DS300ID

Ultra-stable, high precision (ppm class) fluxgate technology DS Series current transducer for non-intrusive, isolated DC and AC current measurement up to 500A

Features

- Linearity error maximum 1.5 ppm
- 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 ϕ27.6mm 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

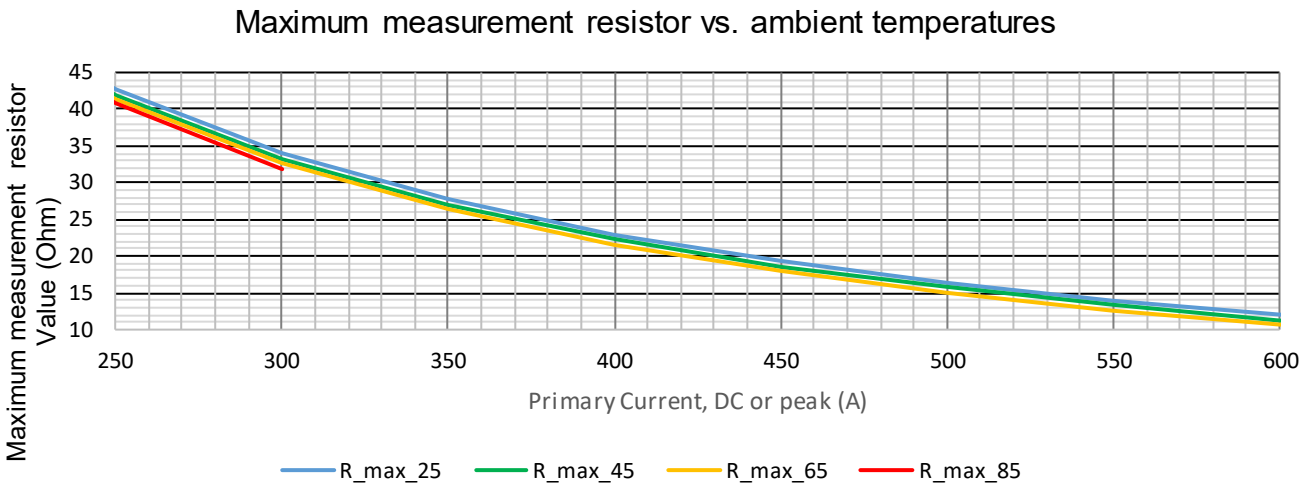
Specification highlights	Symbol	Unit	Min	Typ	Max
Nominal primary AC current	I_{PN} AC	Arms			300
Nominal primary DC current	I_{PN} DC	A	-450		450
Measuring range	$\hat{I}_{PM}$	A	-500		500
Primary / secondary ratio	n1 : n2		1:1000		1:1000
Linearity error	$?_L$	ppm	-1.5		1.5
Offset current (including earth field)	I_{OE}	ppm	-14		14
DC-10Hz Overall accuracy @25°C (= $?_L$ + I_{OE})	acc?	ppm	-15.5		15.5
AC Maximum gain error 10Hz to 5kHz	?G	%			±0.08
Operating temperature range	Ta	°C	-40		85
Power supply voltages	Uc	V	±14.25		±15.75

All ppm (or %) values refer to nominal current

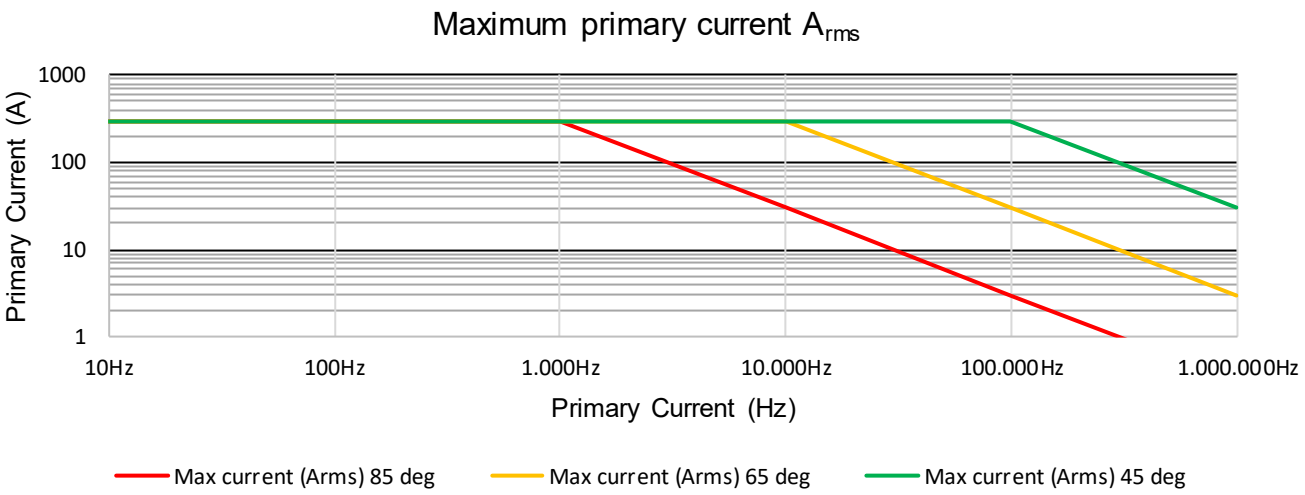
Electrical specifications at Ta=23°C, supply voltage = ± 15V unless otherwise stated

Parameter	Symbol	Unit	Min	Typ.	Max	Comment
Nominal primary AC current	I_{PN} AC	Arms			300	Refer to fig. 1 & 2 for derating
Nominal primary DC current	I_{PN} DC	A	-450		450	Refer to fig. 1 for derating
Measuring range	I_{PM}	A	500		500	Refer to fig. 1 & 2 for derating
Overload capacity	$\hat{I}_{OL}$	A			1500	Non-measured, 100ms
Nominal secondary current	I_{SN}	mA	-450		450	At nominal primary DC current
Primary / secondary ratio			1:1000		1:1000	
Measuring resistance	R_M	Ω	0		17	Refer to fig. 1 for details
Linearity error	?$_L$	ppm µA	-1.5 -0.675		1.5 0.675	ppm refers to nominal current µA refers to secondary current
Offset current (including earth field)	I_{OE}	ppm µA	-14 -6.3		14 6.3	ppm refers to nominal current µA refers to secondary current
DC-10Hz Overall accuracy @25°C (= ?L + IOE)	acc?	ppm	-15.5		15.5	ppm refers to nominal DC current
Offset temperature coefficient	TC_{IOE}	ppm/K µA/K	-0.1 -0.045		0.1 0.045	ppm refers to nominal current µA refers to secondary current
Bandwidth	f(-3dB)	kHz	1000			Small signal, graphs figure 3
Amplitude error 10Hz –2kHz 2kHz -10kHz 10kHz - 100kHz	?G	%			0.08% 0.12% 2.10%	% refers to nominal current
Phase shift 10Hz –2kHz 2kHz -10kHz 10kHz - 100kHz	θ	°			0.02° 0.03° 1.40°	
Response time to a step current IPN	tr @ 90%	µs		1		di/dt = 100A/µs
Noise 0 - 100Hz 0 - 1kHz 0 - 10kHz 0 - 100kHz	noise	ppm rms			0.02 0.04 0.60 2.50	Measured on secondary current
Fluxgate excitation frequency	f_{Exc}	kHz		32.5		
Induced rms voltage on primary conductor		µV rms			5	
Power supply voltages	Uc	V	±14.25		±15.75	
Positive current consumption	Ips	mA	93	97	104	Add Is (if Is is positive)
Negative current consumption	Ins	mA	85	91	96	Add Is (if Is is negative)
Operating temperature range	Ta	°C	-40		85	
Stability						
Offset stability over time		ppm / month	-0.2 -0.09		0.2 0.09	ppm refers to nominal current µA refers to secondary current
Offset change with vertical external magnetic field		µA/mT		0.4	1.6	(perpendicular to bus bar) µA refers to secondary current
Offset change with horizontal external magnetic field		µA/mT		1.6	4	(parallel to bus bar) µA refers to secondary current
Offset change with power supply voltage changes		µA/V		0.08	0.08	µA refers to secondary current

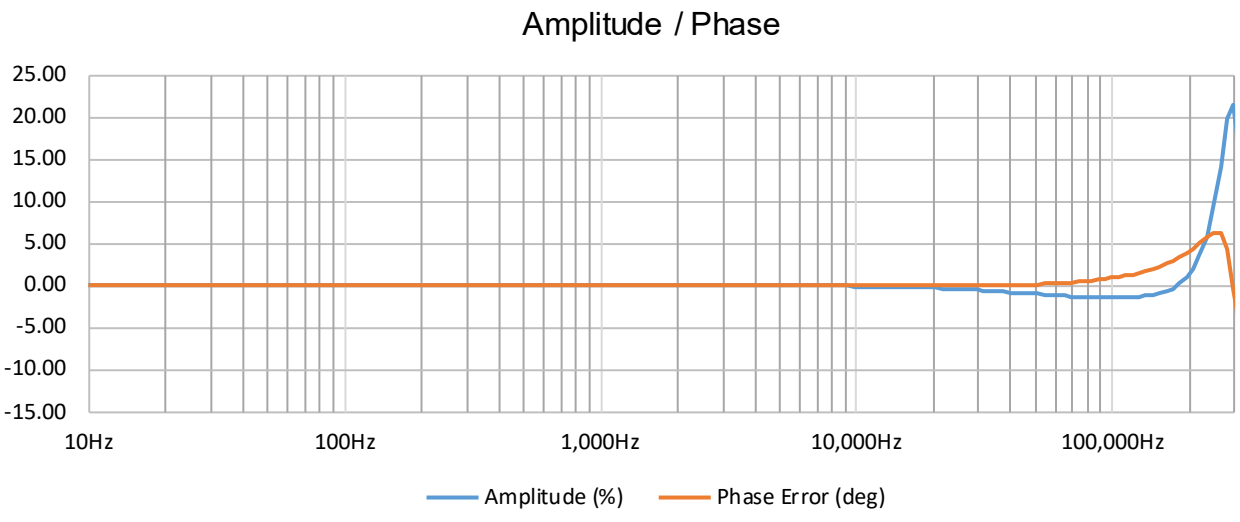
Measurement resistor RM and ambient temperature derating (Fig. 1)



Frequency and ambient temperature derating (Fig. 2)



Frequency characteristics (Fig. 3)



Isolation specifications

Parameter	Unit	Value
Clearance	mm	9
Creepage distance	mm	10
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	 5.7 0.2
Impulse withstand voltage (1.2/50µs)	kV	10.4
Rated rms isolation voltage reinforced isolation, overvoltage category III, Pollution degree 2 according to - IEC 61010-1 - EN50780	V	 300 600

Absolute maximum ratings

Parameter	Unit	Max	Comment
Primary	kA	1.5	Maximum 100ms
Power supply	V	±16.5	

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		0.6		
Connections	Power supplies: D-SUB 9 pins male				
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

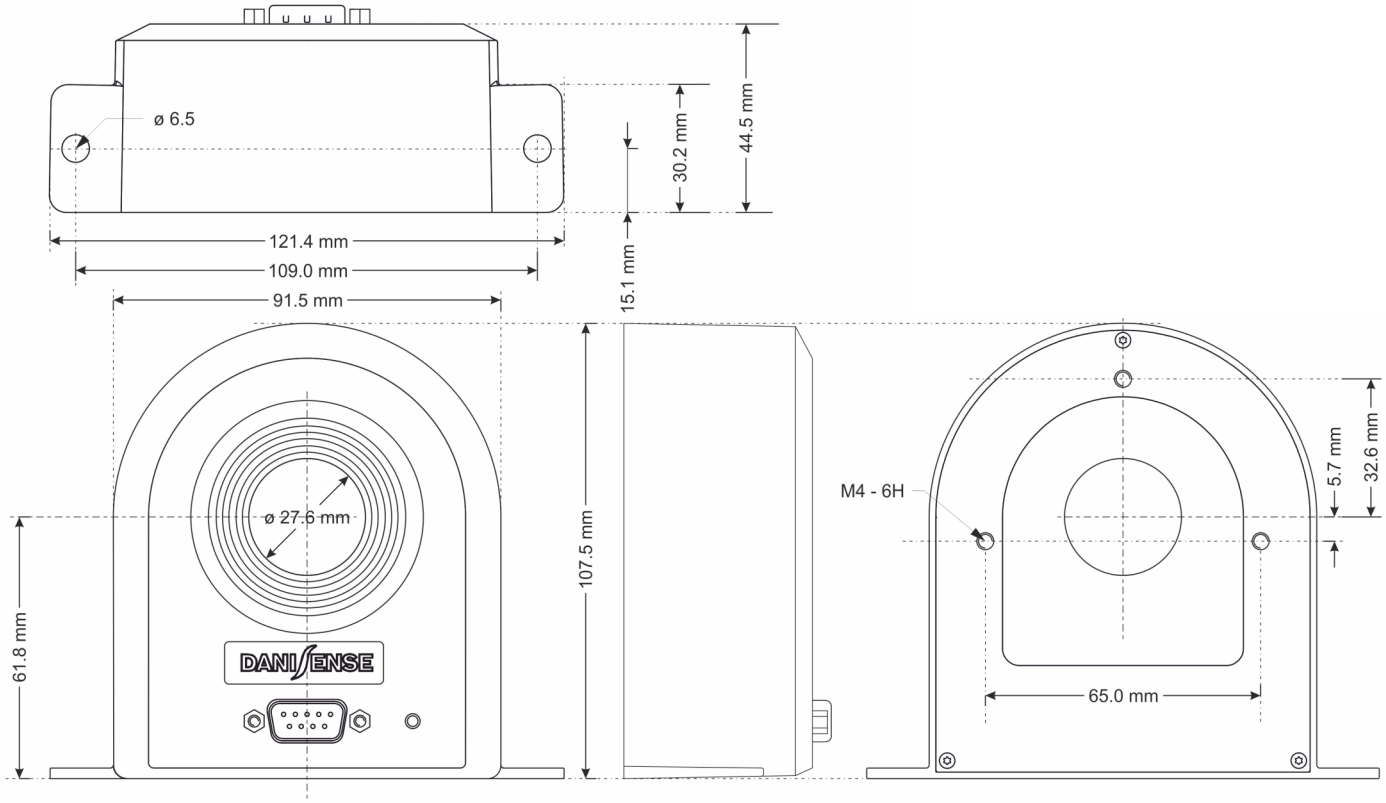
When transducer is operating in normal condition, the status pins (3 and 8) are shorted.

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

Accessories

- 4-channel power supplies unit for connection up to 4xDL2000 : DSSIU-4
- 6-channel power supplies unit for connection up to 6xDL2000 : 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)

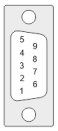
Please visit Danisense homepage for relevant datasheets



(general tolerance 0.3mm unless otherwise stat-

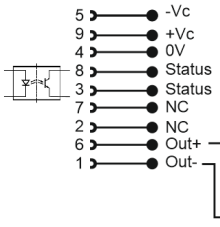
DSUB pin layout

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 instructions

- Base plate mounting — 2 holes ϕ6.5, 2 x M5 steel screws / 6N.m
- Back side panel mounting — 3 holes ϕ4.0 x 6H, 3 x M4 steel screw / 4N.m