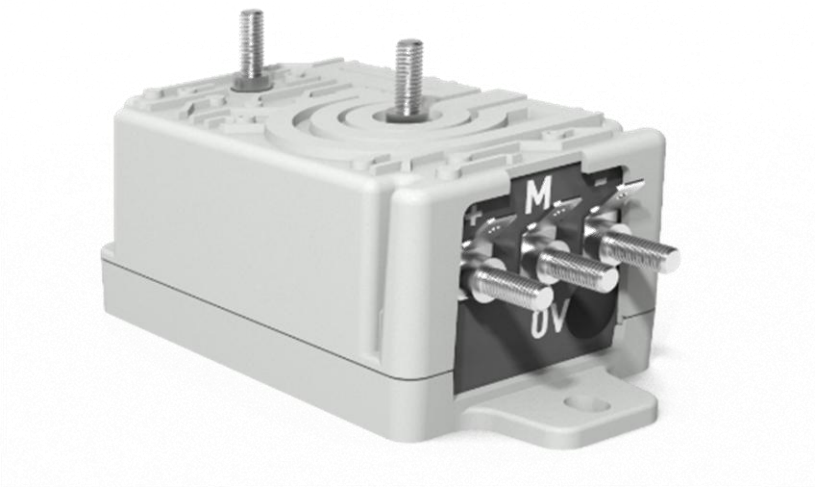
Voltage Sensor - VenuS 1500 V



PVS1500I-1BCBB0

Measuring DC, AC, and pulsating voltages with a galvanic insulation between primary and secondary circuits.

KEY FEATURES

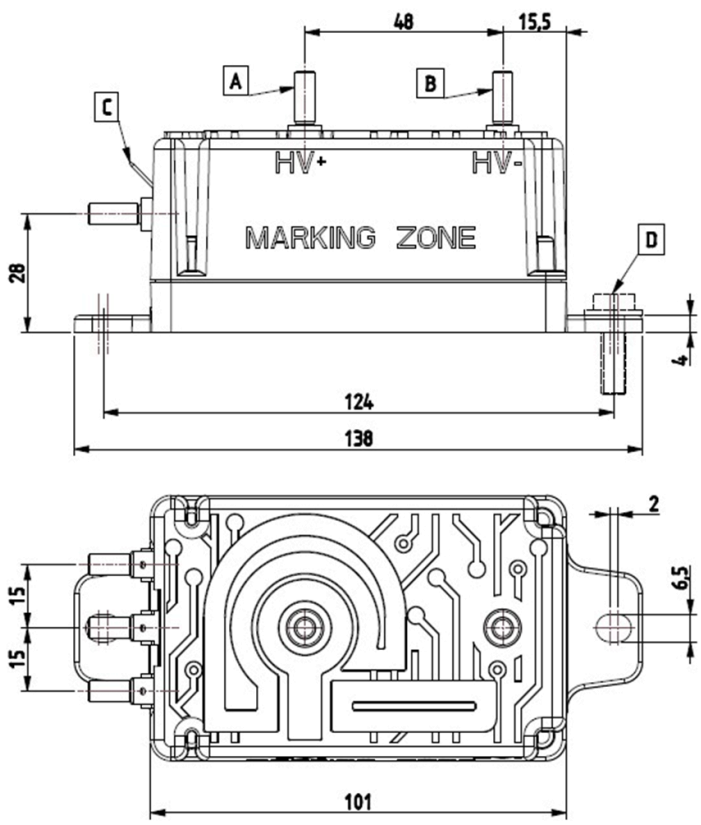
- Unipolar and insulated measurement **range of 0 to 1500 V DC**
- Unipolar **current output** 20 mA RMS for a primary 1500 V RMS
- Primary **input** connections **2x M5 studs**
- Secondary **output** connections **3x M5 studs with 3x Faston**

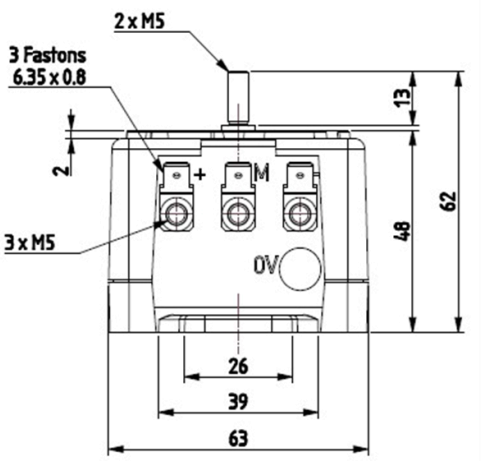
APPLICATIONS

ENERGY

INDUSTRY

Overall dimensions





Clearance & Creepage distances:

A-B	•Clearance : 38 mm •Creepage : 55,5 mm
A-C	•Clearance : 39,5 mm •Creepage : 56,1 mm
B-D	•Clearance : 45,8 mm •Creepage : 58,5 mm

Marking content:

- Product reference
- Primary nominal voltage
- Secondary nominal voltage
- Supply voltage
- Product number

Marking also include a DataMatrix and the dielectric test voltage value (V_d)

Mechanical characteristics

General tolerance	±1 mm
Outline	138mm X 63mm x 62mm
Sensor fixing	2x M6 screws (not provided)
Primary connection	2x M5 studs
Secondary connection	3x M5 studs with 3x Faston
Recommended M5 tightening torque	2,2 N.m max
Mass	< 280g
Assembly requirements	Operational in any position

Synoptic :

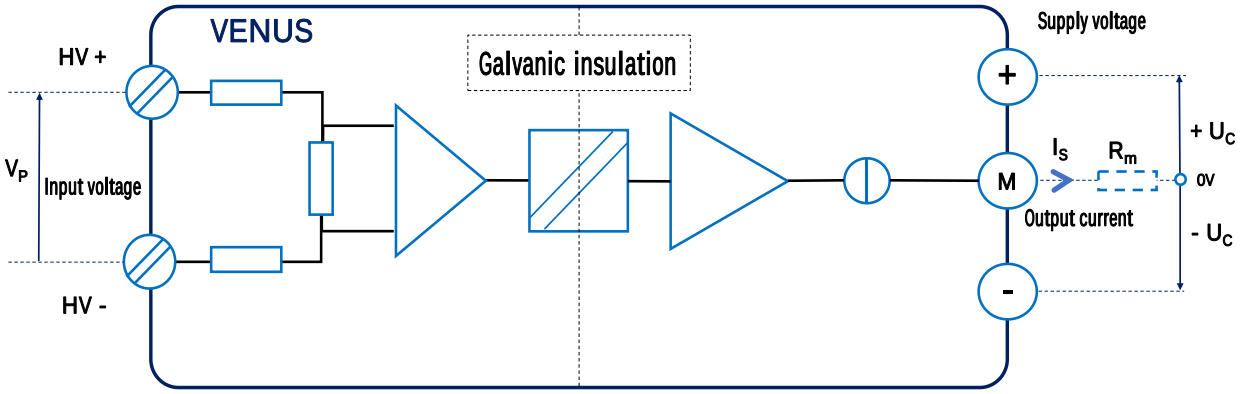


Figure 1: Voltage sensor VENUS synoptic

Voltage range

Parameters	Symbol	Unit	Value
Primary nominal voltage	V_{PN}	V_{RMS}	1500
Measuring range	$V_{P\ max}$	V_{DC}	0 to 1500
Not measurable overload : 1 s/h	$V_{p\ overload}$	V_{DC}	< 3000
Minimum power supply voltage	$U_{C\ min}$	V_{DC}	±15 (±5%) or 0-30 (±5%)
Maximum power supply voltage	$U_{C\ max}$	V_{DC}	±24 (±5%) or 0-48 (±5%)
Temporary power supply overvoltage : 0.1sec	$U_{C\ peak}$	V_{DC}	±34

Using the device beyond these voltage ranges may cause permanent damage that could not be considered as under Petercem's responsibility.

Power supply and measurement

Using a symmetrical power supply:

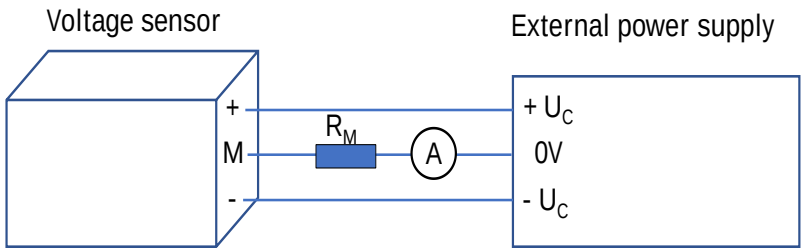


Figure 2: Symmetrical power supply and measurement

The resistance of the external reading instrument should be considered for accurate measurement interpretation.

The external measuring resistance shall be defined according the figure below.

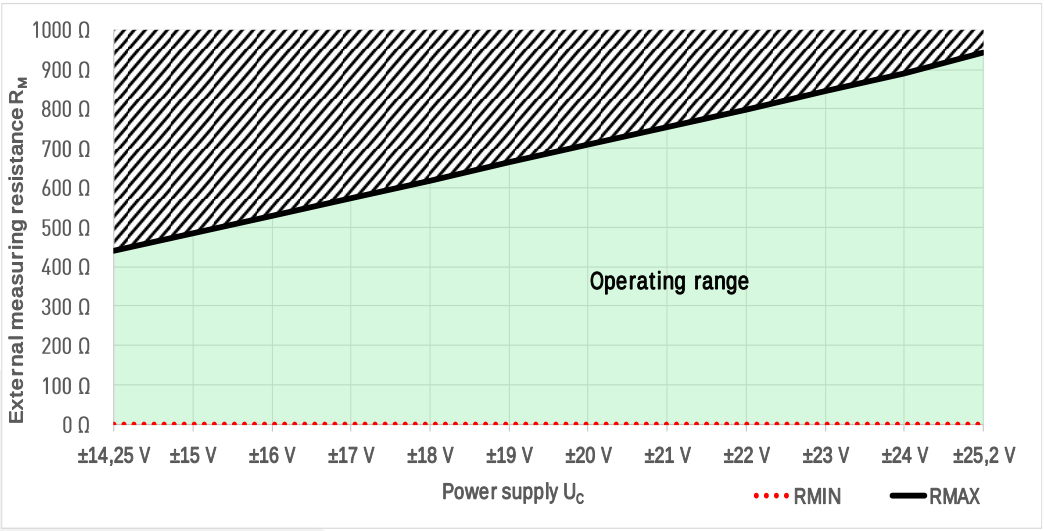


Figure 3 : External measuring resistance according to symmetrical power supply of the sensor

Using a single power supply:

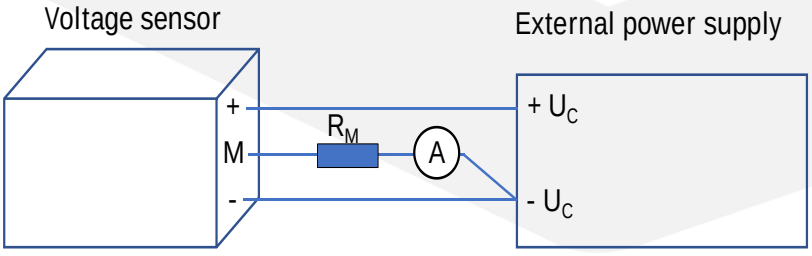


Figure 4: Single power supply and measurement

The external measuring resistance shall be defined according to the Figure 5.

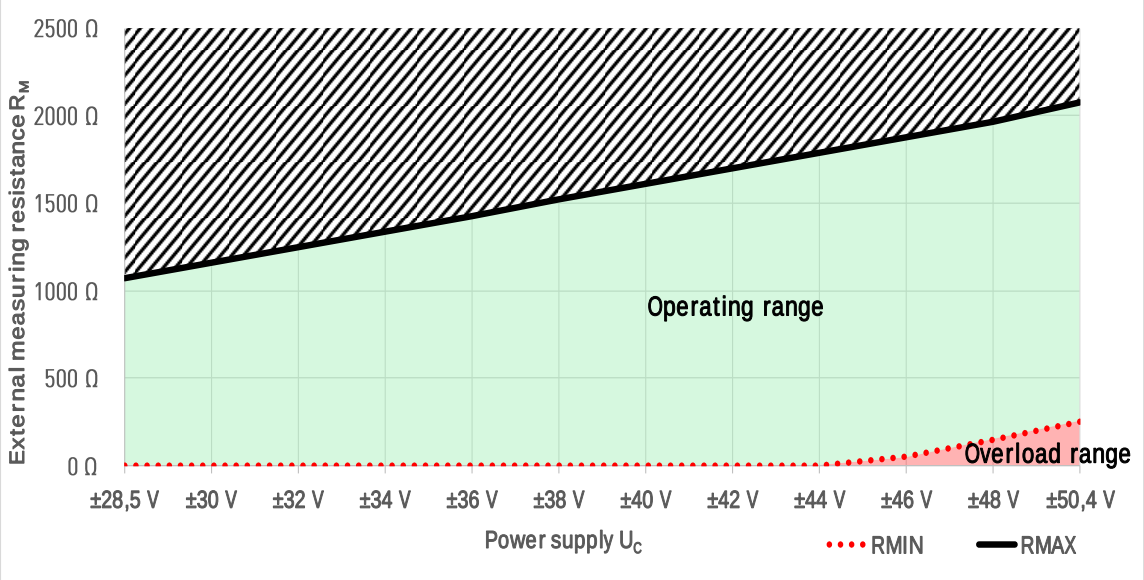


Figure 5 : External measuring resistance according to single power supply of the sensor

Overload range may reduce the lifespan of the sensor.

Temperature range

Parameters	Symbol	Unit	Min.	Max.
Operating temperature range	T_O	°C	-40	+85
Storage temperature range	Ts	°C	-50	+90

All mentioned electrical performances in this data sheet apply only in the operating temperature range unless otherwise specified.

Operating at mentioned extreme temperatures for an extended period may degrade reliability.

Using the device beyond these temperature ranges may cause permanent damage that could not be considered as under Petercem's responsibility.

Insulation properties

Parameters	Symbol	Unit	Value	Comments
Dielectric test AC, 50 Hz, 1min	V_d	kV_{rms}	8.5	See the application examples bellow
Impulse withstand voltage 1.2/50 µs	V_W	kV	16	
Maximum DC common mode voltage	V_{CM}	kV	⩽ 6	At $V_{P\ max}$
Partial discharges	V_e	kV_{rms}	2.7	Extinction voltage at 10pC, 50Hz
Clearance distance	Cl.	mm	See dimension values on page 2	
Creepage distance	Cr.	mm		
Comparative tracking index	CTI	-	600	
Insulation resistance	R_{INS}	MΩ	200	At 500Vdc
Primary resistance	P_r	MΩ	7.4	
Case material	-	-	UL94 - V0	

Application examples according to insulation properties:

Over Voltage Category	Pollution Degree	Between primary and secondary	Between primary and ground (M6 screws)	Between secondary and ground (M6 screws)
OVCIII	PD2	**Reinforced** insulation	**Reinforced** insulation	**Reinforced** insulation
OVCI	PD2	**Reinforced** insulation	**Reinforced** insulation	**Reinforced** insulation

Electrical performances

Parameters		Symbol	Unit	Min.	Typ.	Max.	Comments
Secondary nominal current RMS		Isn	mA		20		See Figure 6
Secondary measuring range, current DC		$I_{Smin/max}$	mA	4		20	
Sensitivity		S	µA/V		10,67		I_S (µA) = 10,67 x V_P + 4
Offset current (V_P = 0 V)		I_{SO}	µA	-30		30	
Total error	-40 to +85°C at T_A*	ε_{TOT}	% of V_{Pmax}	-1 -0.5		+1 +0.5	See Figure 11
Linearity error over V_{Pmax} range		ε_L	% of V_{Pmax}	-0.5		0.5	at T_A*
Sensitivity error		ε_S	%	-0.2		+0.2	at T_A*
Current consumption at Uc = ±24V and V_P = 0 V		I_{CO}	mA	74		90	Depend of V_P
Total primary power loss at V_{PN}		P_P	mW		140		
Start-up time		t_{start}	ms			20	
Rise time		T_R	µs	17	20	30	See Figure 8
Delay time at 10%		T_{D10}	µs	20	21	30	
Delay time at 90%		T_{D90}	µs		38	50	
Frequency bandwidth at	-3 dB -1 dB -0.1 dB	BW	kHz		20 12 4		See Figure 9

*T_A = ambient temperature: 20 to 25°C

Measure range

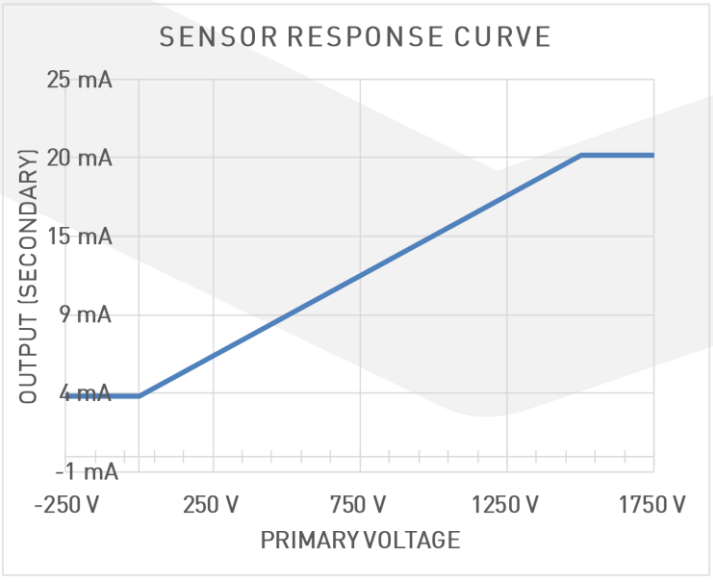


Figure 6: Voltage sensor VENUS primary / secondary measure range and response curve

Response time

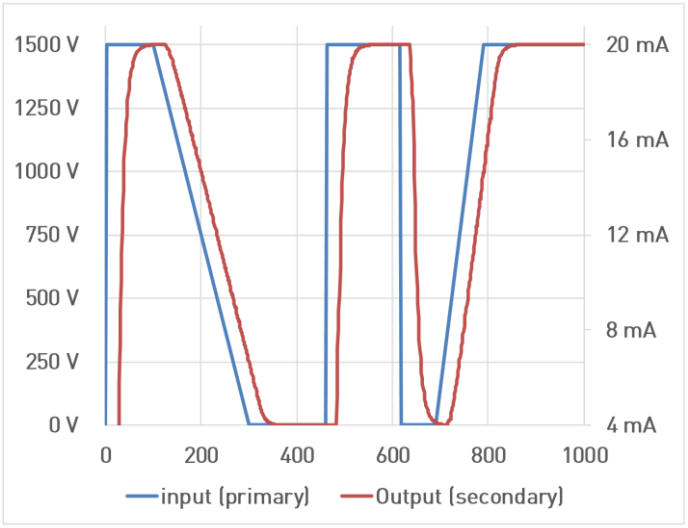


Figure 7: Application example: primary 1500V and secondary signal according to time (µs)

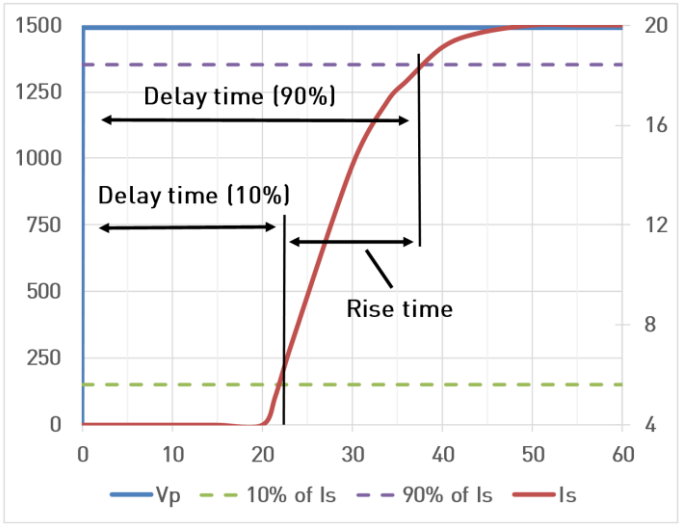


Figure 8: Delay and rise time (µs) for a pulse from 0V to 1500V

Bandwidth

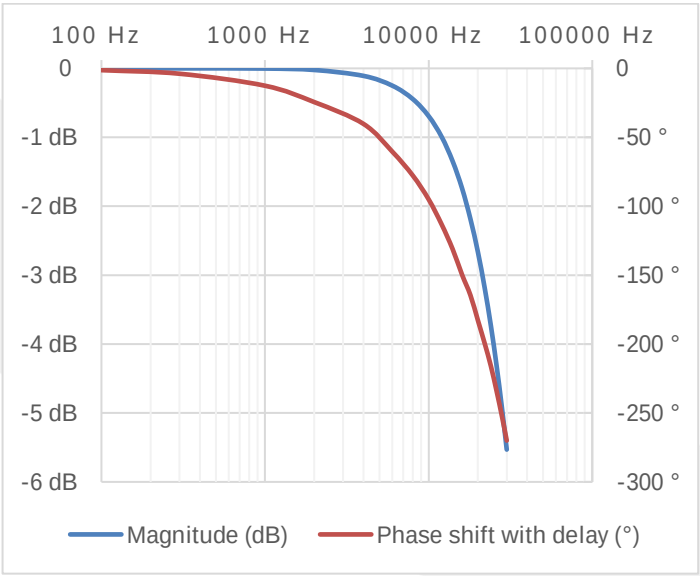


Figure 9: Voltage sensor VENUS frequency bandwidth

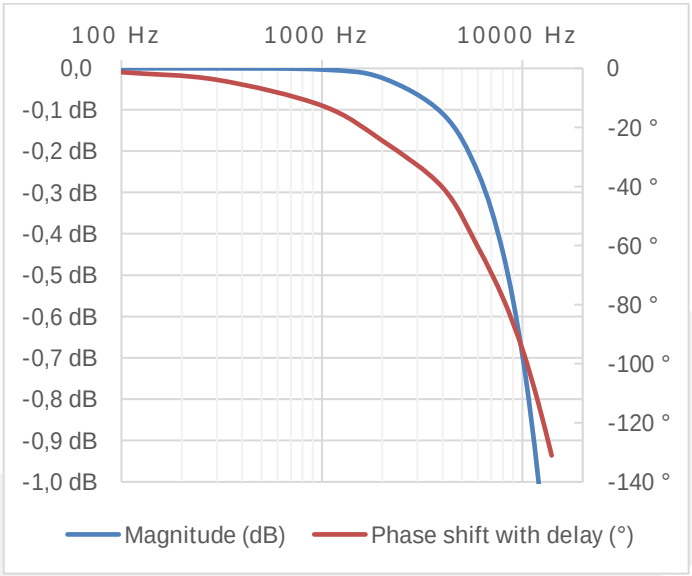


Figure 10: frequency bandwidth between 0 and -1 dB

Thermal drift

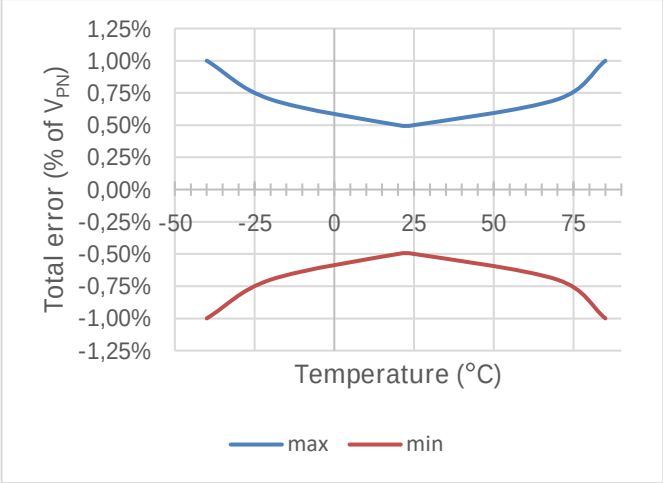


Figure 11: Total error (% of V_{PN}) according to temperature

Output noise

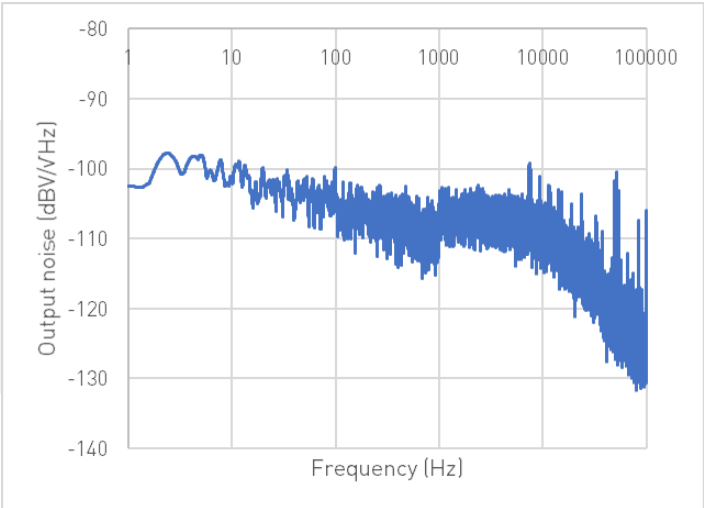


Figure 12: Output noise spectral density

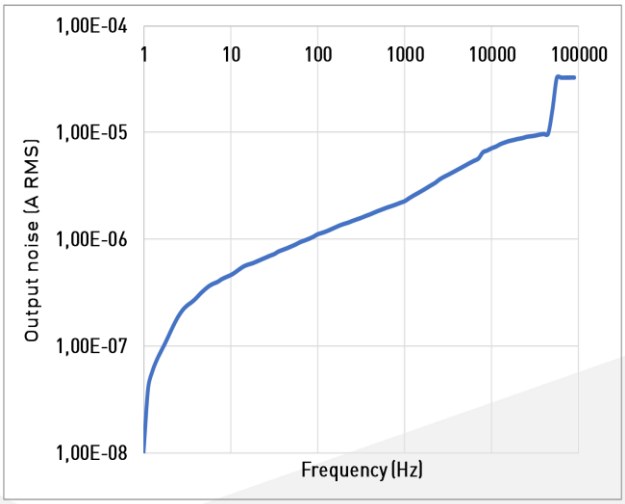


Figure 13: Cumulative output noise current according to frequency

Other characteristics

Standards

Standards	Revision
EN 50178	1999
IEC 61010	2016
UL 508	2003 (Pending)
UL 314	(Pending)

Conditions for Acceptance:

1. These components must be installed within an appropriate enclosure for their intended end-use application.
2. The device's Basic Insulation Level is rated at 16kV, which has been verified through Impulse Withstand Testing. If a higher BIL rating is requested, we need to plan more tests on our VenuS and the cost of the tests will be borne by the applicant.

Safety warnings

This sensor must be used in electrical circuits according to EN61010-1.

This sensor must be used in electric/electronic equipment with respect to applicable standards and safety requirements in accordance with the system instructions and internal customer rules.

Caution: risk of electrical shock. When operating the sensor, certain parts can carry hazardous voltages (primary bar, power supply...). Ignoring this warning can lead to injury and/or cause serious damage.

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