

A contact free flux gate based current measurement sensor – 600A_{rms}

DS 600 is member of the small housing sensor family. The family includes a 200A (1:500) and a 600A (1:1500) version.

Features

- Closed loop compensated current transducer
- Zero flux technology for extreme accuracy
- Industry standard DSUB 9 pin connection
- Green diode for normal operation indication
- Aluminum body for shielding against EMI
- Each sensor is delivered with a gain/phase response

Applications:

- Power analysis
- Stable power supplies
- MRI gradient amplifiers
- Reference transducer for calibration purposes

Specification highlights

- Linearity error 1ppm
- Offset is maximum 4uA
- Operating temperature range -40°C to 85°C
- Turns ratio 1:1500
- Aperture size 27.6mm
- 1200A peak at 25°C ambient temperature and 1Ω measurement resistor



DC Specifications at Ta=25°C, Supply voltage $\pm 15V$

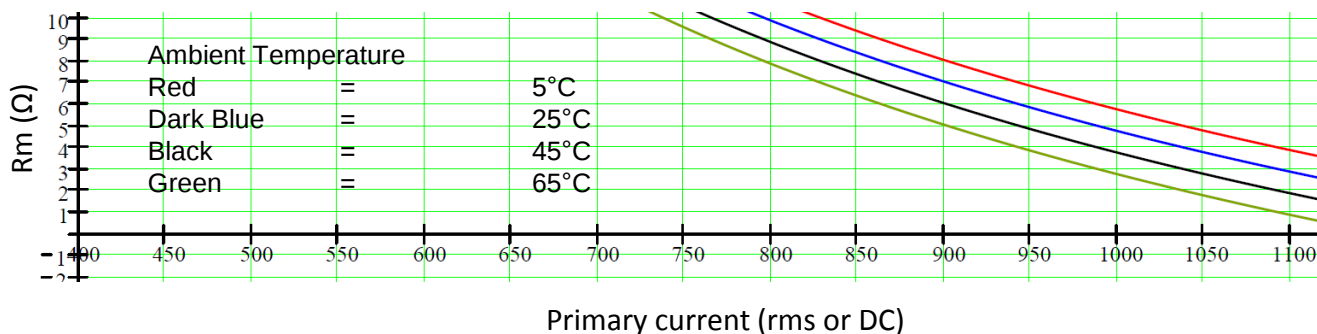
Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary Current	I _p	A	-1050		1050	*
Secondary Current	I _s	mA	-700		700	*
Measuring resistance		Ω	0		3	*
Supply voltage		V	± 14.25		± 15.75	
Linearity error	ϵ_{Lin}	ppm	-1		1	
Offset current	I _{Offset}	μA	-4		+4	Including earth field. Measured on secondary current
Turns Ratio	Turns		1:1500		1:1500	
Noise 0-100Hz 0-1kHz 0-10kHz 0-100kHz	Noise	μA rms			0.004 0.04 0.4 1.2	Measured on secondary current
Primary current Overload		kA			4.5	Maximum pulse length 100ms
Positive supply current	I _{ps}	mA		98	105	Add I _s (if I _s is positive)
Positive supply current	I _{ns}	mA		89	96	Add I _s (if I _s is negative)
Re-injected noise onto primary busbar	U _n	μV rms			5	
Zero Flux Frequency	kHz			31.25		
Stability						
Offset stability over time		$\mu A/Year$			0.16	Measured on secondary current
Offset change with external magnetic field vertical		$\mu A/mT$		0.2	0.8	Magnetic field perpendicular to busbar
Offset change with external magnetic field horizontal		$\mu A/mT$		0.8	2	
Offset change with power supply voltage changes voltage		$\mu A/V$		0.004	0.04	
Offset change with difference between positive and negative power supply voltage (absolute)		$\mu A/V$		0.012	0.04	

* Check burden resistor graph for more information page 3

DC Specifications at Ta=-40°C to 85°C, Supply voltage $\pm 15V$

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary Current*	I_p	A	-900		900	See graph below
Secondary Current	I_s	mA	-600		600	See graph below
Measuring resistance		Ω	0		3	See graph below
Supply voltage		V	± 14.25		± 15.75	
Linearity error	ϵ_{Lin}	ppm	-1		1	
Offset current @25°C	I_{Offset}	μA	-4		+4	Including earth field. Measured on secondary current
Stability						
Offset change with temperature		$\mu A/^\circ C$	-0.04		0.04	

Below is a graph showing the maximum DC and peak current in the DS600 transducer depending on the measurement resistor (R_m) value and ambient temperature with a power supply of $\pm 15V$.



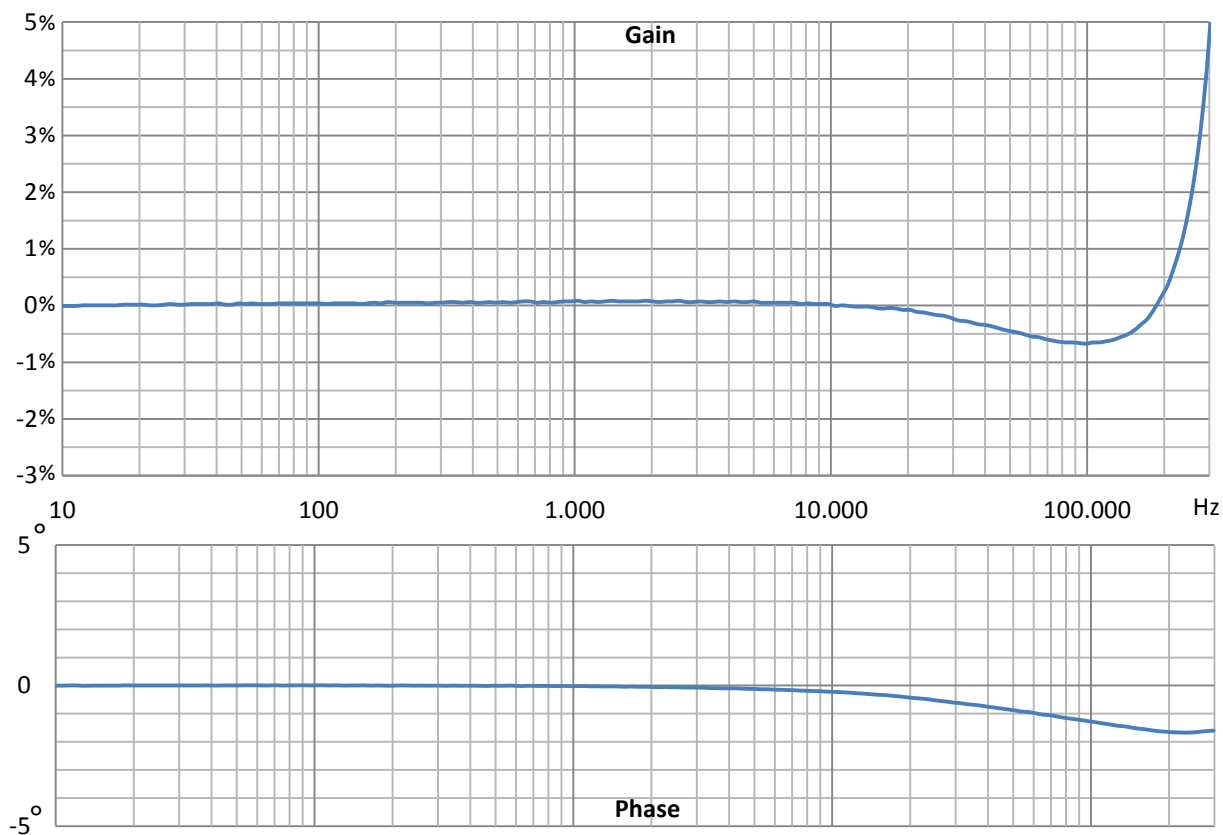
For temperatures above 65 degrees Celsius it is important not to exceed 600A rms or DC.

AC Specifications at Ta=-40°C to 85°C, Supply voltage $\pm 15V$

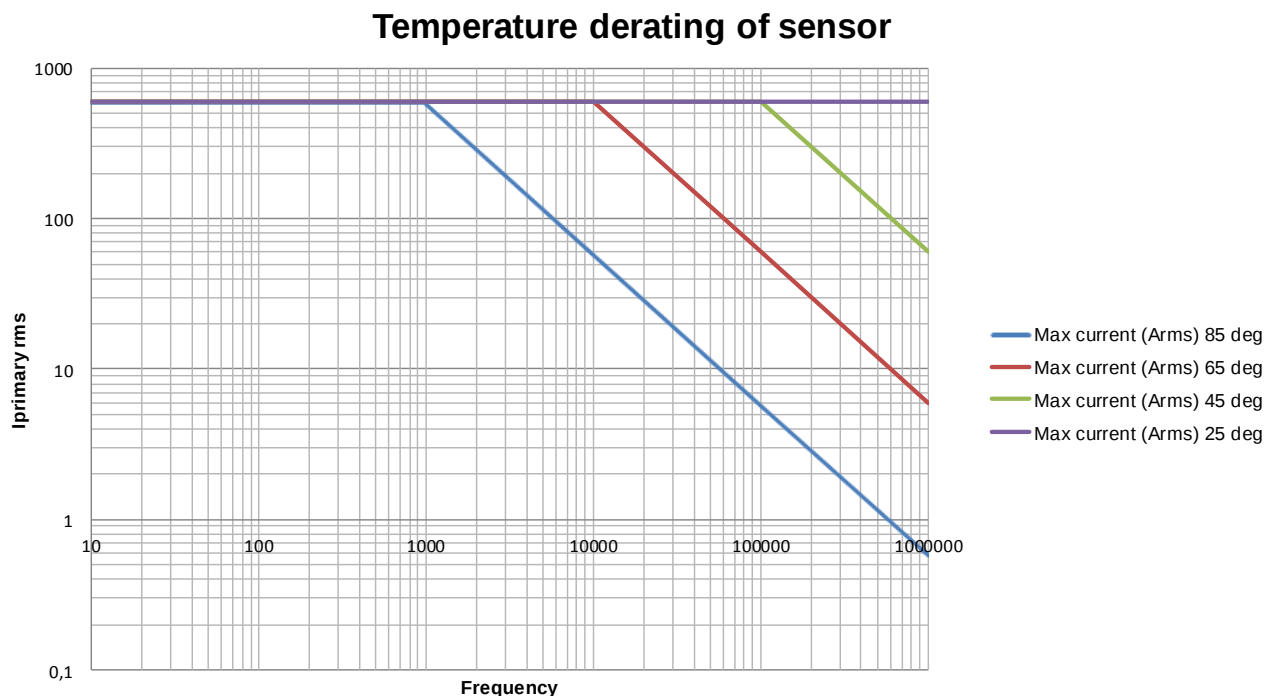
Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary Current, rms	I_p	A	600		600	*
Secondary Current rms	I_s	mA	-400		400	*
Measuring resistance		Ω	0		3	*
Gain error - DC to 2kHz - 2kHz to 10kHz - 8kHz to 100kHz		%			0.01 0.5 3	Of measured value, down to a primary current of 10A pk-pk
Phase error - DC to 2kHz - 2kHz to 10kHz - 8kHz to 100kHz		Degree			0.1 0.5 3	Of measured value, down to a primary current of 10A pk-pk

* Check burden resistor graph for more information page 3

Gain / Phase (typical)



Temperature derating with $I_{primary_{rms}}$, ambient temperature and frequency



Absolute maximum ratings

Parameter	Unit	Min	Typ	Max	Comment
Primary	kA			4.5	* Maximum 100ms
Power supply	V			±16.5	
Current in calibration winding	mA			100mA	

Environment and mechanical characteristics

Parameter	Unit	Min	Typ	Max	Comment
Ambient operating temperature	°C	-40		85	
Storage temperature	°C	-40		85	
Mass	kg		0.6		
Standards	EN 61326 EMC EN 61010 Safety				

Isolation and safety characteristics

Parameter	Unit	Min
Rated isolation voltage rms, reinforced isolation IEC 61010-1 standard and with following conditions - Overvoltage category II - Pollution degree 2	V	500
Rms voltage for AC isolation test, 50/60 Hz, 1 min - Between primary and (secondary and shield) - Between secondary and shield	kV	3.6 0.2
Impulse withstand voltage	kV	9
Creepage distance	mm	10
Comparative Tracking Index	CTI	600

Advanced Sensor Protection Circuits “ASPC”

Developed to protect your sensor from fault conditions typically harmful to flux-gate Sensors. Protection against damage to the electronics in the following situations.

1. Unit is un-powered and secondary circuit is open*
Both DC and AC primary current can be applied up to 100% of nominal current.
2. Unit is un-powered and secondary circuit is closed*
Both DC and AC primary current can be applied up to 100% of nominal current.
3. Unit is powered and secondary circuit is open*
Both DC and AC primary current can be applied up to 100% of nominal current.
4. Unit is powered and secondary circuit is interrupted*
Both DC and AC primary current can be applied up to 100% of nominal current.

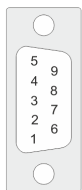
*Notice that the sensor core will be magnetized in all four cases, leading to a small change in output offset current (less than 10ppm)

Package content

- Sensor
- Sensor specific test report with Gain / Phase analysis 1Hz-300kHz and CE certificate of conformance

Connection diagram

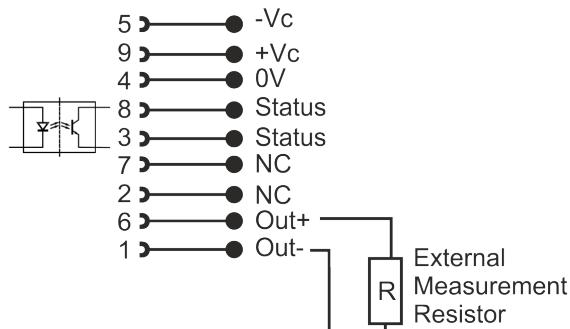
Standard DSUB-9 current output



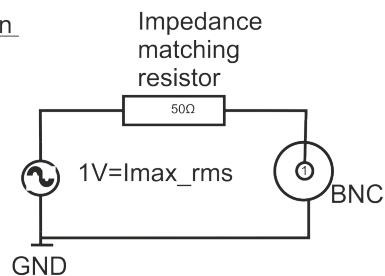
When sensor is operating in normal condition the status pins are shorted.

Status pin properties.

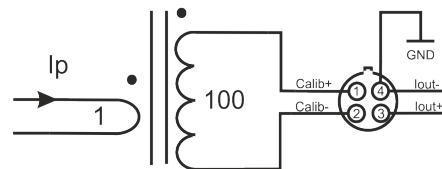
- Forward direction pin 8 to pin 3
- Maximum forward current 10mA
- Maximum forward voltage 60V
- Maximum reverse voltage 5V



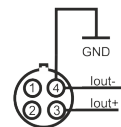
Voltage output in BNC connector



Calibration winding and current output in 4-pin LEMO



Current output in 4-pin LEMO connector



Options and ordering information

Product Description	Part Name	Part Number
DS 600 with current output in 4-pin LEMO connector	DS0600ILSA	1212100001
DS 600 with voltage output in BNC connector	DS0600UBSA	1212200001
DS 600 with calibration winding and current output in 4-pin LEMO	DS0600CLSA	1212400001
DS 600 with current output in 9-pin DSUB	DS0600IDSA	1212100002

Part Name

DS XXXX Y Z SA

Max
Current
RMS

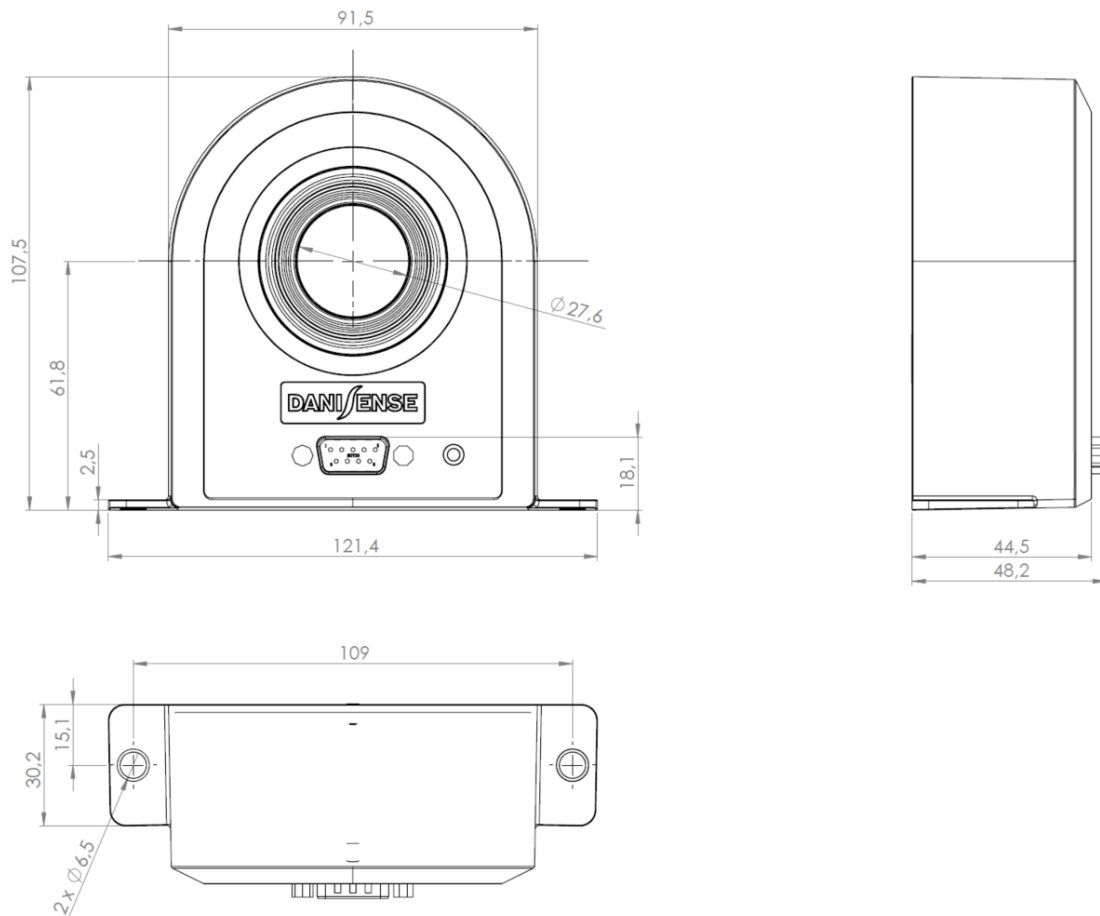
L = LEMO type
B = BNC
D = 9 pin DSUB

I = current

U = Voltage

C = Calibration & current

Mechanical dimensions



Mounting bushings on the back

