VACUUMSCHMELZE	**SPECIFICATION**	**Item no.:**	**T60404-N4644-X101**

K-no.:	**50 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: 24.02.2014
Customer: Standard type	Customers Part no.:	Page 1 of 2

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
- Low 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 Supllies (UPS)

Electrical data - Ratings

I_{PN}	Primary nominal r.m.s. current	50	A
R_M	Measuring resistance	15 ... 200	Ω
I_{SN}	Secondary nominal r.m.s. current	25	mA
K_N	Turns ratio	1 : 2000	

Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range @ R_M=15 Ω	-165		+165	A
X*	Accuracy @ I_{PN}, T_A= 25°C		0,1	0,5	%
ε_L	Linearity			0,1	%
I_0*	Offset current @ I_P=0, T_A= 25°C		0,02	0,05	mA
t_r	Response time			3	µs
Δt ($I_{P,max}$)	Delay time at di/dt = 100 A/µs			1	µs
f	Frequency bandwidth	DC...100			kHz

General data

		min.	typ.	max.	Unit
T_A	Ambient operating temperature	-40		+85	°C
T_S	Ambient storage temperature	-40		+85	°C
m	Mass			30	g
V_C	Supply voltage	±14,25	±15	±15,75	V
I_C	Current consumption			18	mA
V_b	Rated voltage acc. to EN50178				
	Reinforced insulation				
	Insulation material group 1, Pollution degree 2,				
	Rated voltage: Mains supply (effective)		600	V	
	Non Mains supply (DC)		800	V	
	Creepage and clearance distance		8	mm	

Max.duration of peak currents at definied temperatures

T_A	50	70	85	°C
I_P	120	100	50	A
$I_{P,max}$	165	165	160	A
R_M	15	15	20	Ω

All data marked with * is verified by final inspection, other values are typetested.

Date	Name	Isuue	Amendment
24.02.14	KRe.	84	Marking changed acc to UL. 4644X101 ➔ 4644-X101. CN-848
07.08.13	KRe.	84	Mechancial outline: marking with UL-sign. CN-635

Hrsg.: KB-E editor	Bearb: Le. designer		KB-PM: KRe. check			freig.: HS released

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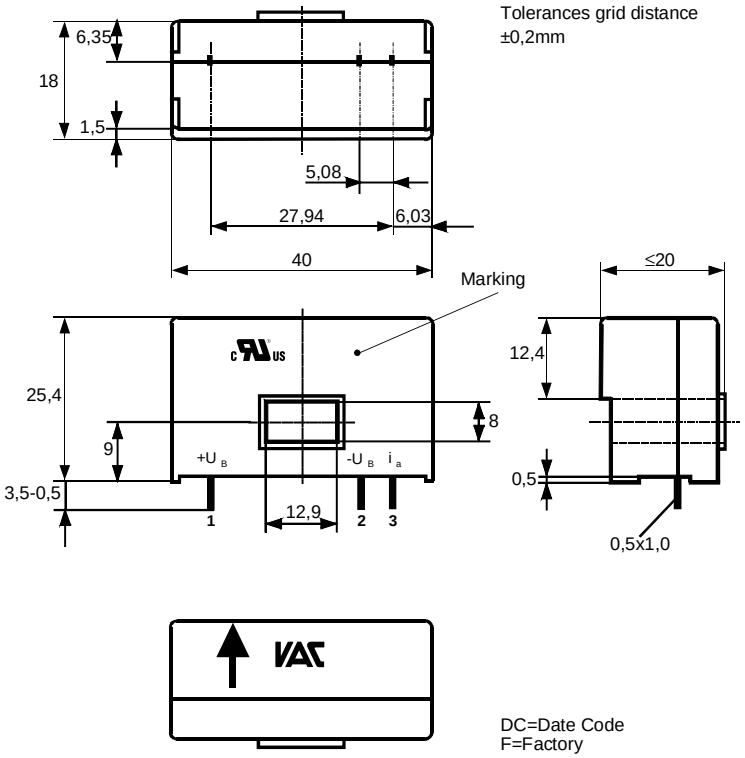
Mechanical outline (mm): General tolerances DIN ISO 2768-c

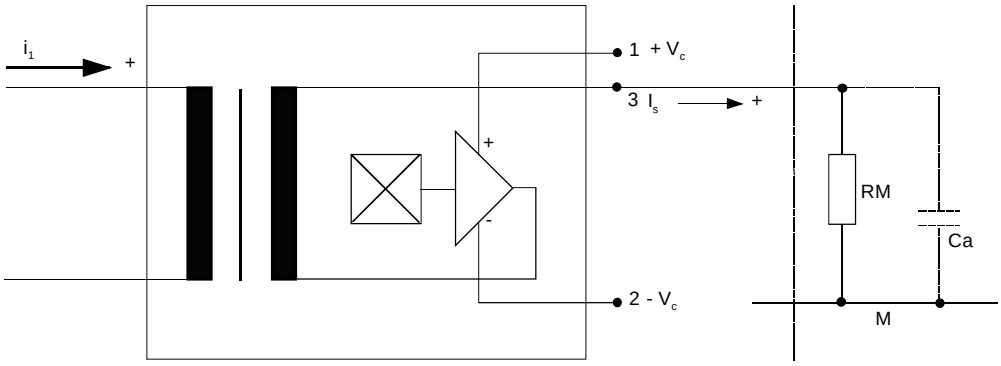
Connections:

Marking:

UL-sign
4644-X101
F DC



Schematic diagram



Additional indications are obtainable on request.
This specification is no declaration of warranty acc. BGB §443 dar.

Hrsg.: KB-E editor	Bearb: Le. designer		KB-PM: KRe. check			freig.: HS released

VACUUMSCHMELZE	**Additional Information**	**Item No.:** **T60404-N4644-X101**

K-No.:	**50 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	Date: 24.02.2014
Customer:	Customers Part No.:	Page 1 of 3

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Electrical Data

		min.	typ.	max.	Unit
V_{Ctot}	Maximum supply voltage (without function)			±18	V
R_S	Secondary coil resistance @ T_A=85°C			120	Ω
X_{Ti}	Temperature drift of X @ T_A = -40 ... +85 °C			0,1	%
I_{0ges}	Offset current (including I_0, I_{0t}, I_{0T})			0,05	mA
I_{0t}	Offset current drift I_0			0,05	mA
I_{0T}	Offset current temperature drift I_0 @ T_A = -40 ...+85°C			0,05	mA
I_{0H}	Hyteresis current @ I_P=0, caused by primary current 3 x I_{PN}			0,075	mA
i_{oss}	Offest ripple			1	mA
$\Delta I_0/\Delta V_C$	Supply voltage rejection ratio			0,01	mA/V
C_k	Maximum possible coupling capacity primary – secondary			9	pF
	Mechanical Stress according to M3209/3 Settings: 10 – 2000 Hz, 1 min/Oktave, 2 hours			2g	

Inspection (Measurement after temperature balance of the samples at room temperature)

K_N (N1/N2)*	(V)	M3011/6:	Transformation ratio (I_1=5A, 40-80 Hz)	= 1 : 2000 ± 0,5	%
I_0*	(V)	M3226:	Offset current	< 0,05	mA
V_d *	(V)	M3014:	Test voltage, rms, 1s Pin 1 - 3 to Primary conductor	3	kV

Type Testing

HV transient test according to M3064 Pin 1 - 3 to Primary conductor	Settings :	$V_{d,max}$	= 8 kV		
		R_i	= 60 Ω		
		1,2 µs / 50 µs-waveform			
	3 in a cycle of t = 10 seconds with changing polarity				
Test voltage and partial discharge voltage according to M3024		V_d	= 4,4	kV	60s
Pin 1 - 3 to Primary conductor		V_e	≥ 1,0	kV	

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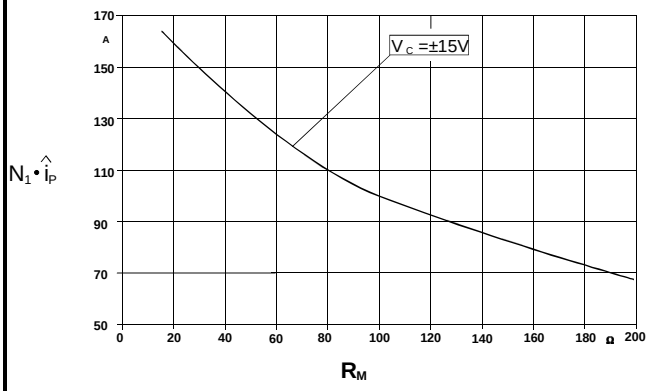
Datum	Name	Index	Änderung
24.02.14	KRe	84	Date updated. CN-848
07.08.13	KRe.	84	Applicable documents: UL-File E169271 added. VDE-registration cancelled. ÄA-635

Hrsg.: KB-E editor	Bearb: Le. designer		KB-PM: KRe. check			freig.: HS released

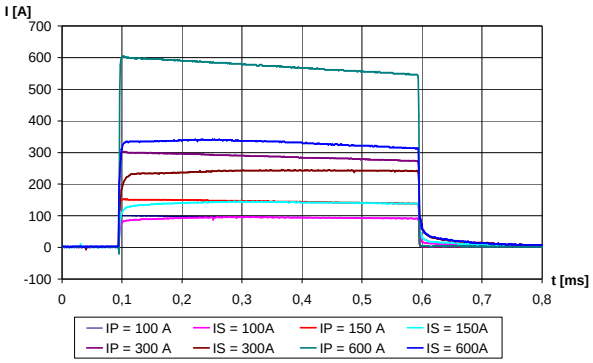
Limit curve of measurable current $\hat{I}_P(R_M)$

@ temperature of the component ≤ 85 °C turns ratio 1 : 2000



Maximum measuring range (µs-range)

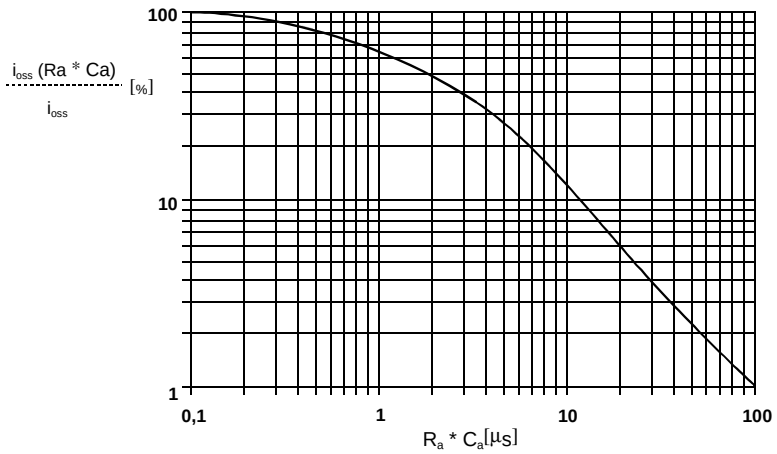
Pulse behaviour at pulse duration= 500µs



The value for Ip,max indicated in the Specification is valid for currents from a few ms on. For shorter duration (e.g. short circuit current) the currents are transformed directly and can therefore be higher than Ip,max. This will curtail the accuracy but can be used for kick-offs.

Example : Avariable Offset ripple reduction means a low pass

The offset ripple can be reduced by an external low pass. Therefore a capacitance C_a must be switched parallel to R_M. The diagram shows the remaining value of the offset ripple ($i_{oss}(R_M \cdot C_a)$) relative to the value without external capacitance (i_{oss}). In this case the response time is lengthened. It is calculated for :



$$t_r' \leq t_r + 2{,}5 \cdot R_M \cdot C_a \quad bzw. \quad f_g = \frac{1}{2\pi \cdot R_M \cdot C_a}$$

Applicable documents

Current direction: A positive output current appears at point I_S, by primary current in direction of the arrow.

Constructed, manufactored and tested in accordance with EN 50178 (VDE 0160) and agrees with the standards.

Enclosures according to IEC529: IP50.

UL - file E169271, category XORU2 (transformers, construction only - component), UL 508

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

$X_{ges}(I_{PN})$: 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} ist he output DC value of an input DC current of the same magnitude as the (positive) rated current ($I_o = 0$)

ε_L: Linearity fault defined by $\varepsilon_L = 100 \cdot \left| \frac{I_P}{I_{PN}} - \frac{I_{Sx}}{I_{SN}} \right|$

Where I_P is any input DC and I_{Sx} the corresponding output term. I_{SN}: see notes of F_i ($I_o = 0$).

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:

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

I_{0H}: Zero variation after overloading with a DC of fourfold 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, measured as delay time at $I_P = 0{,}9 \cdot I_{Pmax}$ between a rectangular current and the output current.

Δt (I_{Pmax}): Delay time between I_{Pmax} and the output current i_a with a primary current rise of $di_1/dt = 100$ A/µs.

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