

**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 Supplies (UPS)

**Electrical data - Ratings**

$I_{PN}$	Primary nominal r.m.s. current	50	A
$R_M$	Measuring resistance	15 ... 200	$\Omega$
$I_{SN}$	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 @ $R_M=15 \Omega$	-165		+165	A
$X^*$	Accuracy @ $I_{PN}, T_A=25^\circ C$		0,1	0,5	%
$\epsilon_L$	Linearity			0,1	%
$I_0^*$	Offset current @ $I_P=0, T_A=25^\circ C$		0,02	0,05	mA
$t_r$	Response time			3	$\mu s$
$\Delta t (I_{P,max})$	Delay time at $di/dt = 100 A/\mu s$			1	$\mu s$
$f$	Frequency bandwidth	DC...100			kHz

**General data**

		min.	typ.	max.	Unit
$T_A$	Ambient operating temperature	-40		+85	$^\circ C$
$T_S$	Ambient storage temperature	-40		+85	$^\circ C$
$m$	Mass			30	g
$V_C$	Supply voltage	$\pm 14,25$	$\pm 15$	$\pm 15,75$	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 defined temperatures**

$T_A$	50	70	85	$^\circ C$
$I_P$	120	100	50	A
$I_{P,max}$	165	165	160	A
$R_M$	15	15	20	$\Omega$

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

Date	Name	Issue	Amendment
24.02.14	KRe.	84	Marking changed acc to UL. 4644X101 → 4644-X101. CN-848
07.08.13	KRe.	84	Mechanical 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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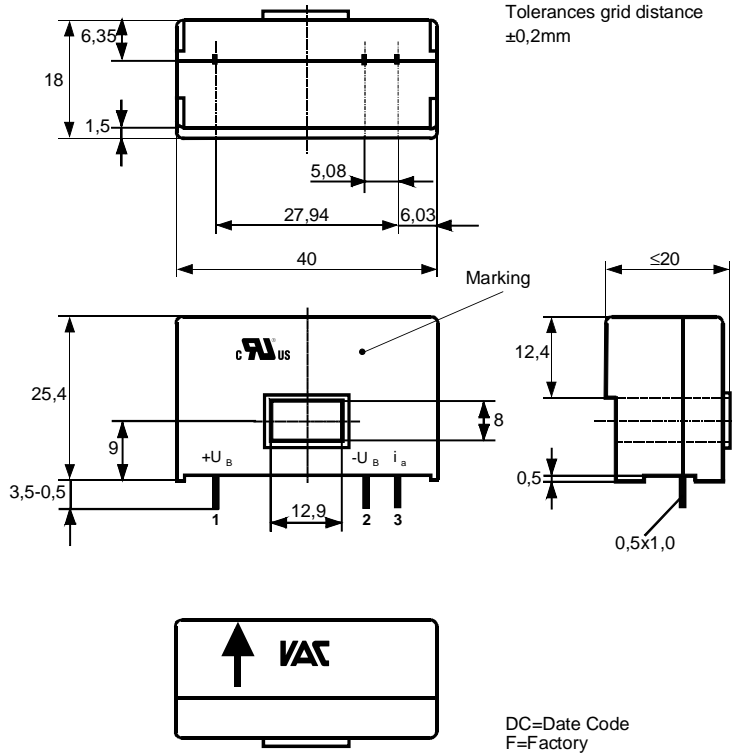
Customers Part no.:

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**Mechanical outline (mm):**

General tolerances DIN ISO 2768-c

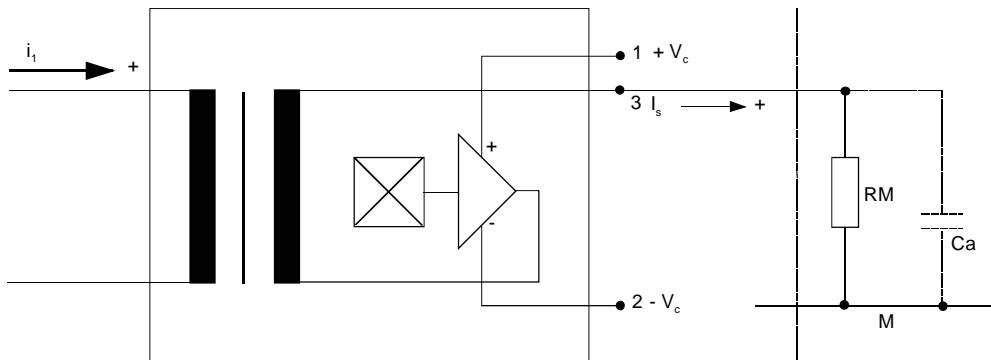
Connections:



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.

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**Electrical Data**

		min.	typ.	max.	Unit
$V_{Ctot}$	Maximum supply voltage (without function)			±18	V
$R_S$	Secondary coil resistance @ $T_A=85^\circ\text{C}$			120	$\Omega$
$X_{Ti}$	Temperature drift of X @ $T_A = -40 \dots +85^\circ\text{C}$			0,1	%
$I_{0ges}$	Offset current (including $I_0$ , $I_{0T}$ , $I_{0H}$ )			0,05	mA
$I_{0t}$	Offset current drift $I_0$			0,05	mA
$I_{0T}$	Offset current temperature drift $I_0$ @ $T_A = -40 \dots +85^\circ\text{C}$			0,05	mA
$I_{0H}$	Hysteresis current @ $I_P=0$ , caused by primary current $3 \times I_{PN}$			0,075	mA
$i_{oss}$	Offset 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**

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

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

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

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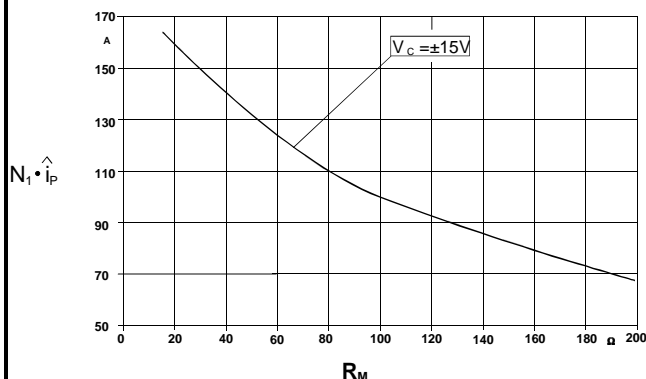
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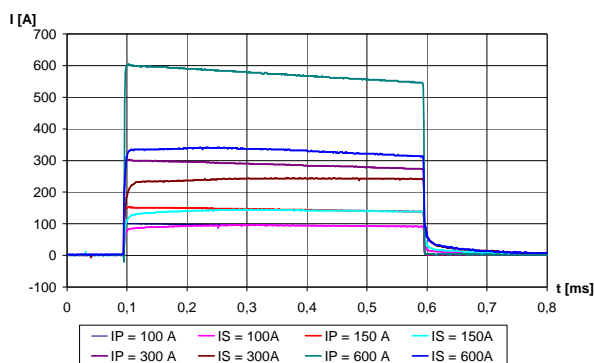
**Limit curve of measurable current  $\hat{I}_p(R_M)$**

@ temperature of the component  $\leq 85^\circ\text{C}$  turns ratio 1 : 2000



**Maximum measuring range (us-range)**

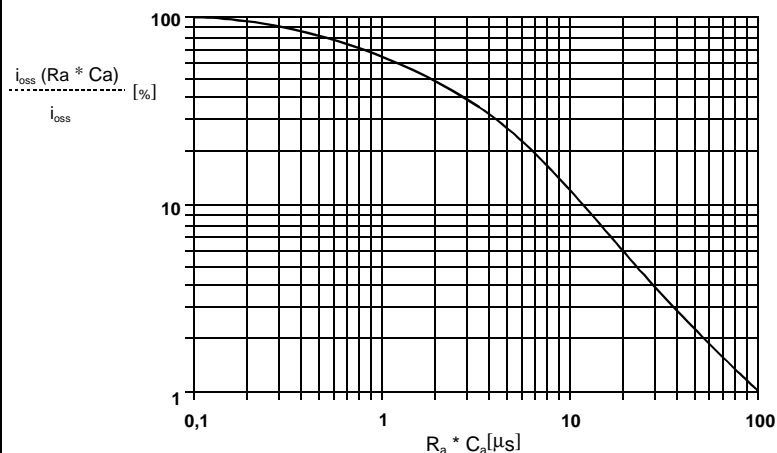
Pulse behaviour at pulse duration= 500µs



The value for  $I_{p,max}$  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  $I_{p,max}$ . This will curtail the accuracy but can be used for kick-offs.

**Example : Avariabel 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 :



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

**Applicable documents**

Current direction: A positive output current appears at point  $I_s$ , by primary current in direction of the arrow.  
Constructed, manufactured 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

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