

## Measuring transformers

Itacoil offers a wide range of standard and custom measuring transformers according to specific customer requirements:

**Current Transformers - toroidal 50-60Hz** – Precision amperometric toroidal transformers with amorphous or nanocrystalline cores suitable for measuring systems, which need small linearity and phase errors.

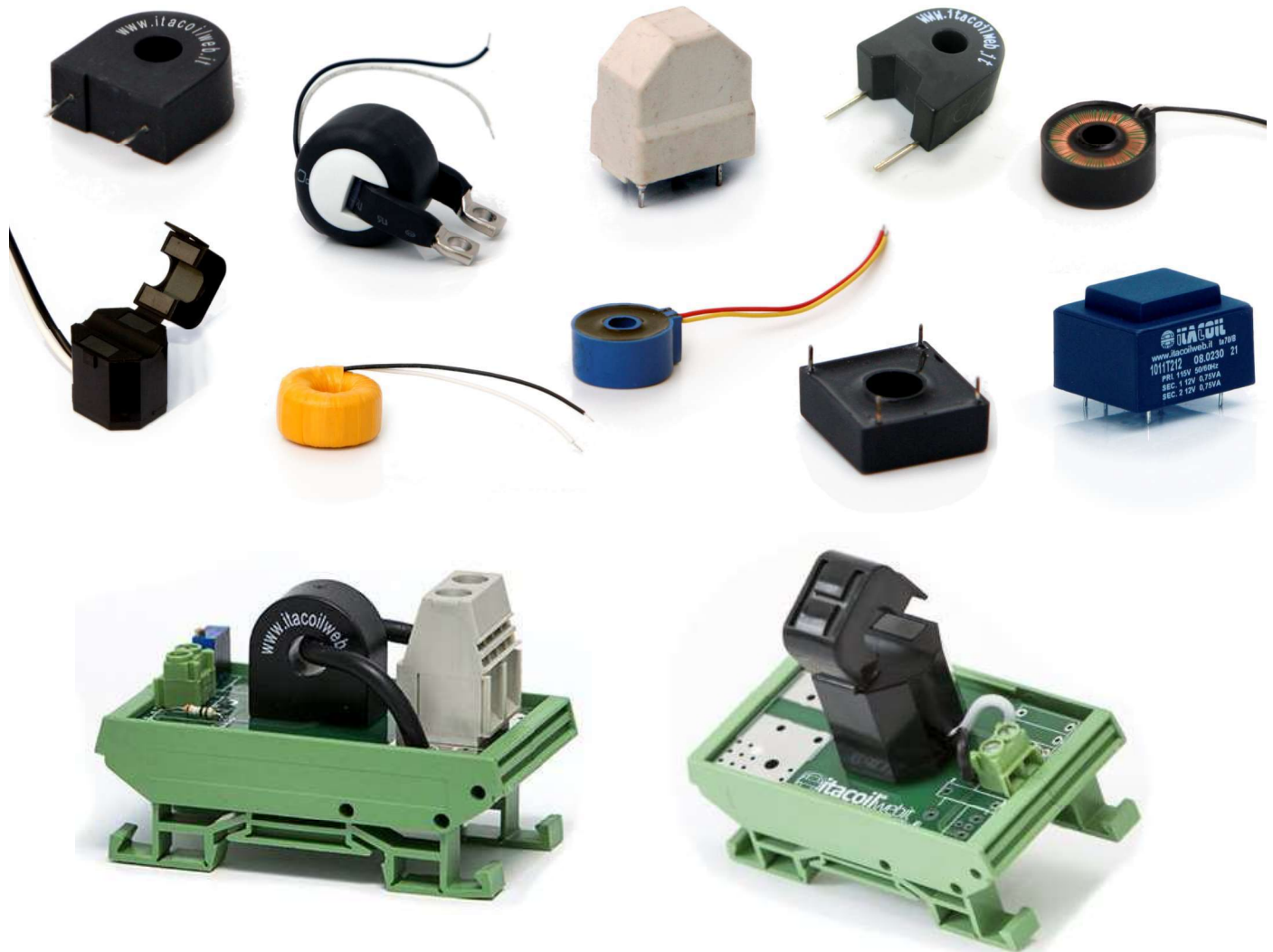
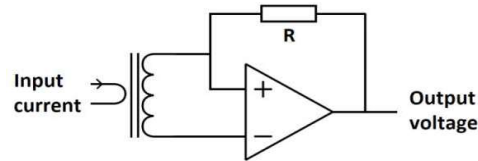
**Current Transformers - toroidal for high-frequency** - Amperometric toroidal transformers with ferrite cores are used for applications where the measurement of current in high-frequency circuits is required (inverters, welding machines, etc.), also for feedback/over current protection. Normally supplied epoxy encapsulated, whether for PCB or on cable installation.

**Current Transformers - Linear** - Amperometric linear transformers with magnetic steel or ferrite core, whether for current with 50-60Hz network frequency or high-frequency.

Most current transformers can be supplied for **DIN rail mount**.

**Voltage Transformers** – Transformers for voltage measurement, with a good linear output signal and galvanic separation up to 10kV.

Typical current sensor application scheme:



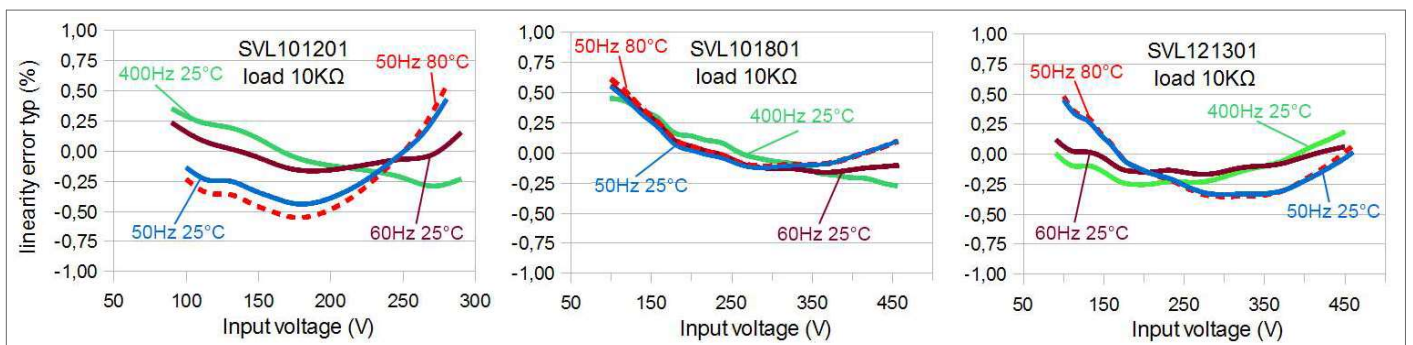
- High precision, 50...400Hz voltage measuring transformers
- Multi output voltage level
- Short circuit proof safety transformers, compliant to EN61558-1 and EN61558-2-6 up to the Max permissible input voltage<sup>3</sup>
- Max ambient temperature 80°C
- Epoxy encapsulated
- Marking on primary side
- Tin-plated phosphor bronze pins
- Pins size: Ø 0.9 mm typ , length 4mm min
- Only electrically used pins are mounted
- 100% tested
- Custom versions on request



ta80/B

Code	Input voltage			Linearity error <sup>1</sup>		Phase error <sup>2</sup>		Output voltage (@nominal V input)	Recom- mended Load	Pri/Sec Dielectric strength	.stp file Download
	Nominal	Permissible range	Precision range	Typical	Max	Typical	Max				
SVL101201	230V	0...300V	90...265V	<±0.40%	<±0.65%	<±1.00°	<±1.70°	2.5-5.0-7.5-10V	10KΩ	5.0KV	
SVL101801 <sup>3</sup>	400V	0...500V	180...440V	<±0.25%	<±0.50%	<±0.60°	<±1.00°	2.5-5.0-7.5-10V	10KΩ	5.0KV	
SVL121301	400V	0...500V	180...440V	<±0.25%	<±0.50%	<±0.75°	<±1.20°	2.5-5.0-7.5-10V	10KΩ	5.0KV	

Dimensions (mm)	SVL101201	SVL101801	SVL121301	Layout (bottom view)	Drawing
a max	32.6	33.1	41.5		
b max	28.0	28.6	35.5		
h max	24.3	29.7	27.5		
x typ	5.0	5.0	5.0		
y typ	20.0	20.0	25.0		



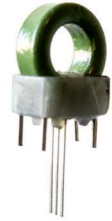
<sup>1</sup> Max errors at 50Hz (@25°C).

<sup>2</sup> For phase shift error compensation please contact our technical dept.

<sup>3</sup> The compliance of SVL101801 to EN61558-1 and EN61558-2-6 standard is limited for use up to 300V max primary voltage. It can be used above 300V where the compliance to EN61558-1 and EN61558-2-6 is not required.

## SHL series - AC-DC current sensor 38A - 90A

- Precision open loop AC/DC current sensor
- Cost effective solution in digital measuring equipment
- DC to 100KHz bandwidth and over
- Low and constant phase shift
- Low temperature drift
- Ambient temperature up to 60°C, 95°C with current derating
- Quick response time
- High insulation and creepage-clearance
- Custom versions on request from 2A to 100A on the same size

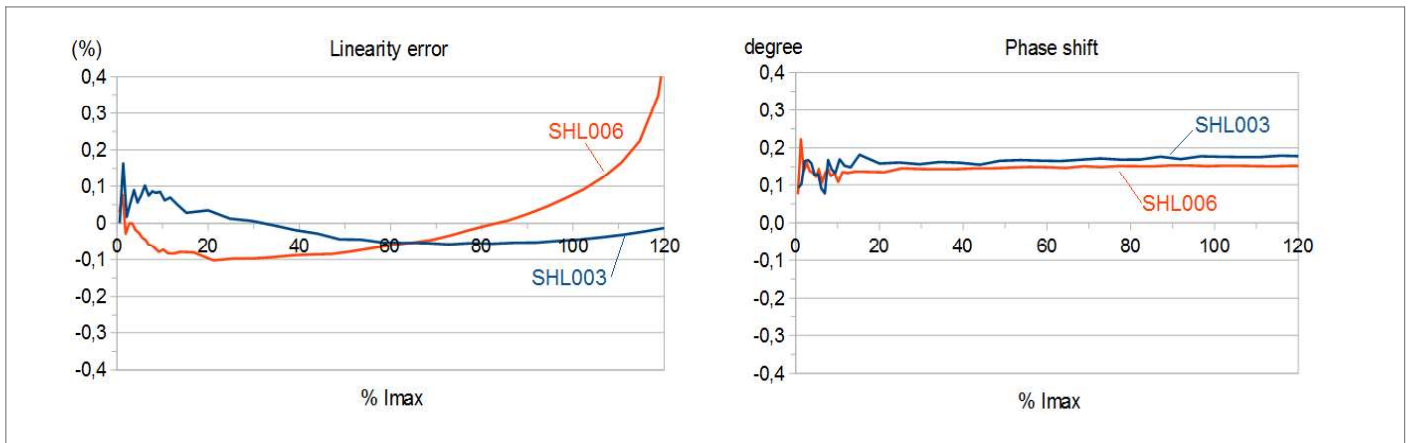


## 38A - 90A

## PRELIMINARY

Code	Precision Input Current	Max Input Current	Typ linearity error <sup>1</sup>	Max linearity error <sup>1</sup>	Typ phase shift <sup>2</sup>	Nominal Vout (Vs=5V)	Supply voltage (Vs)	Vdc Offset (quiescent voltage)	Typ Offset Temperature drift	Typ Gain Temperature drift	Creepage Clearance <sup>3</sup>	In/Out Dielectric strenght <sup>3</sup>
SHL003	38A	38A	±0.1%	±0.6%	0.15°	38 mV/A	3.3..5 Vdc	0.46...0,54*Vs	±0.35mV/°C	±0,022%/°C	8 mm	5 KV
SHL006	75A	90A	±0.2%	±0.6%	0.15°	6 mV/A	3.3..5 Vdc	0.46...0,54*Vs	±0.35mV/°C	±TBD%/°C	8 mm	5 KV

Dimensions	mm	Dimensions	mm		
A max (∅)	13.8	D typ (∅)	0.8		
B max	7.4	D1 typ	0.25		
H max	18.0	D2 typ	0.50		
C min (∅)	7.0	L min	3.5		
E max	13.0	L1 min	10.0		
X typ	10.0	Y typ	5.0		
X1 typ	4.7	Y1 typ	4.0		
X2 typ	5.3	Y2 typ	1.27		



The showed errors and typical graphs are referred to 50/60Hz AC current measuring, Rb=10KΩ.

For precise measurements offset and gain compensation are required after primary conductor securing.

Vout is proportional to both input current and Vs, so it should be monitored by the systems or sufficiently stable.

With frequency over 10KHz sine the max current is derated of a factor  $K_{(SHL003)} = -0.0074 * KHz + 1.073$ .

For mono-directional DC current measurements use software compensation. With bi-directional DC current the linearity error increase +1% due to the hysteresis.

For mono-directional DC current the hysteresis error can be excluded performing the offset compensation after a first DC current pulse with same polarity.

Supply current 12.5mA max. Allowed Rb range 5.6...47kΩ.

<sup>1</sup> Within precision input current range, 50-400Hz AC current.

<sup>2</sup> Within max input current range, 50Hz AC current.

<sup>3</sup> Between pins and uninsulated primary conductor (not supplied).

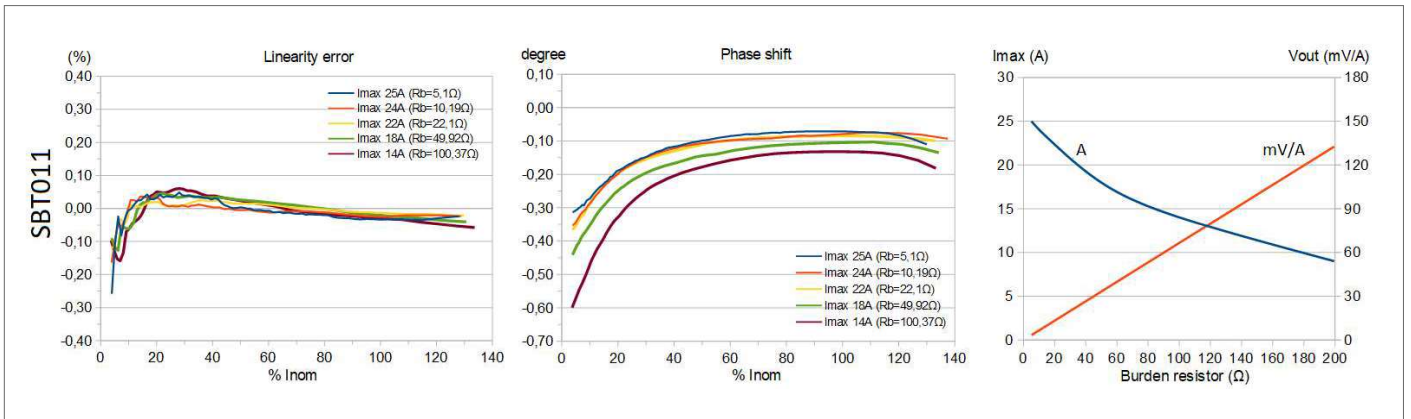
- High precision 50/60Hz current measuring transformers
- Encapsulated in UL94/V-0 epoxy resin
- High insulation between primary/secondary
- Custom versions on request



## 22A

Code	Max Input Current <sup>1</sup>	Nom Input Current <sup>1</sup>	Accuracy Class <sup>2</sup>	Burden resistor <sup>3</sup>	Sec turns	Dielectric strength <sup>4</sup>
SBT011	22A	18.3A	0.5	22 Ω	1500	4KV

Dimensions	mm	Drawing	.stp file Download
A max	17.5		
B max	9.7		
H max	21.0		
C typ (∅)	5.0		
X typ	12.7		
L min	3.0		
D typ (∅)	0.8		



<sup>1</sup> Accuracy range 5...120% of "Nom Input Current". Currents up to "Max Input Current" x 1.2 can be applied continuously.

Low current range measurement: it is suggested to increase primary turns number. It reduce proportionally Max/Nom input current and preserve the accuracy typical curves.

<sup>2</sup> The accuracy class above indicated means that the linearity and phase shift errors are within the tolerances defined on tab.201 of IEC 61869-2, tested at 50Hz-20°C ambient temperature. The standard has not been fully applied since these items are designed as components of electronic equipment.

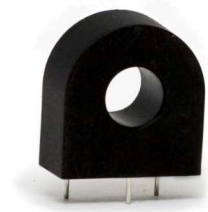
<sup>3</sup> Burden resistor values different than suggested values can be applied. It will affect Max/Nom current, output voltage and precision. See the typical graphs for reference.

<sup>4</sup> Between sec pins/primary hole internal surface.

<sup>nb</sup> The necessary tests and verifications of compliance with the technical and safety standard requirements have to be verified by the customer.

## SBT series - 50/60Hz current sensor - 106A

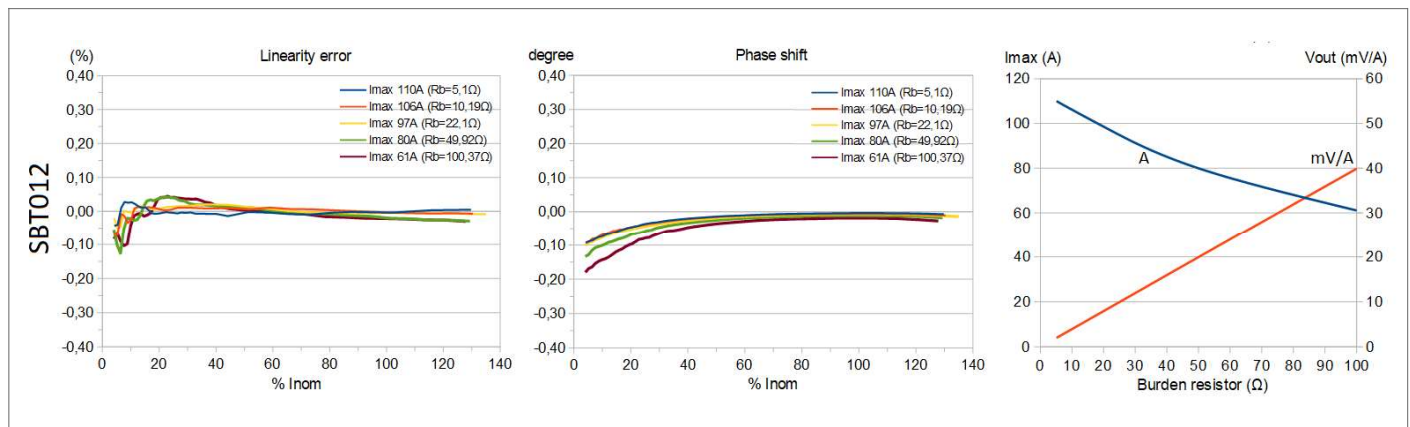
- Very high precision 50/60Hz current measuring transformers
- High output signal level to reduce noise-signal ratio
- High repeatability, actual curves close to typical
- Encapsulated in UL94/V-0 epoxy resin
- High insulation between primary/secondary
- Custom versions on request



## 106A

Code	Max Input Current <sup>1</sup>	Nom Input Current <sup>1</sup>	Accuracy Class <sup>2</sup>	Burden resistor <sup>3</sup>	Sec. turns	Dielectric strength <sup>4</sup>
SBT012	106A	88.3A	0.1	10 Ω	2500	4KV

Dimensions	mm	Drawing	.stp file Download
A max	24.3		
B max	11.7		
H max	25.5		
C typ (∅)	9.5		
X typ	15.24		
X1 typ	7.62		
Y typ	7.62		
L min	3.5		
D typ (∅)	0.8	<p>Pin 3 only for mechanical connection</p>	



<sup>1</sup> Accuracy range 5...120% of "Nom Input Current". Currents up to "Max Input Current" x 1.2 can be applied continuously.

Low current range measurement: it is suggested to increase primary turns number. It reduce proportionally Max/Nom input current and preserve the accuracy typical curves.

<sup>2</sup> The accuracy class above indicated means that the linearity and phase shift errors are within the tolerances defined on tab.201 of IEC 61869-2, tested at 50Hz-20°C ambient temperature. The standard has not been fully applied since these items are designed as components of electronic equipment..

<sup>3</sup> Burden resistor values different than suggested values can be applied. It will affect Max/Nom current, output voltage and precision. See the typical graphs for reference.

<sup>4</sup> Between sec pins/primary hole internal surface.

<sup>nb</sup> The necessary tests and verifications of compliance with the technical and safety standard requirements have to be verified by the customer.



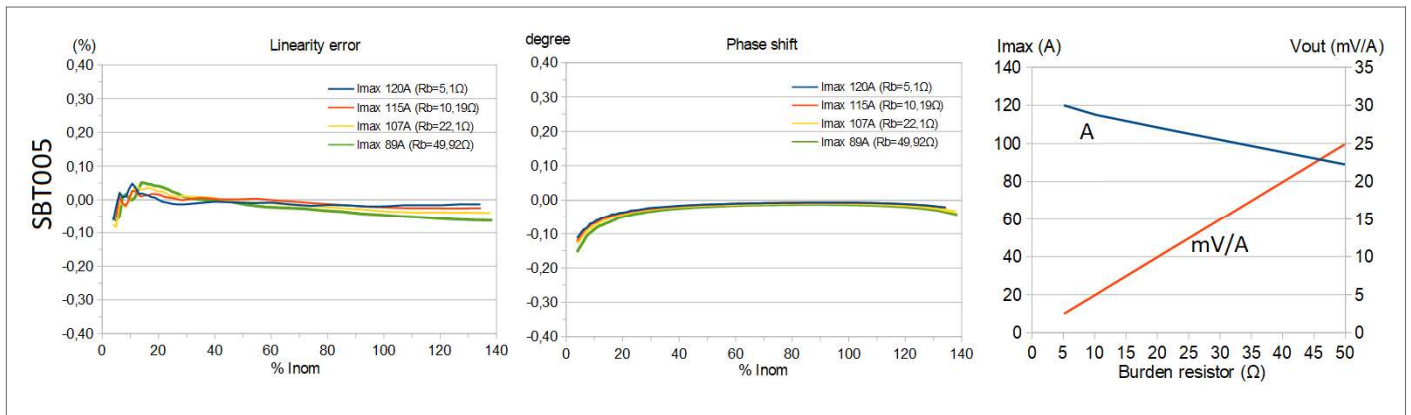
- Very high precision 50/60Hz current measuring transformers
- High output signal level to reduce noise-signal ratio
- High repeatability, actual curves close to typical
- Encapsulated in UL94/V-0 epoxy resin
- High insulation between primary/secondary
- Custom versions on request



## 120A

Code	Max Input Current <sup>1</sup>	Nom Input Current <sup>1</sup>	Accuracy Class <sup>2</sup>	Burden resistor <sup>3</sup>	Sec. turns	Dielectric strength <sup>4</sup>
SBT005	120A	100A	0.1	5 Ω	2000	4KV

Dimensions	mm	Drawing	.stp file Download
A max	24.8		
B max	13.0		
H max	25.4		
C typ (∅)	9.5		
X typ	14.8		
X1 typ	19.0		
Y typ	11.0		
L min	3.5		
D typ (∅)	1.0		



<sup>1</sup> Accuracy range 5...120% of "Nom Input Current". Currents up to "Max Input Current" x 1.2 can be applied continuously.

Low current range measurement: it is suggested to increase primary turns number. It reduce proportionally Max/Nom input current and preserve the accuracy typical curves.

<sup>2</sup> The accuracy class above indicated means that the linearity and phase shift errors are within the tolerances defined on tab.201 of IEC 61869-2, tested at 50Hz-20°C ambient temperature. The standard has not been fully applied since these items are designed as components of electronic equipment.

<sup>3</sup> Burden resistor values different than suggested values can be applied. It will affect Max/Nom current, output voltage and precision. See the typical graphs for reference.

<sup>4</sup> Between sec pins/primary hole internal surface.

<sup>nb</sup> The necessary tests and verifications of compliance with the technical and safety standard requirements have to be verified by the customer.

## SBT series - 50/60Hz current sensor - 46A

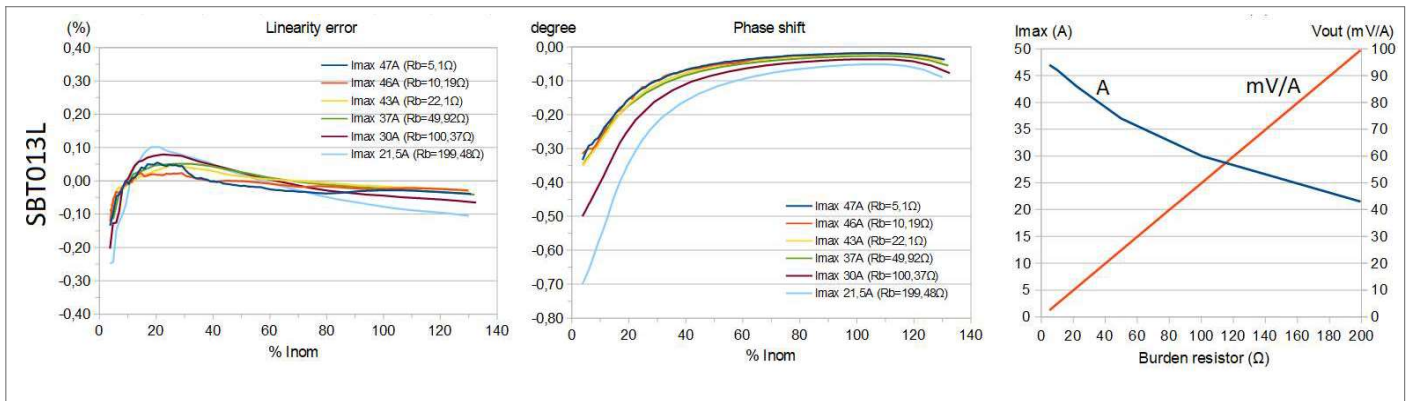
- High precision 50/60Hz leaded current measuring transformers
- Encapsulated in UL94/V-0 epoxy resin
- High insulation between primary/secondary
- Custom versions on request



## 46A

Code	Max Input Current <sup>1</sup>	Nom Input Current <sup>1</sup>	Accuracy Class <sup>2</sup>	Burden resistor <sup>3</sup>	Sec. turns	Dielectric strength <sup>4</sup>
SBT013L	46A	38.3A	0.5	10 Ω	2000	4KV

Dimensions	mm	Drawing	.stp file Download
A max	23.0		
B max	10.4		
H max	26.5		
C typ (Ø)	8.9		
L typ	105.0		



<sup>1</sup> Accuracy range 5...120% of "Nom Input Current". Currents up to "Max Input Current" x 1.2 can be applied continuously.

Low current range measurement: it is suggested to increase primary turns number. It reduce proportionally Max/Nom input current and preserve the accuracy typical curves.

<sup>2</sup> The accuracy class above indicated means that the linearity and phase shift errors are within the tolerances defined on tab.201 of IEC 61869-2, tested at 50Hz-20°C ambient temperature. The standard has not been fully applied since these items are designed as components of electronic equipment.

<sup>3</sup> Burden resistor values different than suggested values can be applied. It will affect Max/Nom current, output voltage and precision. See the typical graphs for reference.

<sup>4</sup> Between sec pins/primary hole internal surface.

<sup>nb</sup> The necessary tests and verifications of compliance with the technical and safety standard requirements have to be verified by the customer.

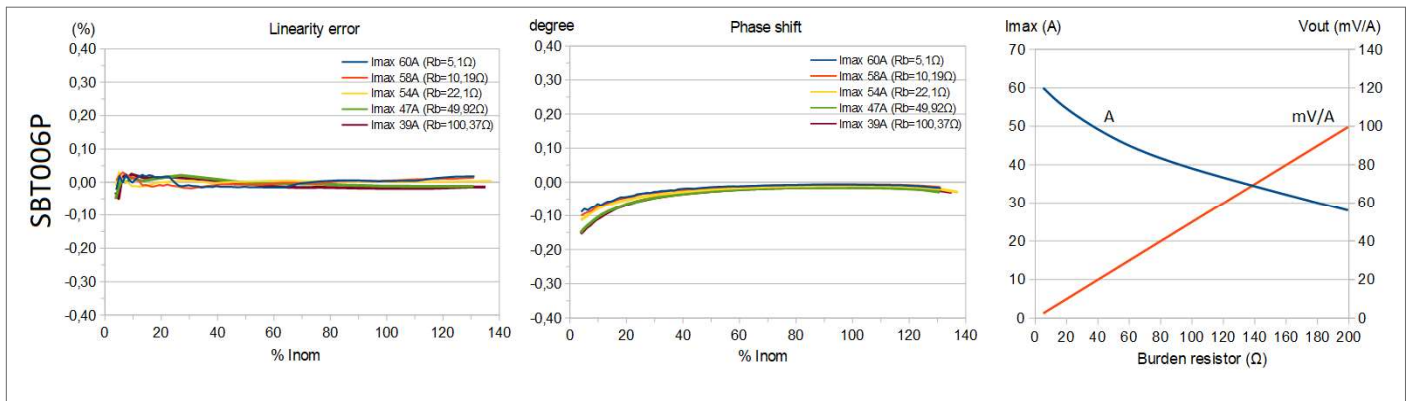
- High precision 50/60Hz current measuring transformers
- Built-in single-turn primary with very low DCR
- Encapsulated in UL94/V-0 epoxy resin
- High insulation between primary/secondary
- Custom versions on request



## 58A

Code	Max Input Current <sup>1</sup>	Nom Input Current <sup>1</sup>	Accuracy Class <sup>2</sup>	Burden resistor <sup>3</sup>	Sec. turns	Dielectric strength <sup>4</sup>
SBT006P	58A	48.3A	0.2	10 Ω	2000	3KV

Dimensions	mm	Drawing	.stp file Download	Trise
A max	25.8			
B max	18.5			
H max	20.5			
X typ	19.0			
X1 typ	6.0			
Y typ	9.0			
Y1 typ	2.0			
L min	2.5			
D typ (∅)	3.5			
D1 typ (∅)	0.8			



<sup>1</sup> Accuracy range 5...120% of "Nom Input Current". Currents up to "Max Input Current" x 1.2 can be applied continuously.

Low current range measurement: it is suggested to increase primary turns number. It reduce proportionally Max/Nom input current and preserve the accuracy typical curves.

<sup>2</sup> The accuracy class above indicated means that the linearity and phase shift errors are within the tolerances defined on tab.201 of IEC 61869-2, tested at 50Hz-20°C ambient temperature. The standard has not been fully applied since these items are designed as components of electronic equipment.

<sup>3</sup> Burden resistor values different than suggested values can be applied. It will affect Max/Nom current, output voltage and precision. See the typical graphs for reference.

<sup>4</sup> Between sec pins/primary hole internal surface.

<sup>nb</sup> The necessary tests and verifications of compliance with the technical and safety standard requirements have to be verified by the customer.



## SDL series - 50/60Hz split core current sensor 70A - 110A

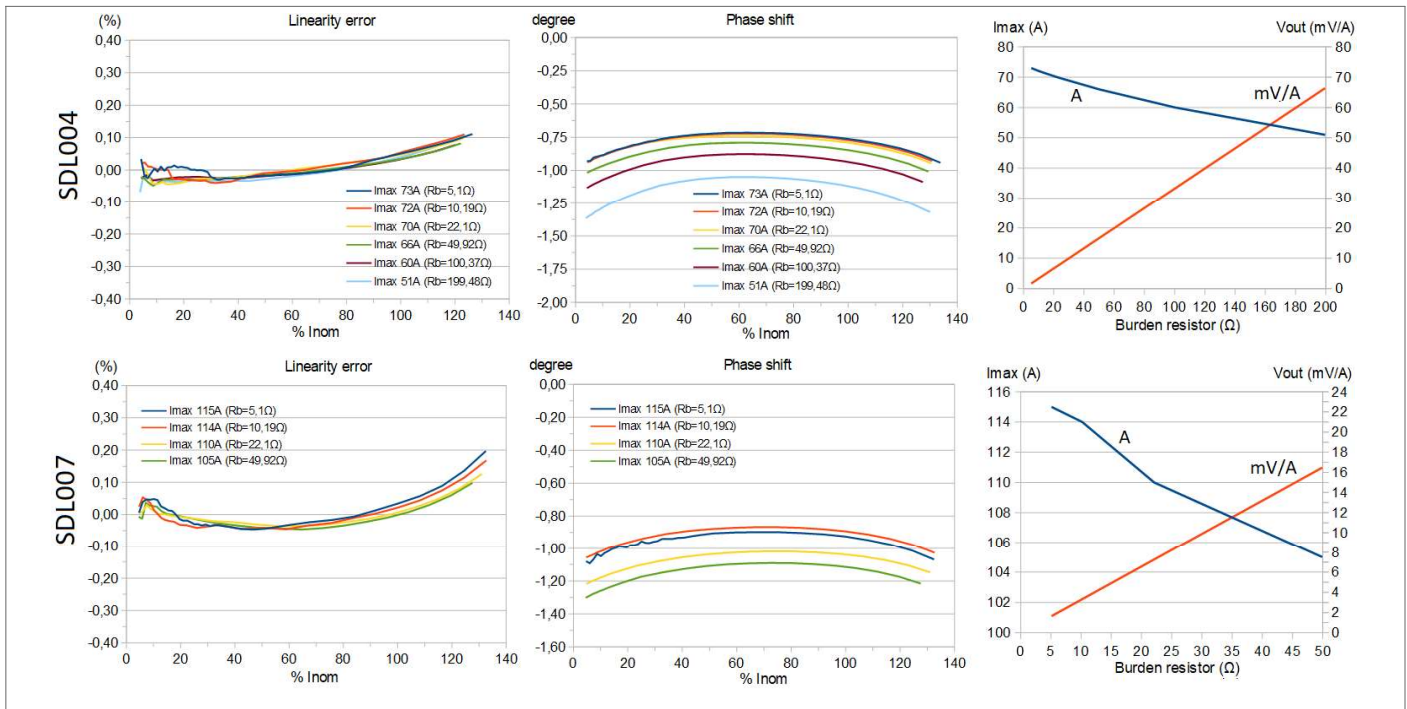
- High precision 50/60Hz split core current measuring transformers
- High output signal level to reduce noise-signal ratio
- High repeatability
- High insulation between primary/secondary



## 70A - 110A

Code	Max Input Current	Typ Linearity error <sup>1</sup>	Max Linearity error	Burden resistor <sup>2</sup>	Sec Turns	Dielectric strength <sup>3</sup>	.stp file Download
SDL004	70A	< 0.15%	0.25%	22Ω	3000	1KV	
SDL007	110A	< 0.15%	0.25%	22Ω	3000	1.5KV	

Dimensions mm	SDL004	SDL007	Drawing
A max	30.2	37.0	
B max	26.7	33.0	
H max	42.6	47.5	
C typ	9.3	16.0	
F typ	13.9	19.0	
G typ	8.3	8.3	
I typ	10.8	16.5	
L typ	1500	1500	



<sup>1</sup> Please note: cleaning the contact surfaces between the core halves before assembly will furtherly reduce the errors.

<sup>2</sup> Burden resistor values different than suggested values can be applied. It will affect Max/Nom current, output voltage and precision. See typical graphs for reference.

<sup>3</sup> Between sec leads/primary hole internal surface.

<sup>nb</sup> The errors are referred to tests executed at 50Hz-20°C ambient temperature.

<sup>nb</sup> The necessary tests and verifications of compliance with the technical and safety standard requirements have to be verified by the customer.

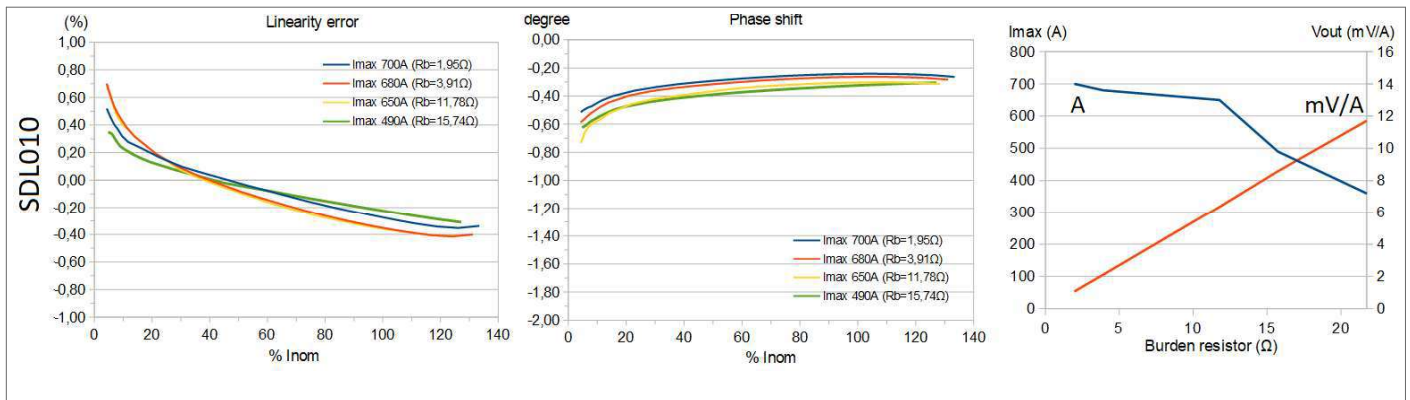
- High precision 50/60Hz split core current measuring transformers
- High output signal level to reduce noise-signal ratio
- High repeatability
- High insulation between primary/secondary



### 680A

Code	Max Input Current	Typ Linearity error	Max Linearity error	Burden resistor <sup>1</sup>	Sec Turns	Dielectric strength <sup>2</sup>	.stp file Download
SDL010	680A	< 0.95%	1.15%	3.9Ω	2000	2KV	

Dimensions	mm	Drawing
A max	53.8	
B max	44.9	
H max	71.9	
C typ	24.2	
F typ	18.2	
G typ	11.1	
I typ	24.2	
L typ	200	



<sup>1</sup> Burden resistor values different than suggested values can be applied. It will affect Max/Nom current, output voltage and precision. See typical graphs for reference.

<sup>2</sup> Between sec leads/primary hole internal surface.

<sup>nb</sup> The errors are referred to tests executed at 50Hz-20°C ambient temperature.

<sup>nb</sup> The necessary tests and verifications of compliance with the technical and safety standard requirements have to be verified by the customer.

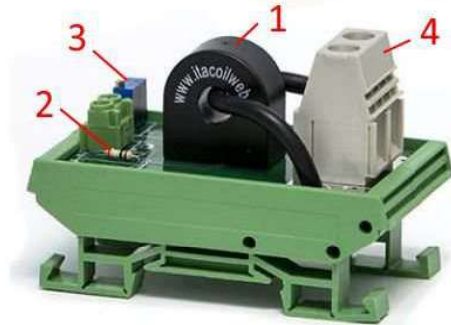
SBT and SDL DIN rail mount EN60715 - 35/7,5mm - up to 680A

- Easy assembly precision current sensor for electric panels
- Flying cable or screw terminal primary versions
- Screw terminal output signal
- Various versions, up to 680A<sup>1</sup>



## Available options

- (1) Any current sensor of SBT and SDL series (see following table)
- (2) Burden resistor value and tolerance on request
- (3) Single-turn or multi-turn trimmer on request for on-site gain adjustment
- (4) Input circuit with 10A<sub>rms</sub> max screw terminals, 50A<sub>rms</sub> max screw terminals<sup>2</sup> or no screw terminals (free current sensor hole)<sup>3</sup>



Example of the version with SBT current sensor, 1 turn primary with 50A current screw terminal, gain adjustment trimmer

## Dimensions

	mm	Drawing	
A max	85.0		
B max	47.0		
H max	Depending on the current sensor		

<sup>1</sup> Contact Us for more info or for inquiries

<sup>2</sup> Multiple primary turns can be necessary to preserve output signal level and precision with currents much lower than max.

<sup>3</sup> Option not available for input currents higher than 50A continuous.