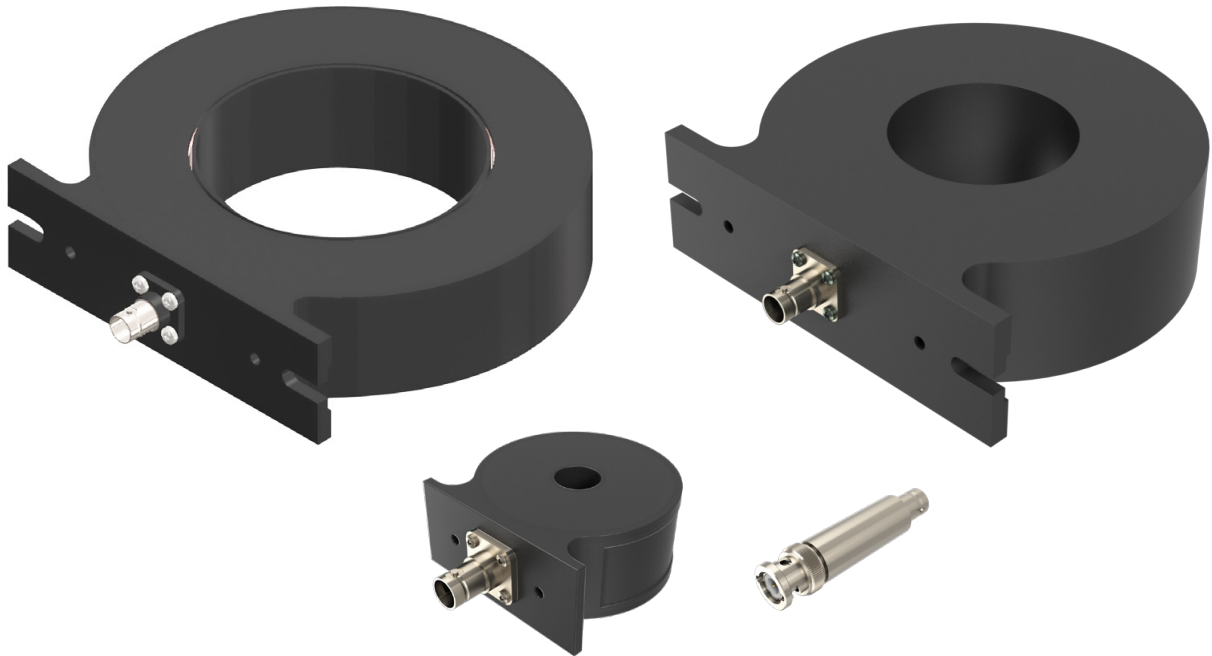




**Probing Solutions.
Made in Germany.**

EN



LILCO[®] SERIES

Precision Wide-Band AC Current Transformers

Datasheet



About PMK LILCO® Series Current Transformers

With bandwidths ranging from mHz to >60 MHz and input currents ranging from mA up to 25 kA, the LILCO® series of PMK's current transformers enables precision high bandwidth AC current measurements, which are required for a broad range of measurement applications. The current transformers are capable of accurately measuring large pulse or continuous input currents while electrical shielding between the input and output reduces the influence of electromagnetic fields on the output.

Key Features

- Accuracy <2% over broad frequency range
- Ultra low droop for improved low frequency accuracy
- High I·t capability
- Very high DC saturation currents
- Minimal phase shift
- Galvanic isolation to the circuit under test
- Integrated precision 50 Ω termination
- Negligible insertion resistance
- Passive device that does not require a power source
- Accurate reproduction of square, pulse, sine and other waveforms
- Extend specifications by changing output termination only
- Customized models available on request

The BNC output of the LILCO® series current transformers makes it easy to connect to a variety of measurement devices, such as, oscilloscopes, digitizers, network analyzers, spectrum analyzers, power analyzers, DMM etc. with just a standard 50 Ω coaxial cable.

Improved low frequency performance and increased I·t capability, as well as an attenuated output signal can be realized by changing the input termination of the measuring instrument. The LILCO® series attenuator ATT10BNCS is used to improve these specifications even more while maintaining the high frequency performance of the current transformer.

Measurement Principle

The measurement principle is the same as of power transformers. The current transformer has a primary and a secondary winding, and an alternating current flowing in the primary winding, I_{PRI} , induces an alternating current in the secondary winding, I_{SEC} . The secondary winding current, I_{SEC} , flows through the internal 50 Ω impedance, $R_{INTERNAL}$, generating an output voltage, V_{OUT} , (Figure 1). This internal burden resistance, in parallel with the BNC output termination sets the L_{SEC}/R_{BURDEN} time constant along with the secondary winding's inductance, L_{SEC} , to set the low frequency bandwidth cut-off point.

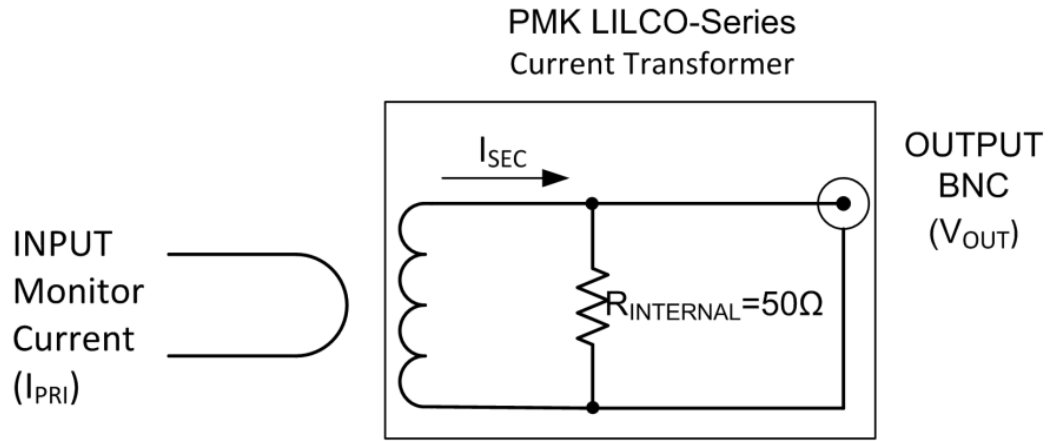


Figure 1 - Simplified Schematic

Galvanic isolation between input and output allows the LILCO® Series to be used in measurement setups with large potential differences or where unwanted currents between input and output appear like in ground loops.

Applications

The flexibility with changing the sensitivity, lower bandwidth cut-off point, droop and I-t specifications of a specific model and the variety of models make LILCO® Series current transformers ideal for a wide variety of measurement applications, like:

- Turn-on, turn-off and conducting performance in power semiconductor devices
- Motor controller and electronic variable speed drive development
- Harmonics measurements in mains power cables and for EMC testing
- Monitoring of laser tubes and diode pulse currents
- Testing to EN61000-4-1 peak inrush current
- ESD testing
- Lightning simulation testing of surge arrestors
- Capacitor discharge surge testing
- Switched mode power supply design
- Development and servicing work in power electronics

Specifications**Electrical Specifications for 1M Ω Termination**

Improved low frequency performance, increased I-t capability and reduced lower frequency limit can be achieved by changing the input termination of your measuring instrument, see section „How to extend the LILCO® series performance“.

Models	Hole Size (Diameter)	Output Sensitivity ¹	Time Domain					Frequency Domain				
			Max. Peak Current I _{peak}	DC Saturation Current I _{sat}	Max. Droop	Rise Time (10% - 90%)	Max. I-t with DC Bias	Max. I-t with NO DC Bias	Max RMS Current I _{rms}	Bandwidth LF (-3dB)	Bandwidth HF (-3dB)	I _{peak} /f
	[mm] (in.)	[V/A]	[A]	[A]	[%/ms]	[ns]	[mA·s]	[mA·s]	[A]	[Hz]	[MHz]	[A/Hz]
13E1000	13 (0.512)	1	500	22	880	7	4.5	2.5	7	1400	60	0.016
13G1000	13 (0.512)	1	500	3	82	7	7	4	7	130	60	0.03
13W1000	13 (0.512)	1	500	0.25	19	7	7	4	7	30	60	0.02
13E0500	13 (0.512)	0.5	1000	22	225	10	18	10	14	360	40	0.062
13G0500	13 (0.512)	0.5	1000	3	22	10	30	15	14	35	40	0.12
13W0500	13 (0.512)	0.5	1000	0.25	3.15	10	13	7	14	5	40	0.04
13E0200	13 (0.512)	0.2	2500	22	38	14	110	60	33	60	30	0.38
13G0200	13 (0.512)	0.2	2500	3	6.3	14	200	100	33	10	30	0.7
13W0200	13 (0.512)	0.2	2500	0.25	0.63	14	70	40	33	1	30	0.25
13E0100	13 (0.512)	0.1	5000	22	10	16	400	220	60	16	25	1.4
13G0100	13 (0.512)	0.1	5000	3	1	16	700	400	60	1.6	25	2.5
13W0100	13 (0.512)	0.1	5000	0.25	0.19	16	540	300	60	0.3	25	2
13E0050	13 (0.512)	0.05	10000	22	3.3	40	1200	660	100	5.3	10	4.1
13G0050	13 (0.512)	0.05	10000	3	0.315	40	2200	1200	100	0.5	10	8
13W0050	13 (0.512)	0.05	10000	0.25	0.063	40	2200	1200	100	0.1	10	3
58M1000	58 (2.291)	1	500	2	25	14	18	10	12	40	30	0.06
58M0500	58 (2.291)	0.5	1000	2	9.4	20	70	40	20	15	20	0.2
58E0200	58 (2.291)	0.2	2500	55	25	20	360	200	50	40	20	1
58M0200	58 (2.291)	0.2	2500	2	2.5	20	360	200	50	4	20	1
58E0100	58 (2.291)	0.1	5000	55	6.3	40	1800	1000	100	10	10	6
58EH100	58 (2.291)	0.1	2500	55	12.6	20	700	400	100	20	20	2
58M0100	58 (2.291)	0.1	5000	2	0.315	40	1800	1000	100	0.5	10	6
58MH100	58 (2.291)	0.1	2500	2	0.63	20	700	400	100	1	20	2
58E0050	58 (2.291)	0.05	10000	55	1.57	80	6000	3400	200	2.5	5	20
58M0050	58 (2.291)	0.05	10000	2	0.095	80	6000	3400	200	0.15	5	20
58E0020	58 (2.291)	0.02	20000	55	0.5	200	20000	12000	500	0.8	2	70
58M0020	58 (2.291)	0.02	20000	2	0.038	200	20000	12000	500	0.06	2	70
58EH010	58 (2.291)	0.01	20000	55	0.315	80	24000	13000	400	0.5	5	85
58MH010	58 (2.291)	0.01	20000	2	0.025	80	24000	13000	400	0.04	5	85
89M0100	89 (3.504)	0.1	5000	5	0.315	40	2600	1400	100	0.5	10	9

This product comes with 2 years warranty. Specifications that are not marked as guaranteed are typical.

Warranted 50 Ω \pm 1%* output impedance for all models.

1. BNC Output Terminated into >50k Ω , see Output BNC Termination Selection Table. Warranted \pm 2%*

2. The DC current level applied to the input signal when the transformer core starts to saturate and the LF 3dB increases by a factor of two (Droop factor has doubled) *Over nominal climate conditions, for reduced bandwidth 10·LF-point to 1/10·HF

Environmental Specifications

Altitude	operating	up to 2000 m
	non-operating	up to 15000 m
Temperature Range	operating	0 °C to +50 °C
	non-operating	-40 °C to +71 °C
Maximum Relative Humidity	operating	80 % relative humidity for temperatures up to +31 °C, decreasing linearly to 40 % at +50 °C
	non-operating	95 % relative humidity for temperatures up to +40 °C

Mechanical Dimensions

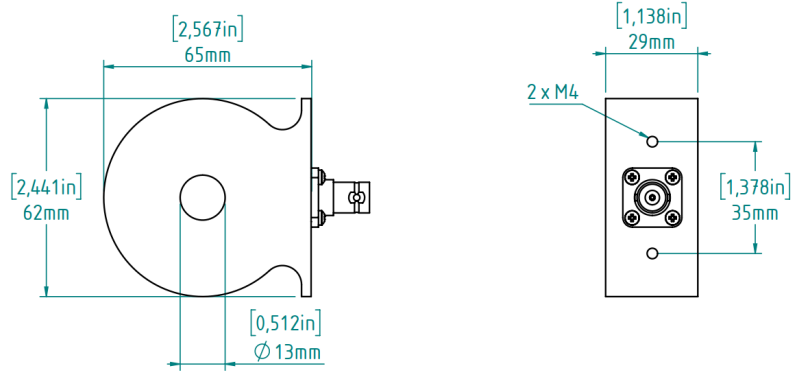


Figure 3 - PMK LILCO®-Series 13 Mechanical Dimensions

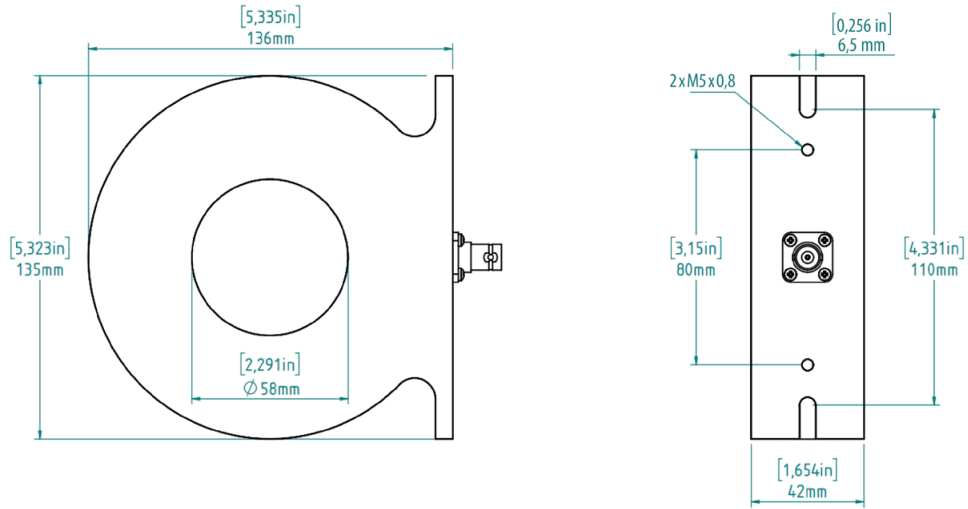


Figure 4 - PMK LILCO®-Series 58 Mechanical Dimensions

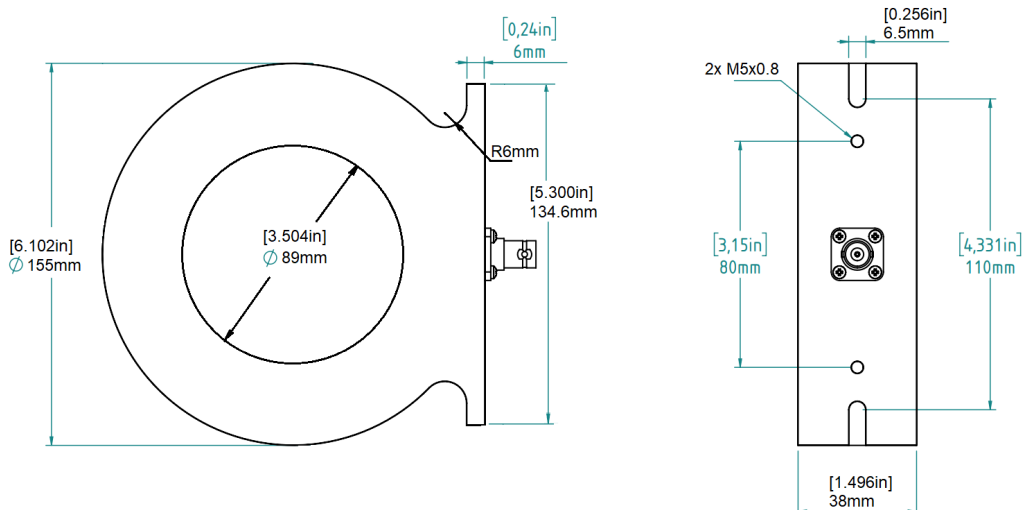


Figure 5 - PMK LILCO®-Series 89 Mechanical Dimensions

Scope of Delivery

Item	Qty	Item	Qty
LILCO® Current Transformer	1	Instruction Manual	1
Calibration Certificate	1	---	---

How to extend the LILCO® Series Performance

To extend the specifications of output sensitivity, lower bandwidth (LF, 3 dB BW) and droop from the Specifications can be achieved by changing the BNC output termination.



Tip! Selecting the right termination provides the ability to optimize the performance to best adapt to a variety of applications.

The overall I-t capability of the transformer increases when using 50Ω, or the attenuator ATT10BNCS.

LILCO® Output Connection	Change in Electrical Specification
1 MΩ (> 50 kΩ)	• None to Electrical Specification Table
50 Ω	• Reduce LF bandwidth (3 dB cut-off) by factor 2 • Reduce droop by factor 2 • Reduce the output sensitivity by factor 2
Attenuator ATT10BNCS	• Reduce LF bandwidth (3 dB cut-off) by factor 10 • Reduce droop by factor 10 • Reduce the output sensitivity by factor 10

Note, the attenuator ATT10BNCS requires a measuring instrument with 1 MΩ input termination. The measurement device input termination is equal to the LILCO® output BNC termination.

Example: Model 13G1000 with 13 mm inner whole diameter

- 1 MΩ output termination (see Specification Table)

- Output Sensitivity: 1 V/A
- Droop: 880 %/ms (0.88 %/μs)
- Bandwidth LF: 1400 Hz

- 50Ω termination

Reduces the output sensitivity by a factor of 2 while improving the low frequency performance by a factor of 2.

- Output Sensitivity: 0.5 V/A
- Droop: 440 %/ms (0.44 %/μs)

- Attenuator ATT10BNCS and 1 MΩ input termination of the measuring instrument

Reduces the output sensitivity by a factor of 10 while improving the low frequency performance by a factor of 10.

- Output Sensitivity: 0.1 V/A
- Droop: 88 %/ms (0.088 %/μs)
- Bandwidth LF: 140 Hz

Optional Accessory: Attenuator ATT10BNCS

Extend the LILCO® current transformer performance with the optional attenuator ATT10BNCS.



Tip! The ATT10BNCS reduces the LF bandwidth (3dB cut-off) by factor 10, droop by factor 10 and the output sensitivity by factor 10 while preserving the high-frequency characteristics.

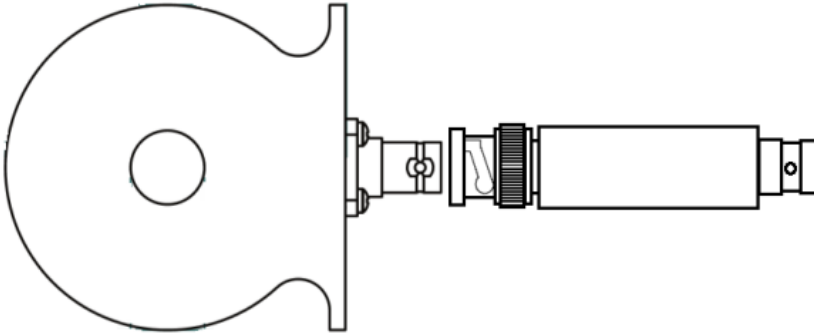


Figure 6 - ATT10BNCS connection to a LILCO® current transformer

The measurement device input termination should be set to 1 M Ω (>50 k Ω), otherwise with a 50 Ω termination, the output sensitivity will be reduced by a factor of 20.

Electrical Specifications for 1 M Ω Termination

Attenuation Ratio	20 dB
Attenuation Tolerance	± 0.25 dB
Frequency Range	DC - 50 MHz
Output Impedance	50 Ω \pm 1 %
Maximum Input Power, RMS	2.25 W
Maximum Rated Input Peak Voltage, No Measurement Category, not in CAT II, III, IV (¹)	
Pollution Degree	2
No Measurement Category	100 V _{PEAK}

Mechanical Specifications

Dimensions (W x H x D)	approx. 97 mm x 35 mm x 29 mm
Weight	approx. 300 g

Manufacturer

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