

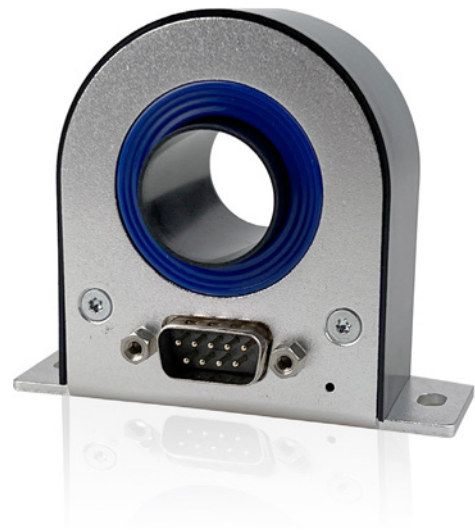
DATA SHEET

CTT50ID

50 A RMS / 50 A DC Current Transducer

SPECIAL FEATURES

- 50 A RMS nominal current
- 50 A DC nominal current
- 2 MHz bandwidth (± 3 dB)
- 20.7 mm aperture for cables and bus bars
- -40 °C to $+85$ °C operating range
- Best in class for accuracy and stability
- Isolated AC and DC current measurements
- 1.5 ppm maximum linearity error
- Industry standard D-SUB 9 connector
- Full aluminum body for superior EMI shielding
- Advanced sensor protection circuit



CTT50ID Functions and Benefits

The HBM series of current transducers feature industry standard, fluxgate, closed-loop technology. The second harmonic zero flux detection ensures the highest accuracy and lowest drift while maintaining a high bandwidth.

HBM current transducers are perfect for measuring currents between 10 and 1000 A RMS. With the high bandwidth support, they can be used with fast rise time signals, such as those found in electric drives or other inverter applications, such as those in renewable industries.

The CT series is available for 50 A RMS to 1000 A RMS, all sharing the same high-end technology. All connectors are compatible for fast exchange.

The optional 1 HE 19" rack mountable power supply can power any mix of up to six CTs.

Current output cables to connect directly to the GN31XB power card, as well as to the GN61XB card, are available.

Optional burden resistors are available for the GEN series Data Acquisition Systems or power analyzers without an integrated burden resistor.

The advanced sensor protection circuit ASPC prevents sensor damage for incorrect use cases, such as currents applied to unpowered CTs or powered CTs without a burden resistor to close the current output loop.

Specification Highlights

	Symbol	Value	Comment
Nominal primary AC current	I_{PN} AC	50 A RMS	
Nominal primary DC current	I_{PN} DC	± 50 A	
Measuring range	\hat{I}_{PM}	± 75 A	
Primary / secondary ratio	n1 : n2	1:500	
Bandwidth	f(± 3 dB)	2000 kHz	Small signal, refer to Figure 3

Electrical Specifications

At Ta = 23 °C, supply voltage = ± 15 V unless otherwise stated

Parameter		Symbol	Value	Comment
Overload capacity		\hat{I}_{OL}	± 250	Non-measured, 100 ms
Linearity error		ε_L	± 1.5 ppm	Refers to nominal DC current
Offset current (including earth field)		I_{OE}	± 100 ppm	Refers to nominal DC current
DC -10 Hz overall accuracy @ 25 °C (= $\varepsilon_L + I_{OE}$)		acc ε	± 101.5 ppm	Refers to nominal DC current
Offset temperature coefficient		TC $_{IOE}$	± 0.8 ppm/K	Refers to nominal DC current
Amplitude error	10 Hz - 5 kHz	ε_G	$\pm 0.01\%$	See Figure 3 for details Refers to nominal current
	5 kHz - 100 kHz		$\pm 1\%$	
	100 kHz - 1 MHz		$\pm 10\%$	
	1000 kHz - 2000 kHz		$\pm 30\%$	
Phase shift	10 Hz - 5 kHz	θ	$\pm 0.01^\circ$	See Figure 3 for details
	5 kHz - 100 kHz		$\pm 1^\circ$	
	100 kHz - 1 MHz		$\pm 10^\circ$	
	1000 kHz - 2000 kHz		$\pm 30^\circ$	
Response time to a step current IPN		tr @ 90%	1 μ s	
RMS Noise	0.1 Hz - 10 Hz	noise	0.07 ppm RMS	ppm RMS refers to nominal current
	0.1 Hz - 100 Hz		1.2 ppm RMS	
	0.1 Hz - 1 kHz		1.2 ppm RMS	
	0.1 Hz - 10 kHz		3 ppm RMS	
	0.1 Hz - 100 kHz		27 ppm RMS	
Peak-to-peak noise	0.1 Hz - 10 Hz	noise	0.7 ppm p-p	ppm peak-to-peak refers to nominal current
	0.1 Hz - 100 Hz		4 ppm p-p	
	0.1 Hz - 1 kHz		7 ppm p-p	
	0.1 Hz - 10 kHz		12 ppm p-p	
	0.1 Hz - 100 kHz		150 ppm p-p	
Fluxgate excitation frequency		f $_{Exc}$	31.25 kHz	
Induced RMS voltage on primary conductor			5 μ V RMS	
Stability				
Offset stability over time		ppm/month μ A/month	± 0.1 ppm/month ± 0.01 μ A/month	Refers to nominal DC current μ A refers to secondary current
Impact of external magnetic field		ppm/mT μ A/mT	± 16 ppm/mT ± 1.6 μ A/mT	Refers to nominal DC current μ A refers to secondary current
Offset change with power supply voltage changes		ppm/mV μ A/mV	± 0.0052 ppm/mV 0.0005 (typical)	Refers to nominal DC current μ A refers to secondary current
Power supply				
Power supply voltages		Uc	± 15.75 V	
Positive current consumption		Ips	40 mA + Is	Add Is (if Is is positive)
Negative current consumption		Ins	35 mA + Is	Add Is (if Is is positive)

Burden Resistor RM and Ambient Temperature Derating

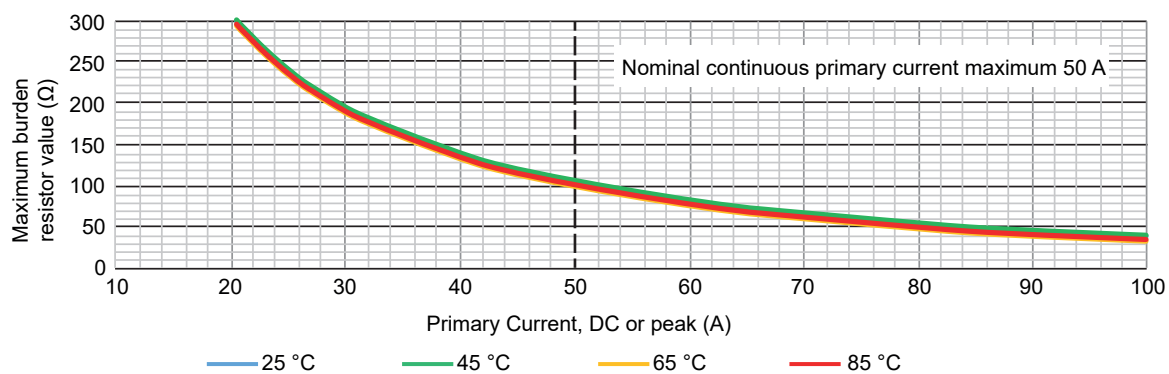


Figure 1: Burden resistor RM and ambient temperature derating

Frequency and Ambient Temperature Derating

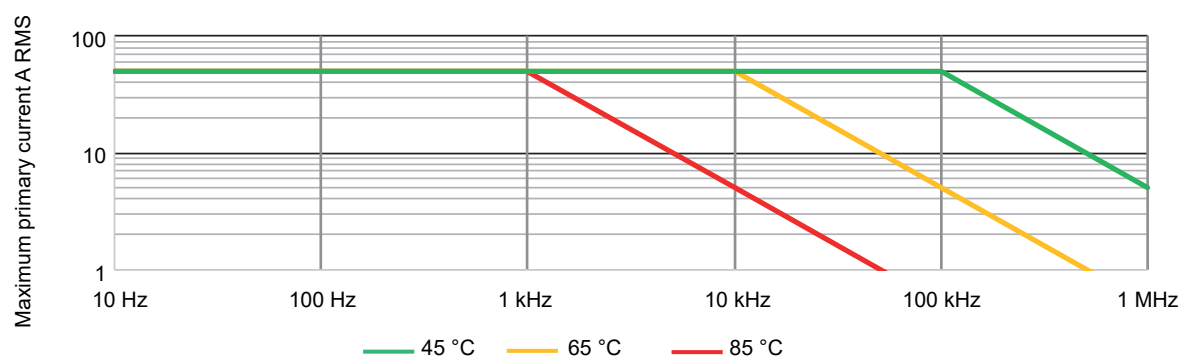


Figure 2: Frequency and ambient temperature derating

Amplitude and Phase Frequency Characteristics⁽¹⁾

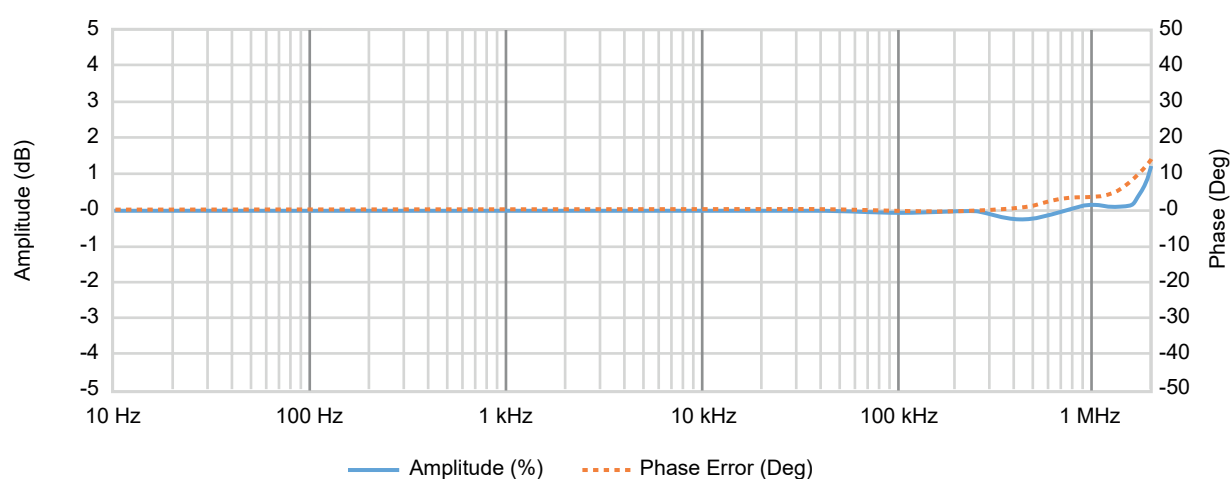


Figure 3: Frequency characteristics

(1) Recommended setup for high frequency: Symmetrical placement of the primary current and the return current.

Isolation Specifications		
Clearance	11.5 mm	
Creepage distance	11.5 mm	
RMS voltage for AC isolation test, 50/60 Hz, 1 min		
Between primary and (secondary and shield)	5.7 kV	
Impulse withstand voltage (1.2/50 μs)	10.4 kV	
Continuous working voltage	Using uninsulated wire	Using insulated wire
Non mains signals	1000 V	2000 V
CAT II signals	600 V RMS / 600 V DC	1000 V RMS / 1000 V DC
CAT III signals	300 V RMS / 300 V DC	1000 V RMS / 1000 V DC
Transient voltage	Using uninsulated wire	Using insulated wire
Non mains signals	4500 V	6000 V
CAT II signals	6000 V	6000 V
CAT III signals	6000 V	8000 V

Note: Higher isolation voltages can be achieved using isolated bus bars. Contact custom systems at: customsystems@hbkworld.com.

Environmental and Safety Specifications	
Ambient operating temperature range	-40 °C to +85 °C
Storage temperature range	-40 °C to +85 °C
Relative humidity	20% to 80%, Non-condensing
Maximum altitude	2000 m (6562 ft)
Usage	Designed for indoor use
Transient voltages	Up to overvoltage category III
Polution Degree	2
External devices	External devices connected to current transducers must comply with the standards IEC61010-1, IEC60950 or IEC62368-1 and be energy-limited circuitry
Cleaning	The transducer should only be cleaned with a damp cloth. No detergent or chemicals should be used.
Ambient Temperature	Note: When multiple primary turns are used or high primary currents are applied the temperature around the transducer will increase, please monitor to ensure that the maximum ratings are not exceeded. It is recommended to have minimum 1mm ² per ampere in the primary bus-bar.

Harmonized Standards for CE and UKCA Compliance, According to the Following Directives ⁽¹⁾

Low Voltage Directive (LVD): 2014/35/EU

Electromagnetic Compatibility Directive (EMC): 2014/30/EU

Electrical Safety

EN 61010-1 (2017)	Safety requirements for electrical equipment for measurement, control, and laboratory use - General requirements
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EN 61010-2-030 (2017)	Particular requirements for testing and measuring circuits
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Electromagnetic Compatibility

EN 61326-1 (2013)	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
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Environmental

EN 60068-2-64:2008	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance
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EN 60068-2-27:2009	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
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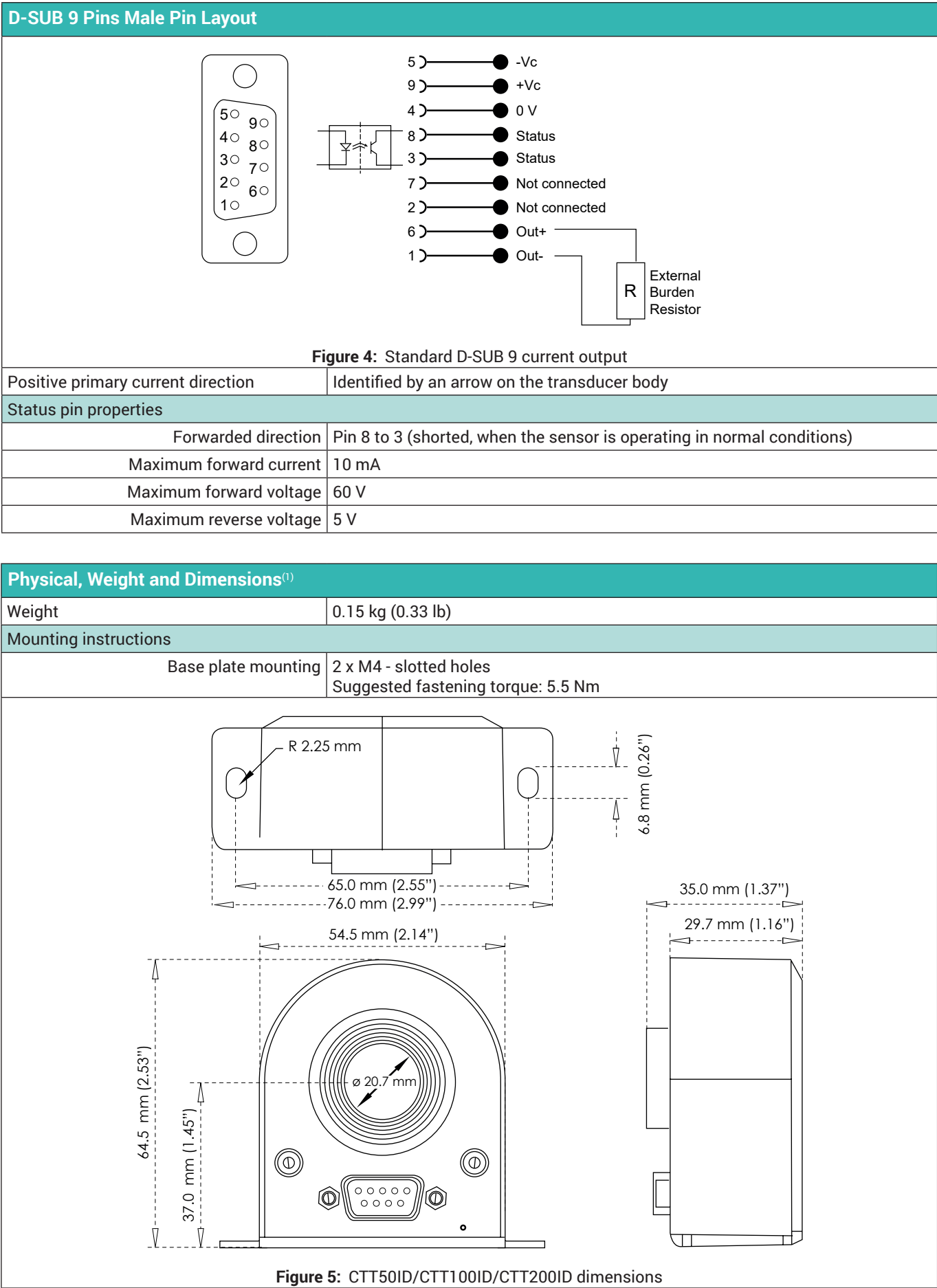
- (1) ^{UK}
^{CA} The manufacturer declares on its sole responsibility that the product is in conformity with the essential requirements of the applicable UK legislation and that the relevant conformity assessment procedures have been fulfilled.

Manufacturer:

Hottinger Brüel & Kjaer GmbH
Im Tiefen See 45
64293 Darmstadt
Germany

Importer:

Hottinger Brüel & Kjaer UK Ltd.
Technology Centre Advanced Manufacturing Park
Brunel Way Catcliffe
Rotherham
South Yorkshire
S60 5WG
United Kingdom



1-CTPSIU-6-1U Interface Unit for CT (Option, to be ordered separately)

Modular 19" rack with 1 to maximum 6 channel CT support.



Figure 6: Front side (left) and rear side (right)

Maximum number of CTs	6
Input connectors	9 pin SUBD
Output connectors	XLR
Signal LEDS	CT Power ON, CT Status
Power supply	100 to 240 V AC, 47 to 63 Hz 120 - 370 V DC
Weight	Typical 6.5 kg (14.33 lb)
Operating temperature range	0 °C to +50 °C (32 °F to 122 °F)

Dimensions

Height	87.2 mm (3,43")
Width / Width including mounting ears	442 mm (17,40") / 466 mm (18,34")
Depth	415 mm (16,33")

Figure 7: Dimensions

Current Transducer Family Overview

Type	Nominal current	Bandwidth (-3 dB)	Ratio Primary : Secondary	Aperture size
CTT50ID	50 A RMS / 70 A DC	2000 kHz	1 : 500	20.7 mm
CTT100ID	100 A RMS 100 A DC	2000 kHz	1 : 1000	20.7 mm
CTT200ID	200 A RMS 200 A DC	2000 kHz	1 : 1000	20.7 mm
CTN1000ID	1000 A RMS 1000 A DC	400 kHz	1 : 1500	41.2 mm

Other values available on request⁽¹⁾

(1) Contact custom systems at: customsystems@hbkworld.com.
Request quote/information for special products for GEN series.

GN310B/GN311B Current Transducer (CT) Wire Diagram

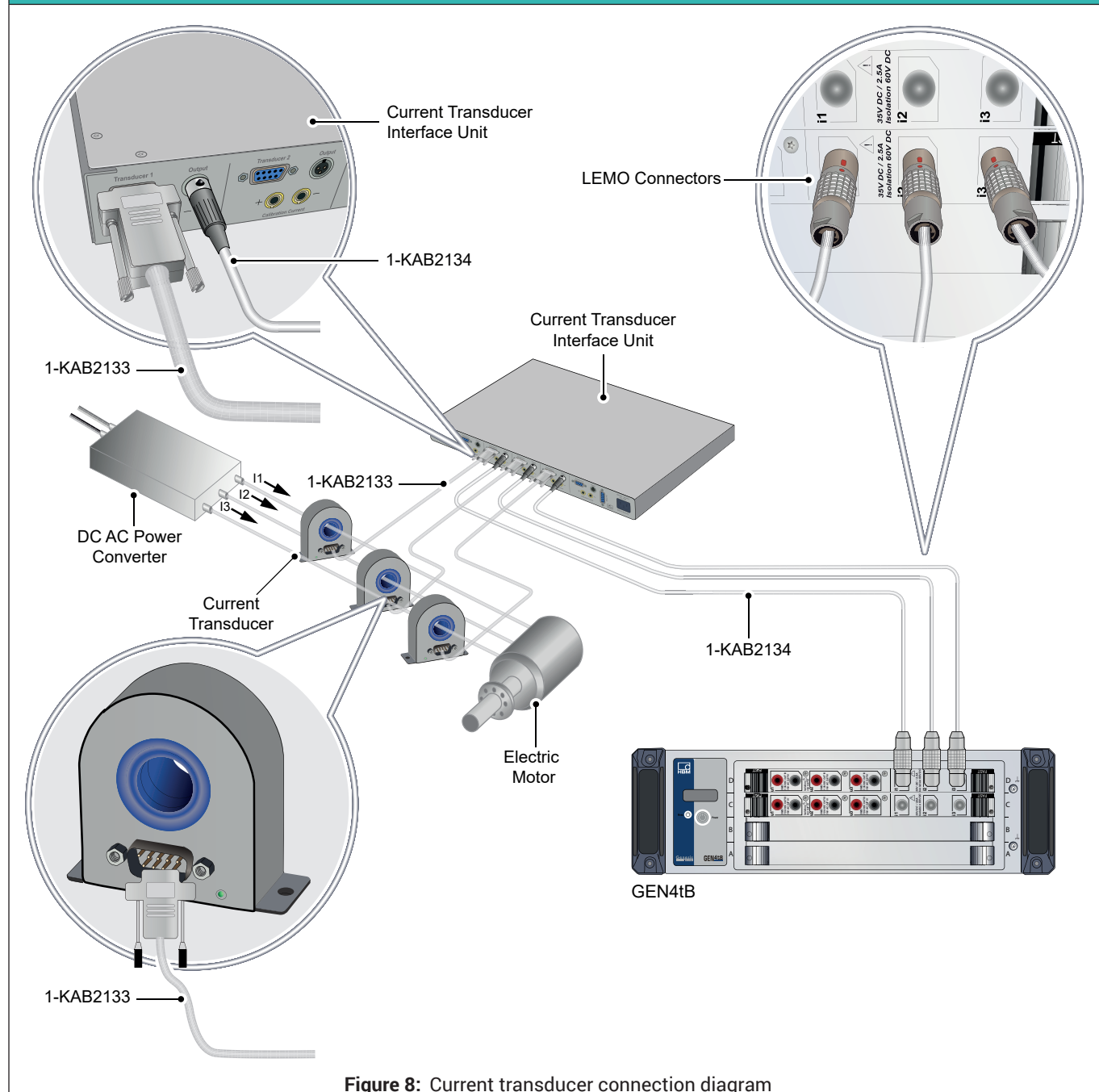


Figure 8: Current transducer connection diagram

GN610B/GN611B Current Transducer (CT) Wire Diagram

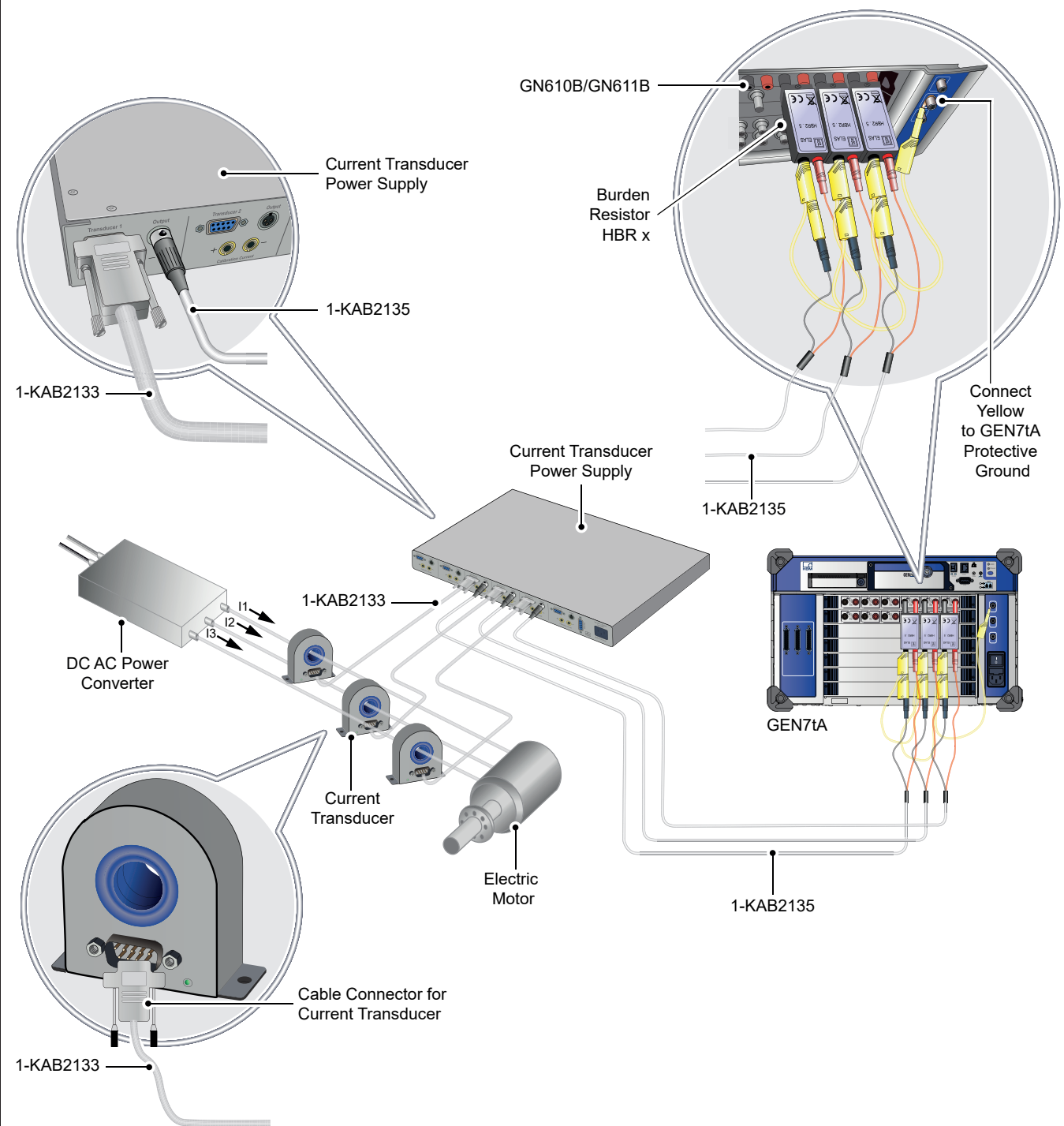
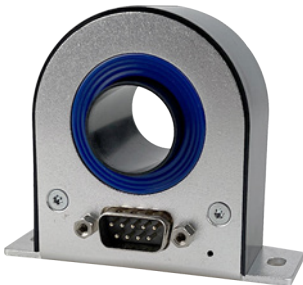






Figure 9: Current transducer connection diagram

Ordering Information		
Article	Description	Order No.
50 A DC or 50 A RMS current transducer	 <p>Ultra-stable, high-precision fluxgate technology current transducer. Non-intrusive isolated DC and AC current measurement up to 50 A RMS / 50 A DC. Full aluminum body for superior EMI shielding. Extended operating temperature range. Large aperture \varnothing 20.7 mm for cables and bus bars. Industry standard D-Sub 9 pin connection.</p>	1-CTT50ID






Current Transducers Interface and Cables, to be ordered separately		
Article	Description	Order No.
CT Interface unit	 <p>Interface unit for up to six current transducers. Industry standard D-SUB 9 pin input connectors. Multi-pin XLR output connectors. Supports transducer calibration winding access through 4 mm banana plugs. Front LEDs to indicate normal operation of each transducer. 100 - 240 V AC 50/60 Hz AC input voltage. 120 - 370 V DC input voltage. 1U height 19" rack mountable.</p>	1-CTPSIU-6-1U
CT cables	 <p>Industry standard current transducer connection cable. Shielded, low ohmic 9 wire cable with D-SUB 9 connectors on both ends. Supports power, status, current output and calibration current input. Lengths: 2, 5, 10 and 20 meters (6, 16, 32 and 65 ft)</p>	1-KAB2133-2 1-KAB2133-5 1-KAB2133-10 1-KAB2133-15 1-KAB2133-20
XLR to LEMO cable for GN31XB	 <p>CT interface unit to GN31xB DAQ power card connection cable. Uses XLR and LEMO connectors for a direct current output connection to the GEN DAQ card. Length 2 m (6 ft)</p>	1-KAB2134-2
XLR to Banana cable for GN61XB	 <p>CT interface unit to GN61xB DAQ 1kV card connection cable. Uses XLR and banana connectors for a current output connection to the GEN DAQ card. Requires an additional burden resistor in front of the GN61xB card to convert current to voltage. Length 2 m (6 ft)</p>	1-KAB2135-2

GN610B/GN611B Burden Resistors, to be ordered separately

Burden selection for GN610B/GN611B

Note: When using the CTS/CTM series together with GN610B/GN611B cards a burden resistor is required to convert the CT output current to a voltage. When selecting the burden several specifications need to be taken into account: maximum power of the burden, maximum voltage the CT can drive with constant current, the wire impedance of the cables used etc. See the CT operating manual for more details.

Model	Recommended burden	mV/A sensitivity	A/V scaling
CTT50ID	HBR 2.5 Ω	5.0	200
CTT100ID	HBR 1.0 Ω	2.0	500
CTT200ID	HBR 1.0 Ω	0.5	2000
CTN1000ID	HBR 1.0 Ω	0.6667	1500

Article	Description	Order No.
HBR 0.25 Ω , 1 W precision burden resistor	 0.25 Ω 1 W, 0.02% high precision, low thermal drift burden resistor. Internally uses 4 wire connection to reduce inaccuracy caused by the currents running to the burden resistor. Using banana input connectors and banana output pins. Directly compatible with GN610B/GN611B acquisition cards.	Ordered from custom systems ⁽¹⁾
HBR 0.5 Ω , 1 W precision burden resistor	 0.5 Ω 1 W, 0.02% high precision, low thermal drift burden resistor. Internally uses 4 wire connection to reduce inaccuracy caused by the currents running to the burden resistor. Using banana input connectors and banana output pins. Directly compatible with GN610B/GN611B acquisition cards.	Ordered from custom systems ⁽¹⁾
HBR 1 Ω , 1 W precision burden resistor	 1 Ω , 1 W, 0.02% high precision, low thermal drift burden resistor. Internally uses 4 wire connection to reduce inaccuracy caused by the currents running to the burden resistor. Using banana input connectors and banana output pins. Directly compatible with GN610B/GN611B acquisition cards.	Ordered from custom systems ⁽¹⁾
HBR 2.5 Ω , 1 W precision burden resistor	 2.5 Ω , 1 W, 0.02% high precision, low thermal drift burden resistor. Internally uses 4 wire connection to reduce inaccuracy caused by the currents running to the burden resistor. Using banana input connectors and banana output pins. Directly compatible with GN610B/GN611B acquisition cards.	Ordered from custom systems ⁽¹⁾
HBR 10 Ω , 1 W precision burden resistor	 10 Ω , 1 W, 0.02% high precision, low thermal drift burden resistor. Internally uses 4 wire connection to reduce inaccuracy caused by the currents running to the burden resistor. Using banana input connectors and banana output pins. Directly compatible with GN610B/GN611B acquisition cards.	Ordered from custom systems ⁽¹⁾

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Request quote/information for special products for GEN series.

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