Current Transducer LF 2005-S/SP9

I_{PN} = 1000 A

For the electronic measurement of currents: DC, AC, pulsed..., with galvanic isolation between the primary circuit and the secondary circuit.

16178

Electrical data

I_{PN}	Primary nominal current rms	1000				A
I_{PM}	Primary current, measuring range @ ± 24 V	0 .. ± 2000				A
$\hat{I}_P$	Overload capability @ 250 µs	50				kA
R_M	Measuring resistance	T_A = 70 °C		T_A = 85 °C		
		$R_{M\,min}$	$R_{M\,max}$	$R_{M\,min}$	$R_{M\,max}$	
	with ± 15 V @ ± 1000 A_{max}	0	27	0	26	Ω
	@ ± 1700 A_{max}	0	2	0	1	Ω
	with ± 24 V @ ± 1000 A_{max}	0	69	3	68	Ω
	@ ± 2000 A_{max}	0	18	3	17	Ω
I_{SN}	Secondary nominal current rms	200				mA
K_N	Conversion ratio	1 : 5000				
V_C	Supply voltage (± 10 %)	± 15 .. 24				V
I_C	Current consumption	33 (@ ± 24 V) + I_S				mA

Accuracy - Dynamic performance data

ε_L	Linearity error	< 0.1	%
t_r	Response time [1] to 90 % of I_{PN} step	< 1	µs
di/dt	di/dt accurately followed	> 100	A/µs
BW	Frequency bandwidth (- 1 dB)	DC .. 100	kHz

Test circuit

N_T	Number of turns	1000	
R_T	Resistance of test circuit @ T_A = 85	16	Ω
I_T	Test current	0.1 [2]	A

Remarks:

- ○ Use a current generator for the test winding (high impedance)
- ○ Otherwise a minimum resistance in series with the test winding is needed:
  - 30 Ω @ T_A = - 25 .. + 85°C
  - 50 Ω @ T_A = - 40 .. + 85°C

General data

T_A	Ambient operating temperature		- 40 .. + 85	°C
T_S	Ambient storage temperature		- 40 .. + 85	°C
R_S	Secondary coil resistance	@ T_A = 70°C	33	Ω
		@ T_A = 85°C	34	Ω
m	Mass		1.4	kg
	Standards		EN 50155: 2001	

Notes: [1] With a di/dt of 100 A/µs
[2] Maximum 1 A during 10 seconds 6 times per hour
[3] Between primary and secondary + test.

Features

- Closed loop (compensated) current transducer using the Hall effect
- Isolated plastic case recognized according to UL 94-V0.

Special features

- I_{PN} = 1000 A
- I_{PM} = 0 .. ± 2000 A
- V_C = ± 15 .. 24 (± 10%) V
- V_d = 12 kV [3]
- N_T = 1000 turns
- T_A = - 40°C .. 85°C
- Secondary connection on shielded cable 5 x 0.5 mm².

Advantages

- Excellent accuracy
- Very good linearity
- Low temperature drift
- Optimized response time
- Wide frequency bandwidth
- No insertion losses
- High immunity to external interference
- Current overload capability.

Applications

- Single or three phases inverter
- Propulsion and braking chopper
- Propulsion converter
- Auxiliary converter
- Battery charger.

Application Domain

- Traction.

Current Transducer LF 2005-S/SP9

Isolation characteristics

V_d	Rms voltage for AC isolation test, 50 Hz, 1 min	12 [1]	kV
		500 [2]	V
V_e	Rms voltage for partial discharge extinction @ 10 pC	≥ 4.1 [3] Min	kV
dCp	Creepage distance	51.5	mm
dCI	Clearance	51.5	mm
CTI	Comparative Tracking Index (group I)	600	

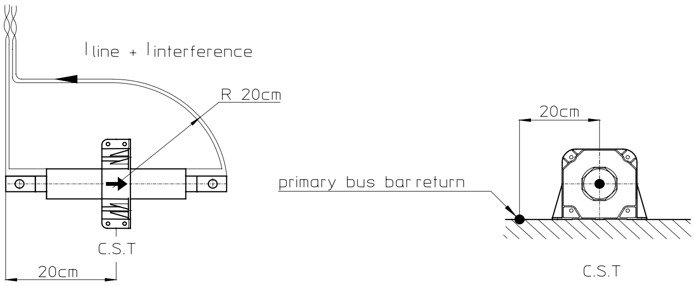
Notes: [1] Between primary and secondary + test
[2] Between shield and secondary + test
[3] Test performed with a non-insulated bus bar (dimension 290 x 50 x 10 mm) centered in the aperture.

DC offset [At]

	Maximum range of measured current			
Temperature range	- 100 .. + 100 A	- 500 .. + 500 A	- 1000 .. + 1000 A	- 2000 .. + 2000 A
- 25°C .. + 85°C	± 3.6	± 3.8	± 4.0	± 4.8
- 40°C .. + 85°C	± 5.1	± 5.3	± 5.5	± 6.3

Maximum DC offset for different ranges of temperature and measured current.

Wiring plan for DC component measuring



Accuracy for the measurement of a single frequency signal

Frequency	20 .. 200 Hz		200 .. 3000 Hz	
Amplitude	Amplitude Error [%]	Phase Error [%]	Amplitude Error [%]	Phase Error [%]
0.1 .. 0.5 A	± 55	- 15.0	± 55	22
0.5 .. 1 A	± 17	- 14.0	± 48	22
1 .. 2 A	± 7.0	- 7.4	± 32	14
2 .. 10 A	± 6.6	- 1.6	± 17	6.2
10 .. 20 A	± 3.7	< - 1.0	± 6.8	- 1.4
20 .. 50 A	± 2.8	< - 1.0	± 3.6	< - 1.0

Amplitude error: in % of the measured signal.
Phase error: in degrees with respect to the measured signal.
Maximum amplitude and phase errors for single frequency signals.
High error values are due to zero-crossing distortion.

Accuracy for the measurement of a signals added to a DC current ≥ 10 A

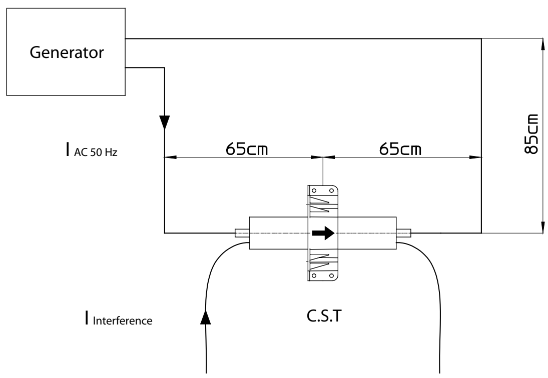
Frequency	20 .. 200 Hz		200 .. 3000 Hz	
Amplitude	Amplitude Error [%]	Phase Error [%]	Amplitude Error [%]	Phase Error [%]
0.1 .. 0.5 A	± 2.2	- 1.6	± 4.4	1.4
0.5 .. 1 A	± 2.5	- 1.6	± 4.1	< - 1.0
1 .. 2 A	± 2.5	- 1.6	± 4.1	< - 1.0
2 .. 10 A	± 6.1	- 1.1	± 7.0	< - 1.0
10 .. 20 A	± 6.1	< - 1.0	± 8.8	< - 1.0
20 .. 50 A	± 6.0	< - 1.0	± 7.5	< - 1.0

Amplitude error: in % of the measured signal.
Phase error: in degrees with respect to the measured signal.
Maximum amplitude and phase errors for signals added to a DC fundamental.

Accuracy for the measurement of a signals added to an AC (fundamental) current (15 Hz < f < 100 Hz), ≥ 10 A rms

Frequency	20 .. 200 Hz		200 .. 3000 Hz	
Amplitude	Amplitude Error [%]	Phase Error [%]	Amplitude Error [%]	Phase Error [%]
0.1 .. 0.5 A	± 1.6	< - 1.0	± 2.3	< - 1.0
0.5 .. 1 A	± 1.2	< - 1.0	± 1.9	< - 1.0
1 .. 2 A	± 0.9	< - 1.0	± 1.3	< - 1.0
2 .. 10 A	± 0.6	< - 1.0	± 0.8	< - 1.0
10 .. 20 A	± 0.6	< - 1.0	± 0.7	< - 1.0
20 .. 50 A	± 1.0	< - 1.0	± 1.0	< - 1.0

Amplitude error: in % of the measured signal.
Phase error: in degrees with respect to the measured signal.
Maximum amplitude and phase errors for signals added to an AC fundamental.

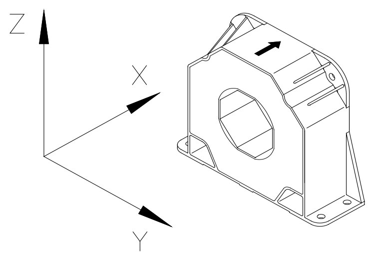


Wiring plan for measurements with an AC component.

Influence regarding external magnetic fields

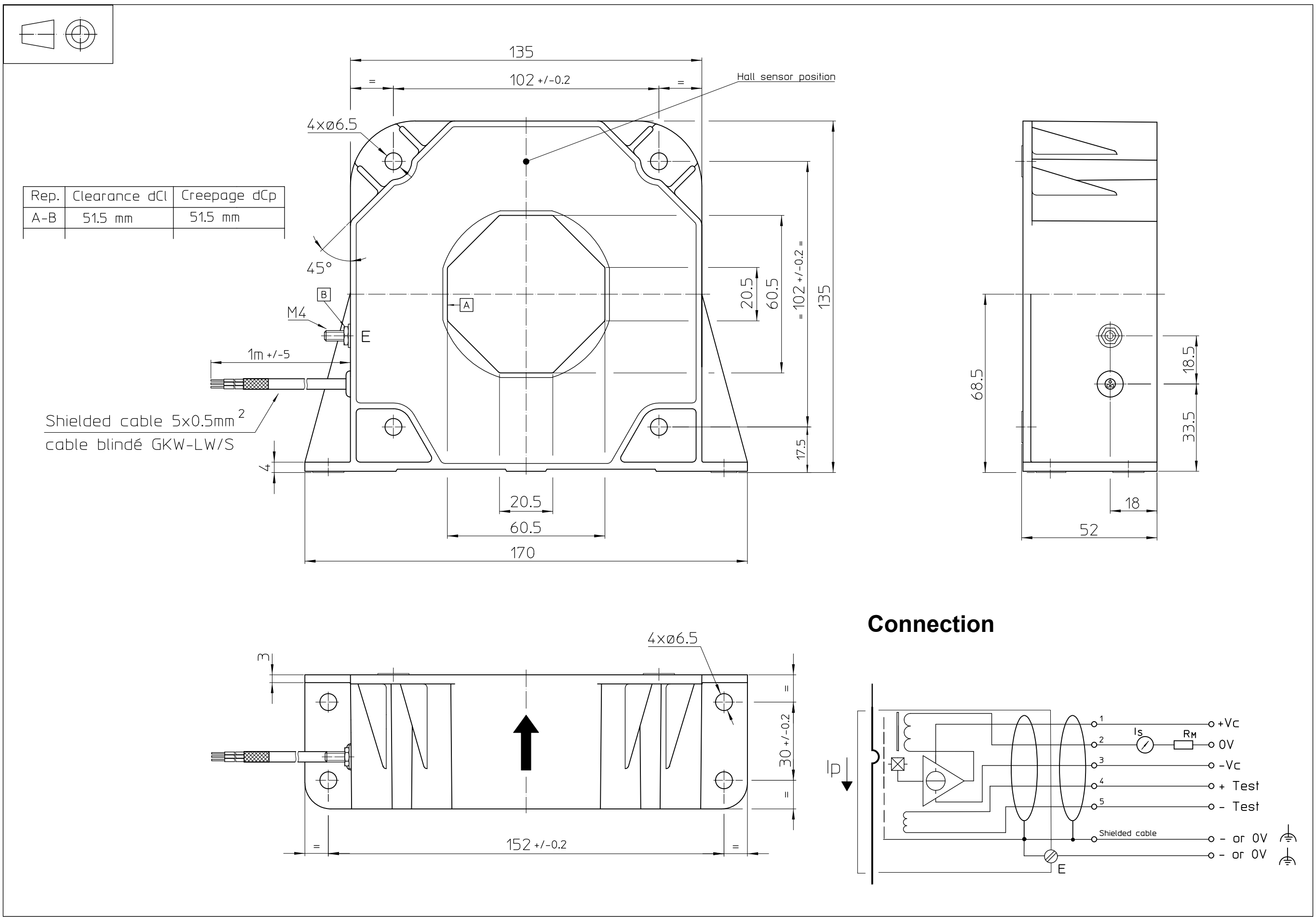
Frequency Direction	0 .. 5 Hz Max error [mAt $_{rms}$ per A/m]	0 .. 5 Hz Max error [mAt $_{rms}$ per A/m]
X-axis	0.16	0.18
Y-axis	3.3	5.3
Z-axis	0.04	0.08

Error in the measurement of the primary current [mA $_{rms}$] due to external magnetic fields at the specified frequencies for the three axes of the transducer



Orientation of transducer during magnetic field sensitivity testing.

Dimensions LF 2005-S/SP9 (in mm)



Mechanical characteristics

- General tolerance ± 0.5 mm
- Transducer fastening
  Vertical or flat position 4 holes Ø 6.5 mm, 4 M6 steel screws
  Recommended fastening torque 4.2 Nm
- Primary through-hole 60.5 x 20.5
  Or Ø 56 mm max
- Connection of secondary shielded cable 5 x 0.5 mm²
- Connection shields M4 threaded stud
  Recommended fastening torque 1.2 Nm

Remarks

- I_S is positive when I_P flows in the direction of the arrow.
- Temperature of the primary conductor should not exceed 100°C.
- Dynamic performances (di/dt and response time) are best with a single bar completely filling the primary hole.

Safety

This transducer must be used in electric/electronic equipment with respect to applicable standards and safety requirements in accordance with the manufacturer's operating instructions.

Caution, risk of electrical shock

When operating the transducer, certain parts of the module can carry hazardous voltage (eg. primary busbar, power supply).
Ignoring this warning can lead to injury and/or cause serious damage.
This transducer is a build-in device, whose conducting parts must be inaccessible after installation.
A protective housing or additional shield could be used.
Main supply must be able to be disconnected.