VACUUMSCHMELZE	**Datasheet**	**Item no.: T60404-N4648-X052**

K-No.: 26575	**500A Current Sensor** 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: 11.03.2020

Customer: Standard type	Customers Part no:	Page 1 of 4

Description

- Closed loop (compensation) Current Sensor with magnetic 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
- reduced offset ripple

Applications

Mainly used for stationary operation in industrial applications:

- AC variable 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 nominal RMS current			500	A
R_M	Measuring resistance			0 … 200	Ω
I_{SN}	Secondary nominal RMS current			250	mA
K_N	Transformation ratio			(1) : 2000	

Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range @V_C=±15V, R_M < 10Ω (t_{max} = 10sec)	700			A
X	Accuracy @ I_{PN}, ϑ_A = 25°C			0.5	%
ε_L	Linearity			0.1	%
I_O	Offset current @ I_P = 0A, ϑ_A = 25°C			0.2	mA
t_r	Response time		<1		µs
t_{ra}	Reaction time		<1		µs
f	Frequency bandwidth	DC…50			kHz

General data

ϑ_A	Ambient operation temperature	-40		85	°C
ϑ_S	Ambient storage temperature (acc. M3101)	-40		85	°C
m	Mass		120		g
V_C	Supply voltage	±14.25	±15	±15.75	V
I_C	Supply current at I_P = 0A and RT		±23		mA
	Constructed and manufactured and tested in accordance with IEC 61800-5-1:2007 (Pin 1-4 to hole) Reinforced insulation, Insulation material group 1, Pollution degree 2				
s_{clear}	Clearance	8			mm
s_{creep}	Creepage	12			mm
$U_{sys,1}$	System voltage (overvoltage category III)			600	V_{RMS}
$U_{sys,2}$	System voltage (overvoltage category II)			1000	V_{RMS}
	max. Potential Difference acc. to UL 508			600	V_{RMS}

Date	Name	Issue	Amendment
		81	

Editor: R&D-PD NPI D	Designer: DJ		MC-PM: Sn.			Released: SB

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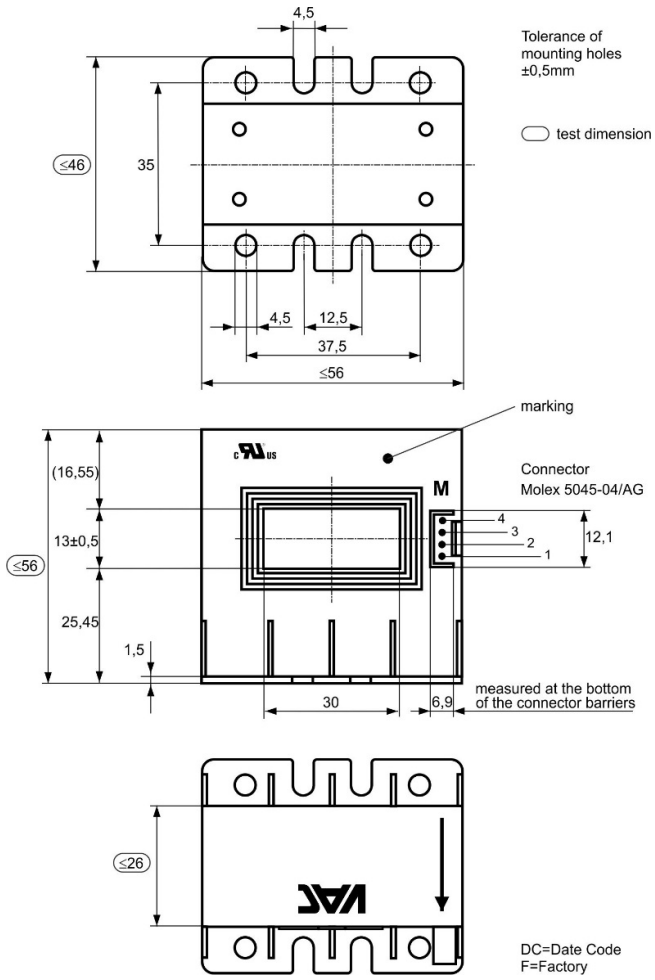
Mechanical outline (mm): General tolerances DIN ISO 2768-c



Connections:

Pins 1-4: 0.64mm x 0.64mm

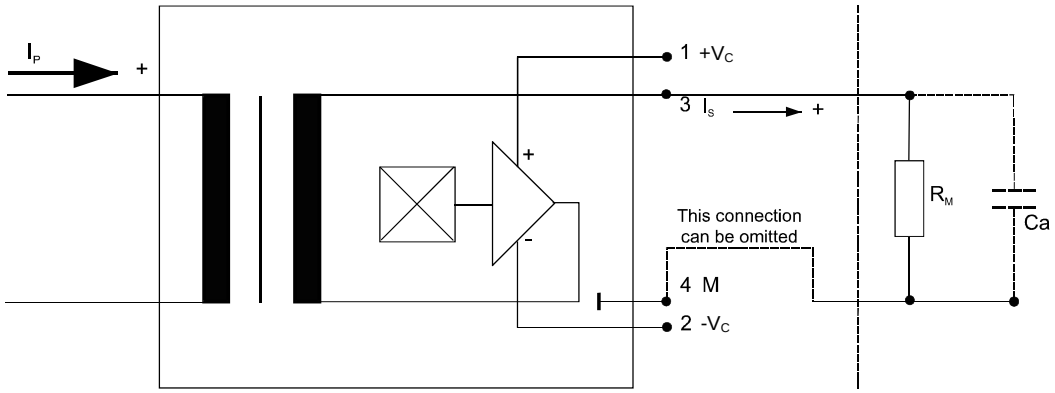
Marking:

UL-sign 4648-X052 F DC

F: Factory
DC: Date Code

Date Code Format: [YWW]
Example: K04: 2018, Week 4

Schematic diagram:



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Electrical data: (investigate by a type checking)

		min.	typ.	max.	Unit
$V_{C,tot}$	maximum supply voltage (without function) ±15.75V to ±18V: for 1s per hour			±18	V
R_S	Secondary coil resistance @ ϑ_A = 85°C			30	Ω
X_{TI}	Temperature drift of X @ ϑ_A = -40°C ... 85°C			0.1	%
I_{Ot}	Long term drift of I_O		0.05		mA
I_{OT}	Offset current temperature drift I_O @ ϑ_A = -40°C … 85°C		0.05		mA
I_{OH}	Hysteresis current @ I_P = 0A (caused by I_P = 3 x I_{PN})		0.1		mA
$\Delta I_O/\Delta V_C$	Supply voltage rejection ratio			0.01	mA/V
i_{OSS}	Offsetripple* (with 1 MHz-Filter, first order)		0.4	0.6	mA_{pp}
i_{OSS}	Offsetripple* (with 100 kHz-Filter, first order)		0.06		mA_{pp}
i_{OSS}	Offsetripple* (with 20 kHz-Filter, first order)		0.02		mA_{pp}
C_k	Maximum possible coupling capacity (primary - secondary)		15		pF
	Mechanical stress according to M3209/3 Settings: 10-2000Hz, 1min/oct, 2 hours		2		g

Routine Tests: (Measurement after temperature balance of the samples at room temperature, SC=significant characteristic)

K_N (SC)	(100%) M3011/6:	Transformation ratio	1990 ... 2010	
I_O	(100%) M3226:	Offset current	0.2	mA
U_d	(100%) M3014:	Test voltage, 1s	1.8	kV_{RMS}
U_{PDE} U_{PD}*1.875	(AQL 1/S4) M3024:	Partial discharge voltage (extinction)	1.5 1.875	kV_{RMS}

Type Tests: (Precondition acc. to M3236)

$\hat{U}_W$	HV transient test acc. to M3064 (1.2µs / 50µs) 5 pules -> polarity +, 5 pulses -> polarity -	8	kV
U_d	Test voltage acc. to M3014, 5s	3.6	kV_{RMS}
U_{PDE} U_{PD}*1.875	Partial discharge voltage (extinction) acc. to M3024	1.5 1.875	kV_{RMS}

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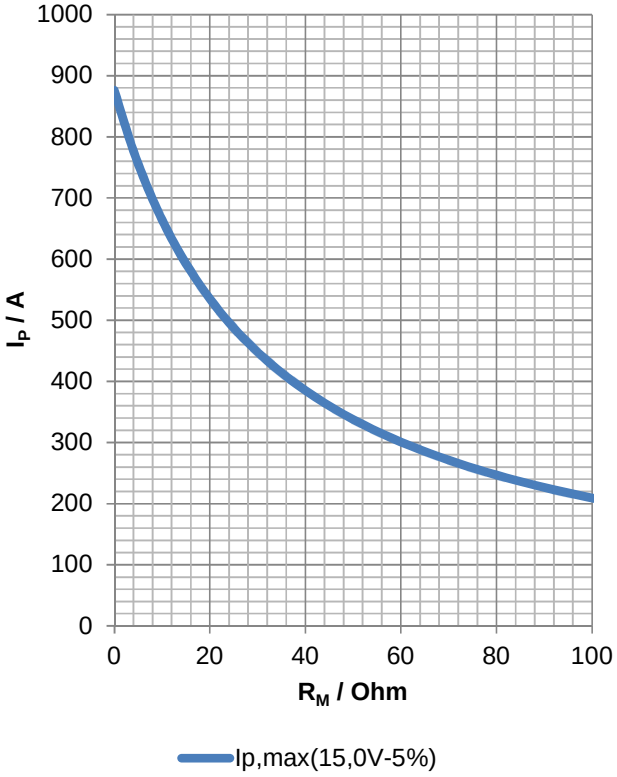
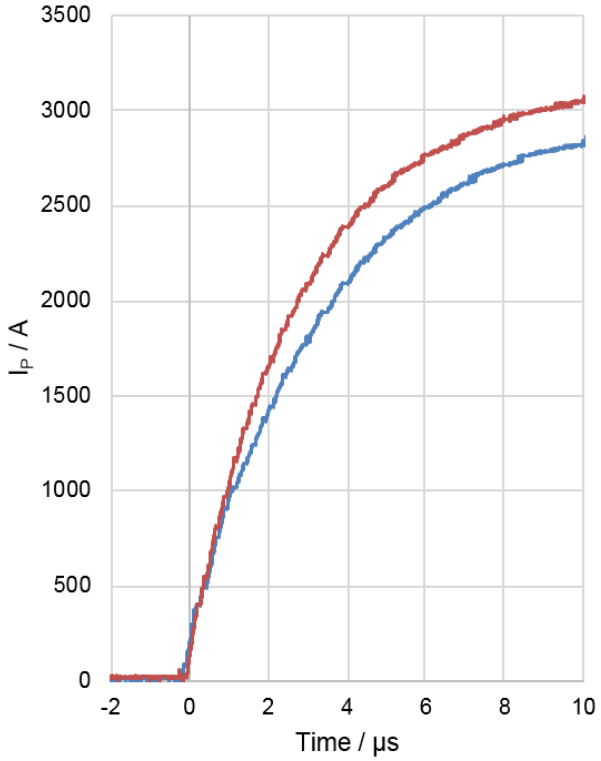
Limit curve of measurable current of N4648-X052





Fast increasing currents (higher than the specified $I_{P,max}$), e.g. in case of a short circuit, can be transmitted because the currents are transformed directly and be limited by diodes only.

***Possible way to reduce the Offset ripple by a Low-Pass-Filter**

The offset ripple can be reduced by an external low pass. Simplest solution is a passive low pass filter of 1st order with cutoff frequency:

$$f_g = \frac{1}{2 * \pi * R_M * C_a}$$

In this case the response time is enlarged:

$$t_r' \leq t_r + 2{,}5 * R_M * C_a$$

Other instructions

- Current direction: A positive output current appears at point I_S, if primary current flows in direction of the arrow.
- Temperature of the primary conductor should not exceed 105°C.
- Housing and bobbin material UL-listed: Flammability class 94V-0.
- Further standards: UL508, UL-file: E317483, category NMTR2 / NMTR8