

**K-No.:** 25104

**100 A Current Sensor Module**

 For the electronic measurement of currents:  
 DC, AC, pulsed, mixed ..., with a galvanic isolation  
 between the primary circuit (high power) and  
 the secondary circuit (electronic circuit)

**Date:** 18.05.2009

**Customer:** Standard Type

**Customer Part No.:**
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**Description**

- Closed loop (compensation)  
Current Sensor with magnetic field probe
- Printed circuit board mounting
- Casing and materials UL-listed

**Characteristics**

- Excellent accuracy
- Very low offset current
- Very low temperature dependency and offset current drift
- Very low hysteresis of offset current
- Short response time
- Wide frequency bandwidth
- Compact design

**Applications**

Mainly used for stationary operation in industrial applications:

- AC variabel speed drives and servo motor drives
- Static converters for DC motor drives
- Battery supplied applications
- Switched Mode Power Supplies (SMPS)
- Power Supplies for welding applications
- Uninterruptable Power Supplies (UPS)

**Electrical Data – Ratings**

$I_{PN}$	Primary rated current, r.m.s	100	A
$R_M$	Load resistance	0 ... 200	$\Omega$
$I_{SN}$	Output rated current, r.m.s	100	mA
$K_N$	Turns ratio	1 : 1000	

**Accuracy – Dynamic performance data** (with DRV401 @  $V_C = 5V \pm 5\%$ )

		min.	typ	max.	Unit
$I_{P,max}$	Max. measuring range @ $R_M = 1,563 \Omega$	$\pm 160$			A
$X(T)$	Measuring accuracy @ $I_{PN}, T_A = -40... +85^\circ C$			0.5	%
$\epsilon_L$	Linearity			0.1	%
$I_0(T)$	Offset current @ $I_P=0, T_A = -40... +85^\circ C$			0.01	mA
$I_{0H}$	Hysteresis		0.03	0.1	mA
$t_r$	Response time		0.04	0.1	$\mu s$
$\Delta t(I_{p,max})$	Delay time at $di/dt = 100 A/\mu s$		1		$\mu s$
f	Frequency range	DC...100			kHz

**General Data**

		min.	typ.	max.	Unit
$T_A$	Ambient temperature	-40		+85	$^\circ C$
$T_S$	Storage temperature	-40		+85	$^\circ C$
m	Mass		32		g
$R_S$	Secondary coil resistance @ $T_A=85^\circ C$			24	$\Omega$
$C_k$	Coupling capacity		10		pF
	Mechanical Stress according to M3209/3 Settings: 10 – 2000 Hz, 1 min/Decade, 2 hours			20g	
	Constructed and manufactured and tested in accordance with EN 61800-5-1 (Pin 1 – 4 to inner hole) Reinforced insulation, Insulation material group 1, Pollution degree 2, Overvoltage category 3				
$S_{clear}$	clearance (component without solder pad)	12			mm
$S_{creep}$	creepage (component without solder pad)	14			mm
$V_{sys}$	System voltage overvoltage category 3	RMS		600	V
$V_{work}$	Working voltage (table 7 acc. to EN61800-5-1)	RMS		1400	V
$U_{PD}$	Rated discharge voltage	peak value		1508	V

**Type Testing** according to EN 61800-5-1 (Pin 1 – 4 to inner hole)

$V_W$	HV transient test according to M3064 (1,2 $\mu s$ / 50 $\mu s$ -wave form)			8	kV
$V_d$	High voltage test acc. to M3014 (RMS)		(5 s)	3.6	kV
$V_e$	Partial discharge voltage test acc. to M3024 (RMS) with $V_{vor}$ (RMS)			1600	V
				2000	V

Datum	Name	Index	Änderung
18.05.09	Le	81	Mechanical outline: gluing not applicable. AA-592 Inspection M3014: write error changed.

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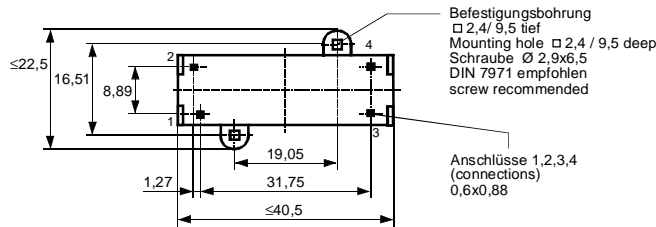
Customer Part No.:

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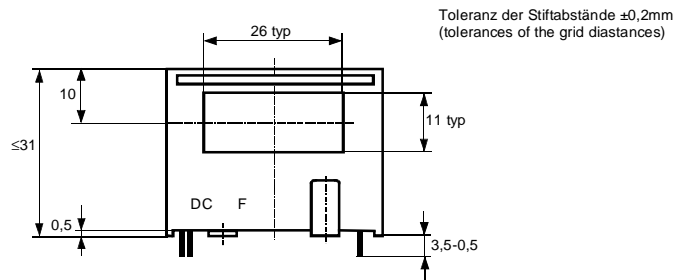
**Mechanical outline (mm):**

General tolerances DIN ISO 2768-c

Connections:

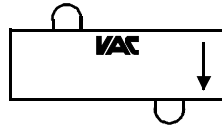


1..4: 0,6x0,88 mm



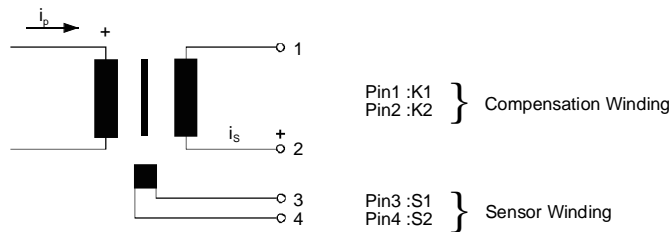
Marking:

**VAC**  
 4645X060  
 F DC



DC=Date Code  
 F=Factory

**Schematic diagram**



**Inspection** (Measurements after temperature balance of the samples at room temperature.)

$K_N$ (N1/N2)	(V)	M3011/6c:	Turns ratio ( $I_p=100A, 40...80$ Hz)	$=1 : 1000 \pm 0.5$	%
$I_0$		M3226:	Offset current	$< 0.1$	mA
$\Delta\Phi$ (K1-K2)	(V)	M3090:	Magnetic Flux compensation core	23.7...27	nVs
$\Delta\Phi$ (S1-S2)	(V)	M3090:	Magnetic Flux sensor	20...35	nVs
$R_S$ (K1-K2)	(V)	M3011/5:	Winding resistance compensation coil	15...18.5	$\Omega$
R (S1-S2)	(V)	M3011/5:	Winding resistance magnetic probe coil	2.5...3.5	$\Omega$
$V_d$	(V)	M3014:	Testing voltage, rms, 1s (Pin 1 – 4 to inner hole)	1.8	kV
$V_e$	(AQL1/S4)	M3024:	Partial discharge voltage (RMS) with $V_{vor}$ (RMS)	1600	V
				2000	V

**Applicable documents**

Current direction: A positive output current appears at point  $I_s$ , by primary current in direction of the arrow.  
 Temperature of the primary conductor should not exceed 110°C  
 Housing and bobbin material: UL-listed. Flammability class UL 94V-0.  
 Enclosures according to IEC 60529: IP50.

Additional data available on request.  
 This specification is no declaration of warranty acc. BGB §443.

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**Explanation of several of the terms used in the tablets (in alphabetical order)**

- $I_{0H}$ : Zero variation of  $I_0$  after overloading with a DC of tenfold the rated value ( $R_M = R_{MN}$ )
- $I_{0t}$ : Long term drift of  $I_0$  after 100 temperature cycles in the range -40 bis 85 °C.
- $t_r$ : Response time (describe the dynamic performance for the specified measurement range), measured as delay time at  $I_P = 0,9 \cdot I_{Pmax}$  between a rectangular current and the output current.
- $\Delta t (I_{Pmax})$ : Delay time (describe the dynamic performance for the rapid current pulse rate e.g short circuit current) measured between  $I_{Pmax}$  and the output current  $i_a$  with a primary current rise of  $di_1/dt = 100 A/\mu s$ .
- $U_{PD}$  Rated discharge voltage (recurring peak voltage separated by the insulation) proved with a sinusoidal voltage  $V_e$   
 $U_{PD} = \sqrt{2} \cdot V_e / 1,5$
- $V_{vor}$  Defined voltage is the RMS valve of a sinusoidal voltage with peak value of  $1,875 \cdot U_{PD}$  required for partial discharge test in IEC 61800-5-1  
 $V_{vor} = 1,875 \cdot U_{PD} / \sqrt{2}$
- $V_{sys}$  System voltage RMS value of rated voltage according to IEC 61800-5-1
- $V_{work}$  Working voltage voltage according to IEC 61800-5-1 which occurs by design in a circuit or across insulation
- $X_{ges}(I_{PN})$ : The sum of all possible errors over the temperature range by measuring a current  $I_{PN}$ :  

$$X_{ges} = 100 \cdot \left| \frac{I_S(I_{PN})}{K_N \cdot I_{PN}} - 1 \right| \%$$
- $X$ : Permissible measurement error in the final inspection at RT, defined by  

$$X = 100 \cdot \left| \frac{I_{SB}}{I_{SN}} - 1 \right| \%$$
where  $I_{SB}$  is the output DC value of an input DC current of the same magnitude as the (positive) rated current ( $I_0 = 0$ )
- $X_{Ti}$ : Temperature drift of the rated value orientated output term.  $I_{SN}$  (cf. Notes on  $F_i$ ) in a specified temperature range, obtained by:  

$$X_{Ti} = 100 \cdot \left| \frac{I_{SB}(T_{A2}) - I_{SB}(T_{A1})}{I_{SN}} \right| \%$$
- $\epsilon_L$ : Linearity fault defined by  $e_L = 100 \cdot \left| \frac{I_P}{I_{PN}} - \frac{I_{Sx}}{I_{SN}} \right| \%$   
Where  $I_P$  is any input DC and  $I_{Sx}$  the corresponding output term.  $I_{SN}$ : see notes of  $F_i$  ( $I_0 = 0$ ).

**This "Additional information" is no declaration of warranty according BGB §443.**

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