

K-No.: 25099

1 ... 50A 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: 02.10.2007

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 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	25	A
R_M	Load resistance	0 ... 200	Ω
I_{SN}	Output rated current, r.m.s	12.5	mA
K_N	Turns ratio	1...3 : 2000	

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

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range @ $R_M = 12,5 \Omega$	± 85			A
$X(T)$	Measuring accuracy @ $I_{PN}, T_A = -40... +85^\circ C$			0.5	%
ϵ_L	Linearity			0.1	%
$I_o(T)$	Offset current @ $I_P=0, T_A = -40... +85^\circ C$		0.02	0.05	mA
I_{oH}	Hysteresis		0.02	0.05	mA
t_r	Response time		0.3		μs
$\Delta t(I_{p,max})$	Delay time at $di/dt = 100 A/\mu s$		0.2		μs
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		12		g
R_S	Secondary coil resistance @ $T_A=85^\circ C$			67	Ω
R_P	Primary coil resistance per turn @ $T_A=25^\circ C$		1		m Ω
C_k	Coupling capacity		5		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 (Pin 1 - 6 to Pin 7 - 10)

Reinforced insulation, Insulation material group 1, Pollution degree 2

S_{clear}	clearance (component without solder pad)	7			mm
S_{creep}	creepage (component without solder pad)	7			mm
V_{sys}	System voltage overvoltage category 3	RMS		300	V
V_{work}	Working voltage (table 7 acc. to EN61800-5-1)	RMS		650	V
U_{PD}	Rated discharge voltage	peak value		1320	V

Type Testing according to EN 61800-5-1 (Pin 1 - 6 to Pin 7 - 10)

V_W	HV transient test according to M3064 (1,2 μs / 50 μs -wave form)			6	kV
V_d	Testing voltage to M3014		(5 s)	3	kV
V_e	Partial discharge voltage acc.M3024 (RMS) with V_{vor} (RMS)			1400	V
				1750	V

Datum	Name	Index	Änderung
		81	

 Hrsg.: KB-E
 editor

 Bearb.: SA
 designer

 KB-E: Le
 check

 KB-PM: KRe.
 check

 freig.: Heu.
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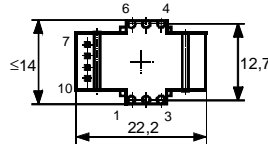
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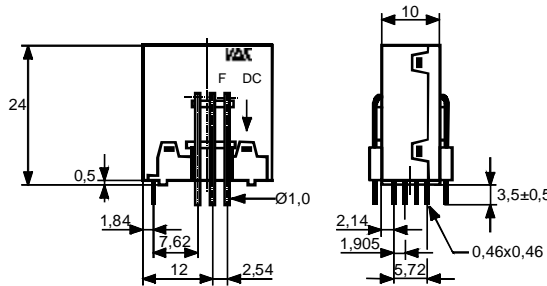
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Mechanical outline (mm):

General tolerances DIN ISO 2768-c



Toleranz der Stiftabstände
±0,2 mm
(Tolerances grid distance)



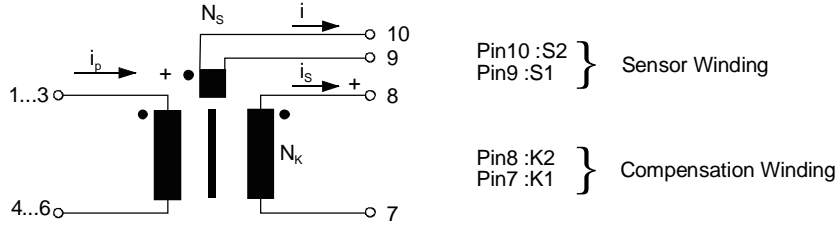
DC = Date Code
F = Factory

Connections:
1...6: Ø 1 mm
7..10: 0,46*0,46 mm

Marking:

VAC
4645X600
F DC

Schematic diagram



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

K_N (N1/N2)	(V)	M3011/6c:	Turns ratio ($I_p=3*8A$, 40...80 Hz)	3 : 2000 ± 0,5	%
I_0		M3226:	Offset current	< 0.05	mA
$\Delta\Phi$ (K1-K2)	(V)	M3090:	Magnetic Flux compensation core	4,5...7	nVs
$\Delta\Phi$ (S1-S2)	(V)	M3090:	Magnetic Flux sensor	20...35	nVs
R_S (K1-K2)	(V)	M3011/5:	Winding resistance compensation coil	44...52,5	Ω
R (S1-S2)	(V)	M3011/5:	Winding resistance magnetic probe coil	2.3...3.0	Ω
V_d	(V)	M3014:	Testing voltage, rms, 1s Pin 1 - 6 to Pin 7 - 10	1,5	kV
V_e	(AQL1/S4)	M3024:	Partial discharge voltage (RMS) with V_{vor} (RMS)	>1400 1750	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 I₀ after overloading with a DC of tenfold the rated value (R_M = R_{MN})
- I_{0t}:** Long term drift of I₀ 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 · I_{Pmax} between a rectangular current and the output current.
- Δt (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 di₁/dt = 100 A/μs.
- 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 * 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 (I₀ = 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:

$$X_{Ti} = 100 \cdot \left| \frac{I_{SB}(T_{A2}) - I_{SB}(T_{A1})}{I_{SN}} \right| \%$$
- ε_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 (I₀ = 0).

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