

**K-No.:** 25102

**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:** 14.11.2007

**Customer:** Standard Type

**Customers 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 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 @ $R_M = 12,5 \Omega$	$\pm 230$			A
$X(T)$	Measuring accuracy @ $I_{PN}, T_A = -40... +85^\circ C$			0.5	%
$\epsilon_L$	Linearity			0.1	%
$I_o(T)$	Offset current @ $I_p=0, T_A = -40... +85^\circ C$		0.02	0.1	mA
$I_{oH}$	Hysteresis		0.06	0.1	mA
$t_r$	Response time		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		+90	$^\circ C$
m	Mass		18		g
$R_S$	Secondary coil resistance @ $T_A=85^\circ C$			14	$\Omega$
$C_k$	Coupling capacity		6		pF

 Mechanical Stress according to M3209/3  
 Settings: 10 – 2000 Hz, 1 min/Decade, 2 hours

Constructed and manufactured and tested in accordance with EN 61800-5-1 (primary to secondary)

Reinforced insulation, Insulation material group 1, Pollution degree 2

$S_{clear}$	clearance (component without solder pad)	12			mm
$S_{creep}$	creepage (component without solder pad)	12			mm
$V_{sys}$	System voltage overvoltage category 3	RMS		600	V
$V_{work}$	Working voltage (table 7 acc. to EN61800-5-1)	RMS		1000	V
$U_{PD}$	Rated discharge voltage	peak value		1225	V

**Type Testing** according EN 61800-5-1 (primary to secondary)

$V_W$	HV transient test according to M3064 (1,2 $\mu s$ / 50 $\mu s$ -wave form)			8	kV
$V_d$	Testing voltage to M3014		(5 s)	3.6	kV
$V_e$	Partial discharge voltage acc.M3024 (RMS) with $V_{vor}$ (RMS)			1300	V
				1625	V

Datum	Name	Index	Änderung
		81	

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 editor

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 designer

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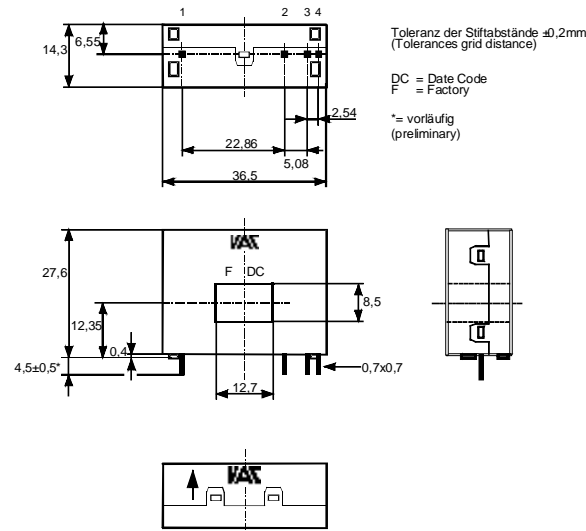
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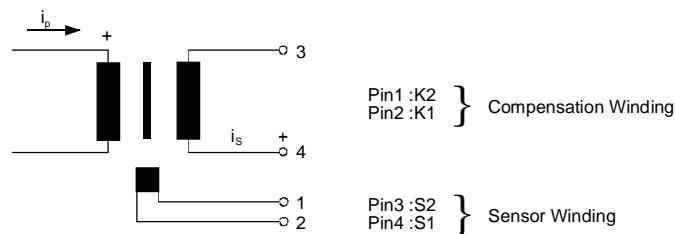
**Mechanical outline (mm):**

General tolerances DIN ISO 2768-c


**Connections:**

 1...6:  $\varnothing$  1 mm  
 7..10: 0,46\*0,46 mm

**Marking:**
  
 4645X100  
 F DC

**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	6...8	nVs
$\Delta\Phi$ (S1-S2)	(V)	M3090:	Magnetic Flux sensor	20...35	nVs
$R_S$ (K1-K2)	(V)	M3011/5:	Winding resistance compensation coil	8.5...10,5	$\Omega$
$R$ (S1-S2)	(V)	M3011/5:	Winding resistance magnetic probe coil	2.5...3.5	$\Omega$
$V_d$	(V)	M3014:	Testing voltage, rms, 1s primary to secondary	1,8	kV
$V_e$	(AQL1/S4)	M3024:	Partial discharge voltage (RMS) with $V_{vor}$ (RMS)	>1300 1625	V 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  $I_o$  after overloading with a DC of tenfold the rated value ( $R_M = R_{MN}$ )

 **$I_{0t}$ :** Long term drift of  $I_o$  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  $di/dt = 100 \text{ A}/\mu\text{s}$ .

 **$U_{PD}$**  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 value 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  $I_{PN}$ :

$$X_{ges} = 100 \cdot \left| \frac{I_S(I_{PN})}{K_N \cdot I_{SN}} - 1 \right| \%$$

 **$X$ :** 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 ( $I_o = 0$ )

 **$X_{Ti}$ :** 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  $F_i$  ( $I_o = 0$ ).

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