

K-No.: 26567

700A 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: 20.10.2020

Customer: Standard type

Customers Part no:

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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	700	A
R_M	Measuring resistance	0 ... 200	Ω
I_{SN}	Secondary nominal RMS current	233	mA
K_N	Transformation ratio	(1) : 3000	

Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range @ $V_C = \pm 15V$, $R_M < 10\Omega$ ($t_{max} = 10sec$)	1250			A
X	Accuracy @ I_{PN} , $\vartheta_A = 25^\circ C$			0.5	%
ϵ_L	Linearity			0.1	%
I_o	Offset current @ $I_P = 0A$, $\vartheta_A = 25^\circ C$			0.15	mA
t_r	Response time		<1		μs
t_{ra}	Reaction time		<1		μs
f	Frequency bandwidth (with reduced Amplitude)	DC...50			kHz

General data

ϑ_A	Ambient operation temperature (not with full I_{PN}) ¹⁾	-40		85	$^\circ C$
ϑ_S	Ambient storage temperature (acc. M3101)	-40		85	$^\circ C$
m	Mass		165		g
V_C	Supply voltage	± 14.25	± 15	± 15.75	V
I_C	Supply current at $I_P = 0A$ and RT		± 42		mA

Constructed and manufactured and tested in accordance with IEC 61800-5-1 (2007) (Pin 1-4 to inner hole)
Insulation material group 1, Pollution degree 2, Overvoltage category III

S_{clear}	Clearance	8			mm
S_{creep}	Creepage	12			mm
$U_{sys, re}$	System voltage (reinforced insulation)			600	V_{RMS}
$U_{work, re}$	Working voltage (reinforced insulation)			1000	V_{RMS}
U_{PD}	Rated discharge voltage			1414	V_{PEAK}
$U_{sys, basic}$	System voltage (basic insulation)			1000	V_{RMS}
$U_{work, basic}$	Working voltage (basic insulation)			2400	V_{RMS}
	max. Potential Difference acc. to UL 508			600	V_{RMS}

¹⁾ Maximal continues primary current at given ambient temperatures:

ϑ_A	max. I_P
-40 $^\circ C$... 70 $^\circ C$	700A _{RMS}
-40 $^\circ C$... 85 $^\circ C$	400A _{RMS}

Date	Name	Issue	Amendment
20.10.2020	DJ	81	Mechanical outline corrected. Is already introduced in production. Minor change

Editor: R&D-PD CS	Designer: DJ	MC-PM: NSch.	Released: SB
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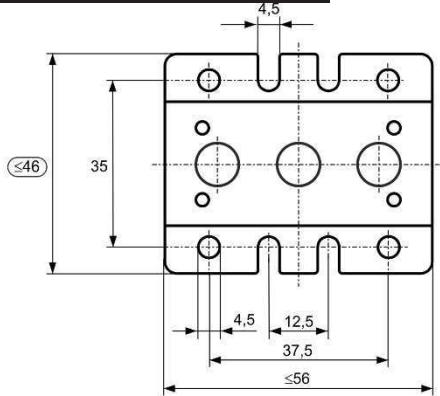
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Mechanical outline (mm):

General tolerances DIN ISO 2768-c



Tolerance of mounting holes $\pm 0,5\text{mm}$

○ test dimension

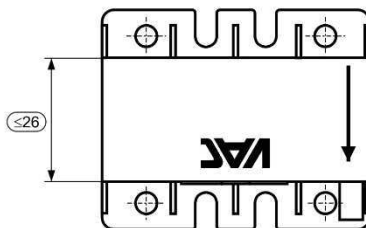
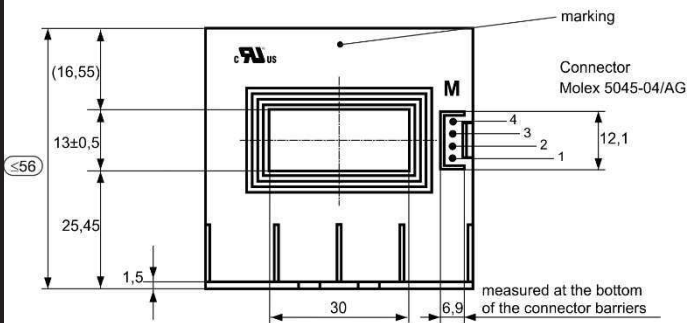
Connections:
Pins 1-4: 0.64mm x 0.64mm

Marking:

UL-sign 4648-X054 F DC

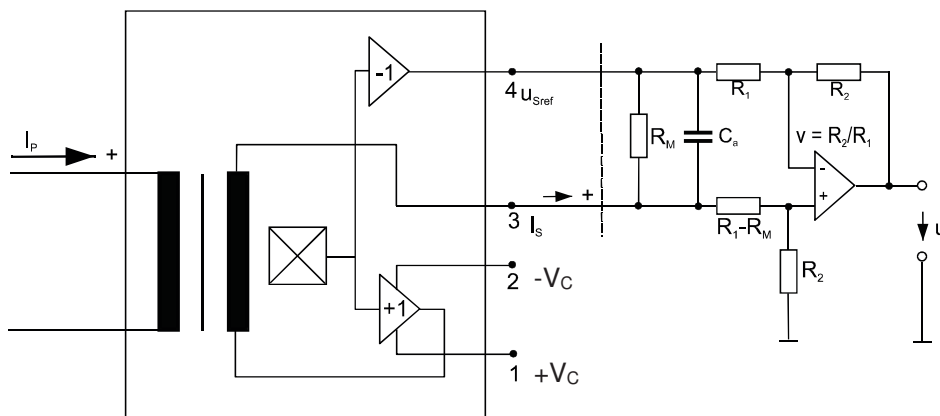
F: Factory
DC: Datecode

Datecode Format: [YYWW]
Example: 1946: 2019, Week 46



DC=Date Code
F=Factory

Schematic diagram:



REMARK:
Pin4 must NEVER be connected to ground.
Sensor will be destroyed!

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Electrical data: (investigate by a type checking)		min.	typ.	max.	Unit
$V_{C,tot}$	maximum supply voltage (without function) $\pm 15.75V$ to $\pm 18V$: for 1s per hour			± 18	V
R_S	Secondary coil resistance @ $\vartheta_A = 85^\circ C$			60	Ω
X_{TI}	Temperature drift of X @ $\vartheta_A = -40^\circ C \dots 85^\circ C$			0.1	%
I_{ot}	Long term drift of I_o			0.1	mA
I_{oT}	Offset current temperature drift I_o @ $\vartheta_A = -40^\circ C \dots 85^\circ C$			0.05	mA
I_{oH}	Hysteresis current @ $I_P = 0A$ (caused by $I_P = 3 \times I_{PN}$)			0.15	mA
$\Delta I_o / \Delta V_C$	Supply voltage rejection ratio			0.1	mA/V
i_{oss}	Offsetripple* (with 1 MHz-Filter, first order)		0.3	0.8	mAPP
i_{oss}	Offsetripple* (with 100 kHz-Filter, first order)		0.1		mAPP
i_{oss}	Offsetripple* (with 20 kHz-Filter, first order)		0.05		mAPP
C_k	Maximum possible coupling capacity (primary - secondary)		20		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	2985 ... 3015	
I_o	(100%) M3226:	Offset current	0.15	mA
U_d	(100%) M3014:	Test voltage, 1s	1.8	kV _{RMS}
U_{PDE}	(AQL 1/S4) M3024:	Partial discharge voltage (extinction)	1.5	kV _{RMS}
$U_{PD}^*1.875$			1.875	

Type testing:

(Precondition acc. to M3236)

\hat{U}_W	HV transient test acc. to M3064 (1.2 μ s / 50 μ s) 5 pulses -> polarity +, 5 pulses -> polarity -	8	kV
U_d	Test voltage acc. to M3014, 60s	3.6	kV _{RMS}
U_{PDE}	Partial discharge voltage (extinction) acc. to M3024	1.5	kV _{RMS}
$U_{PD}^*1.875$		1.875	

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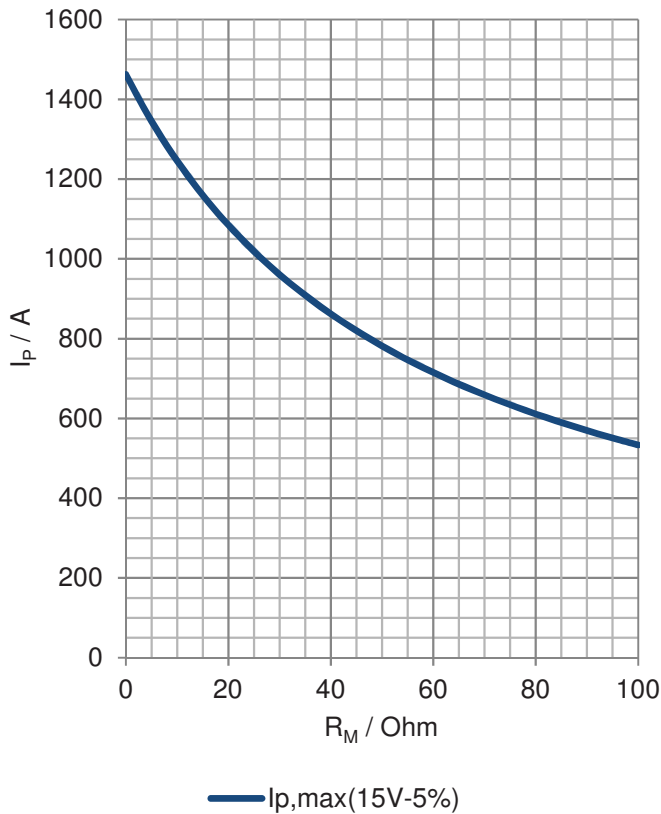
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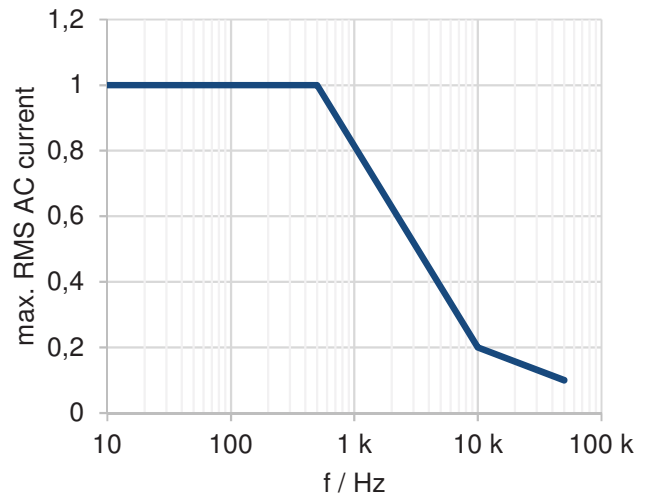
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Limit curve of measurable current:



AC Current Derating:



Measured without feedback current from sensor (bus pumping effect). For detailed information about the feedback current, which is produced by the sensor due to his final amplifier topology read the application note about interaction between current sensor and power supply.

*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:

$$t'_r \geq t_r + 2,5 * R_M * C_a$$

Other instructions

- Current direction: A positive output current appears at point Is, if primary current flows in direction of the arrow.
- Temperature of the primary conductor should not exceed 105°C.
- The PCBA of this sensor is covered with conformal coating and the sensor is filled with resin.
- Housing and bobbin material UL-listed: Flammability class 94V-0. Resin UL-listed: Flammability class 94V-2.
- Further standards: UL508, UL-file: E317483, category NMTR2 / NMTR8