	Ta	°C	-40		+85
Power supply voltages	Uc	V	$\pm 14.25$		$\pm 15.75$

All ppm (or %) values refer to nominal current

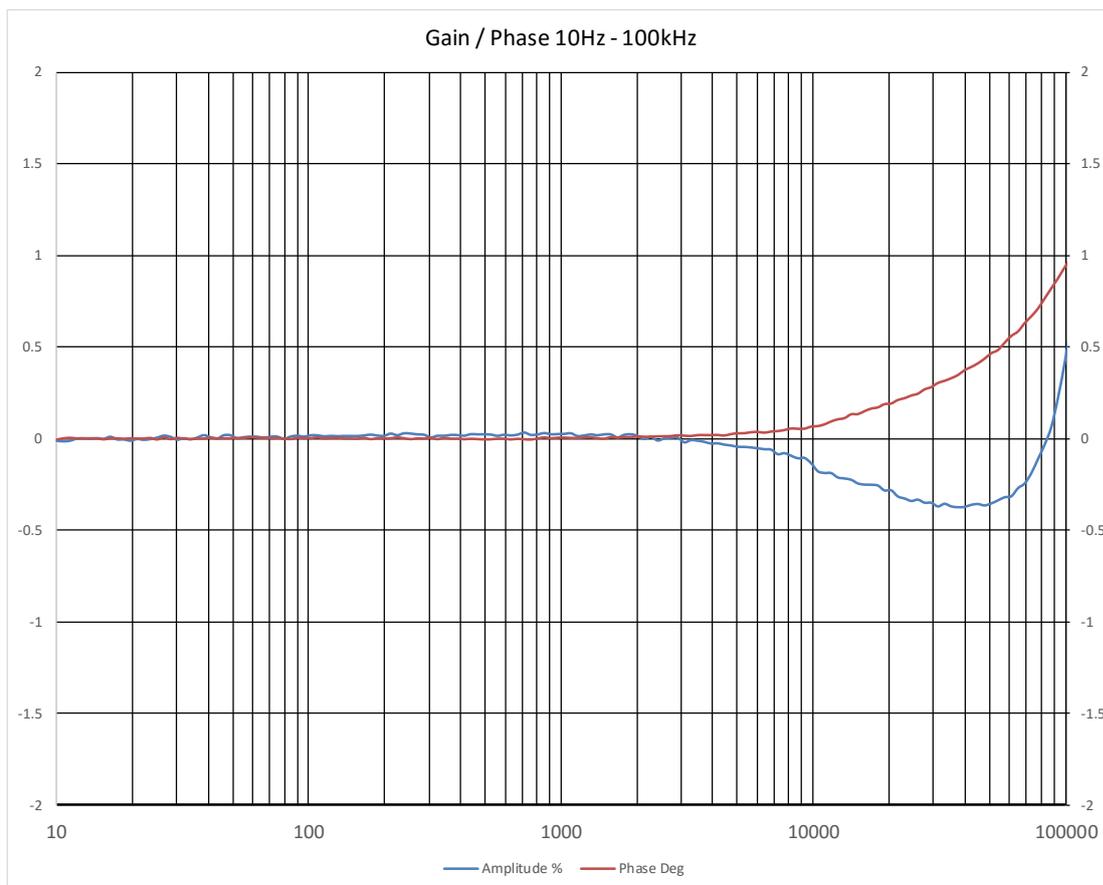
**Electrical specifications at Ta=25°C, supply voltage = ± 15V unless otherwise stated**

Parameter	Symbol	Unit	Min	Typ.	Max	Comment
Nominal primary AC current	IPN AC	Arms			2000	Refer to fig. 1 and 2 for derating
Nominal primary DC current	IPN DC	A			3000	Refer to fig. 1 for derating
Overload capacity	$\hat{I}_{OL}$	A			10000	Non-measured, 100ms
Nominal output voltage	Vout	V	1V		1V	At nominal primary DC current
Linearity error	$\epsilon_{Lin}$	ppm $\mu V$	-20 -20		+20 +20	ppm refers to nominal current $\mu A$ refers to secondary current
Offset current (including earth field)	IOffset	ppm $\mu V$	-15 -15		+15 +15	ppm refers to nominal current $\mu A$ refers to secondary current
Offset temperature coefficient	TCIOE	ppm/K $\mu V/K$	-0.5 -0.5		+0.5 +0.5	ppm refers to nominal current $\mu A$ refers to secondary current
Bandwidth	f(-3dB)	kHz	300			
Gain error DC -1kHz 1kHz -10kHz 10kHz - 100kHz	$\epsilon_G$	%			0.01% 0.50% 2.00%	% refers to nominal current
Phase shift DC -1kHz 1kHz -10kHz 10kHz - 100kHz	$\theta$	°			0.04° 0.20° 2.00°	
Response time to a step current IPN	tr @ 90%	$\mu s$			TBD	di/dt = 100A/ $\mu s$
Noises 0 - 100Hz 0 - 1kHz 0 - 10kHz 0 - 100kHz	noises	$\mu A$ rms			TBD	Measured on secondary current
Fluxgate excitation frequency	fExc	kHz		15.63		
Induced rms voltage on primary conductor		$\mu V$ 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	I <sub>ns</sub>	mA	145	155	165	Add Is (if Is is negative)
Operating temperature range	Ta	°C	-40		+85	
<b>Stability</b>						
Offset stability over time		ppm/year $\mu A$ /year	-1 -1.3		+1 +1.3	ppm refers to nominal current $\mu A$ refers to secondary current
Offset change with vertical external magnetic field		$\mu V$ /mT		2	8	(perpendicular to bus bar)
Offset change with horizontal external magnetic field		$\mu V$ /mT		8	20	(parallel to bus bar)
Offset change with power supply voltage changes		$\mu V$ /V		TBD	TBD	
Offset change with absolute power supply voltages tracking		$\mu A$ /V		TBD	TBD	

Frequency and ambient temperature derating



Typical 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 temperature 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)

**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 RM (15ppm/K)			
Low drift RM (2ppm/k)		DS2000UBLA-1HS	DS2000UBLA-10HS

LEMO output connector and other customized options are available upon request

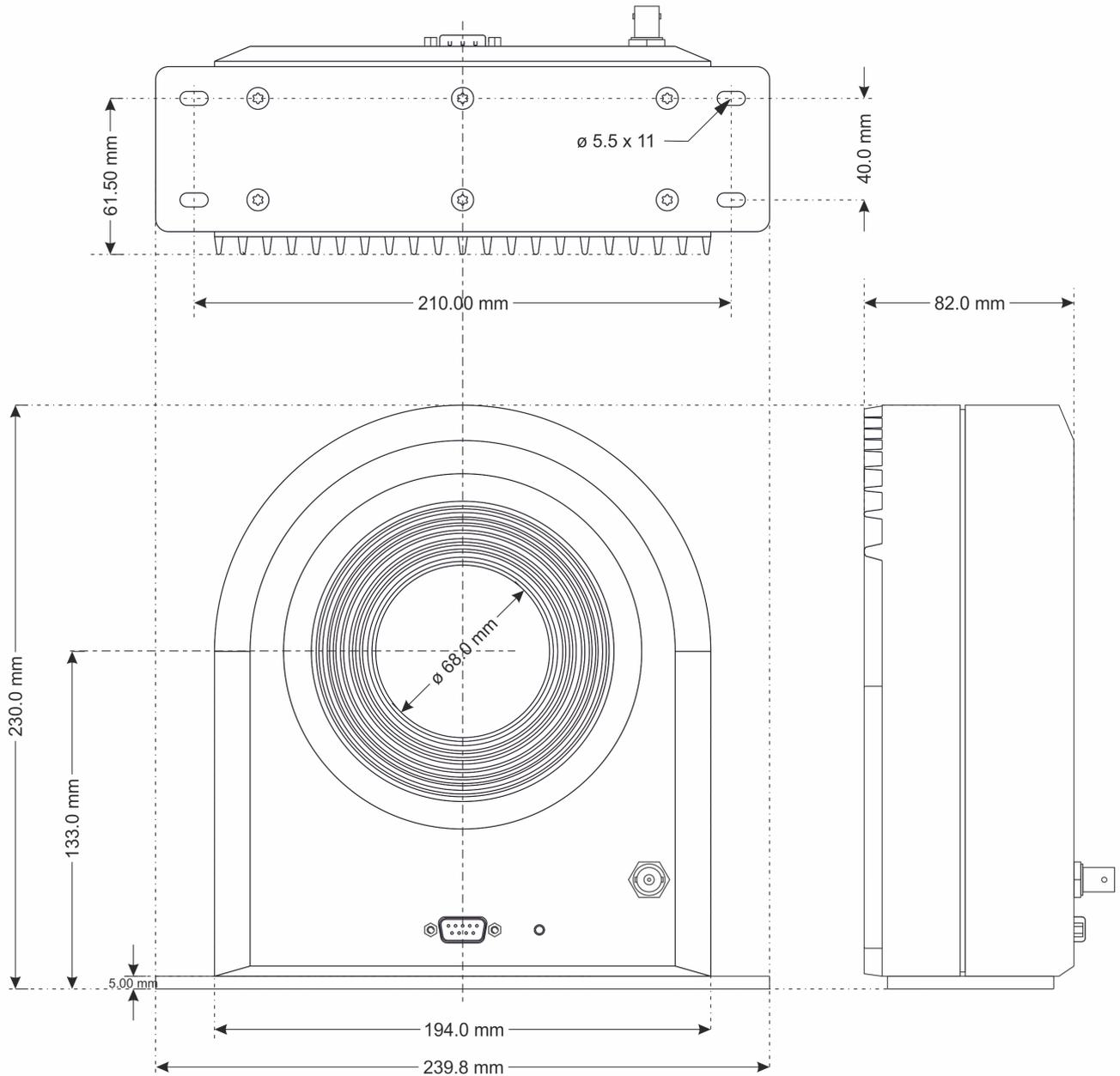
**Accessories**

- 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  $\phi$ 4 banana jacks)

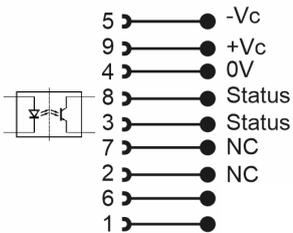
Please visit Danisense homepage for relevant datasheets

**DS2000 Dimensions**

(general tolerance 0.3mm unless otherwise stated)



**DSUB pin layout**



**Mounting instructions**

- Base plate mounting
  - 4 holes  $\phi 5.5 \times 11$
  - 4 x M5 steel screws / 6N.m
- Bottom direct mounting  
(after unscrewing the base plate)
  - 6 holes  $\phi 4.2 \times 7$
  - 6 x M4 steel screw / 4N.m

**Positive current direction**

Is identified by an arrow on the transducer body