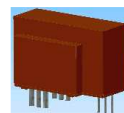


K-No.: 24618

50/100A 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: 21.01.2019

Customer: Standard type

Customers Part no.:

Page 1 of 4

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
- 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 @ $V_C = \pm 15V$, $R_M \geq 0\Omega$ @ $V_C = \pm 12V$, $R_M \geq 0\Omega$ or $V_C = \pm 15V$, $R_M \geq 16\Omega$	50 100	A A
R_M	Measuring resistance $V_C = \pm 12V$ $V_C = \pm 15V$	0 ... 200 16 ... 400	Ω Ω
I_{SN}	Secondary nominal rms current	25/50	mA
K_N	Turns ratio	1...3 : 2000	

Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range @ $V_C = \pm 12V$, $R_M = 10\Omega$ ($t_{max} = 10sec$) @ $V_C = \pm 15V$, $R_M = 16\Omega$ ($t_{max} = 10sec$)	± 145 ± 175			A A
X	Accuracy @ I_{PN} , $T_A = 25^\circ C$		0.1	0.5	%
$\square_L$	Linearity			0.1	%
I_0	Offset current @ $I_P = 0$, $T_A = 25^\circ C$		0.02	0.08	mA
t_r	Response time		500		ns
$\Delta t (I_{P,max})$	Delay time at $di/dt = 100 A/\mu s$		200		ns
f	Frequency bandwidth	DC...200			kHz

General data

		min.	typ.	max.	Unit
T_A	Ambient operating temperature	-40		+85	$^\circ C$
T_S	Ambient storage temperature (acc. M3101)	-40		+90	$^\circ C$
m	Mass		13.5		g
V_C	Supply voltage	± 11.4	± 12 or ± 15	± 15.75	V
I_C	Current consumption		18.5		mA
Constructed and manufactured and tested in accordance with EN 61800-5-1 (Pin 1 - 6 to Pin 7 – 9) Reinforced insulation, Insulation material group 1, Pollution degree 2					
S_{clear}	clearance (component without solder pad)	10.2			mm
S_{creep}	creepage (component without solder pad)	10.2			mm
V_{sys}	System voltage overvoltage category 3			600	V_{RMS}
V_{work}	Working voltage (table 7 acc. to EN61800-5-1)			1020	V_{RMS}
U_{PD}	Rated discharge voltage			1400	V_{PEAK}
Max. potential difference acc. to UL 508		RMS		600	V_{AC}

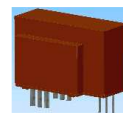
Date	Name	Issue	Amendment
21.01.19	DJ	81	Page 2: Marking changed from 4646X412 to 4646-X412. Page 3, Type test M3064 accurately defined. CN-19-018.
18.04.13	KRe	81	Mechanical outline: marking with UL-sign and max. potential difference added. CN-661

Hrsg.: R&D-PD NPI D editor	Bearb.: DJ designer	MC-PM: NSch. check	freig.: SB released
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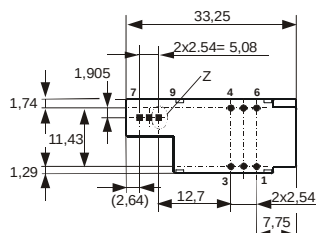
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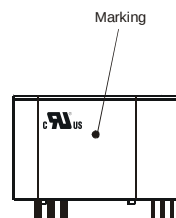
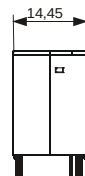
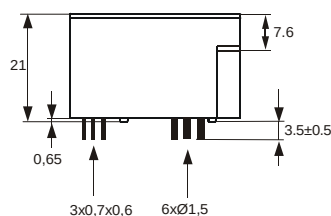
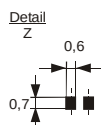
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Page 2 of 4

Mechanical outline (mm):

General tolerances DIN ISO 2768-c


Tolerances grid distance
±0,2mm

DC = Date Code
F= Factory


Connections:

1...6: Ø 1.5mm

7...9: 0.6x0.7mm

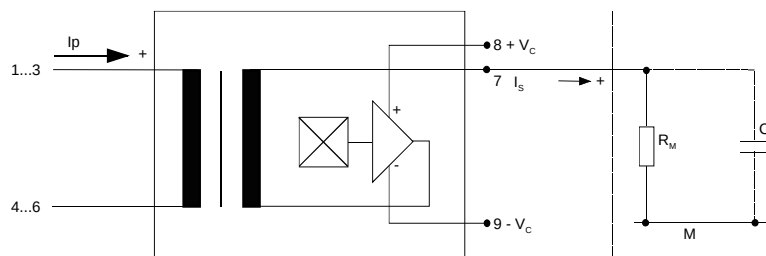
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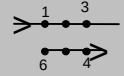
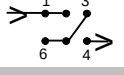
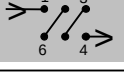
UL-sign

4646-X412

F DC

Schematic diagram


Possibilities of wiring for $V_C = \pm 15V$ (@ $T_A = 85^\circ C$, $R_M = 25 \Omega$)

primary windings N_p	primary current RMS I_p [A]	primary current maximal $\hat{I}_{p,max}$ [A]	output current RMS I_s (I_p) [mA]	turns ratio K_N	primary resistance R_p [mΩ]	wiring
1	100	175	50	1:2000	0.12	
2	35	82	35	2:2000	0.54	
3	25	58	37.5	3:2000	1.1	

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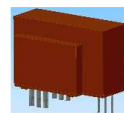
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Page 3 of 4

Electrical Data (investigate by a type checking)

		min.	typ.	max.	Unit
V_{Ctot}	Maximum supply voltage (without function) ± 15.75 to ± 18 V: for 1s per hour			± 18	V
R_S	Secondary coil resistance @ $T_A=85^\circ\text{C}$			145	Ω
R_p	Primary coil resistance per turn @ $T_A=25^\circ\text{C}$			0.36	m Ω
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_{0T})			0.1	mA
I_{0t}	Long term drift Offset current I_0		0.03		mA
I_{0T}	Offset current temperature drift I_0 @ $T_A = -40 \dots +85^\circ\text{C}$		0.03		mA
I_{0H}	Hysteresis current @ $I_P=0$ (caused by primary current $3 \times I_{PN}$)		0.02	0.05	mA
$\Delta I_0/\Delta V_C$	Supply voltage rejection ratio			0.01	mA/V
i_{oss}	Offsetripple (with 1MHz- filter first order)			0.15	mA
i_{oss}	Offsetripple (with 100kHz- filter first order)		0.017	0.025	mA
i_{oss}	Offsetripple (with 20kHz- filter first order)		0.005	0.007	mA
C_k	Maximum possible coupling capacity (primary – secondary)		5		pF
	Mechanical Stress according to M3209/3 Settings: 10 – 2000 Hz, 1 min/Oktave, 2 hours An exceptionally high rate of on/off – switching of the supply voltage accelerates the aging process of the sensor.			10	g

Inspection (Measurement after temperature balance of the samples at room temperature; SC = significant characteristic)

$K_N(SC)$	(V)	M3011/6	Transformation ratio ($I_P=3 \times 10A$, 40-80 Hz)	1...3 : 2000 $\pm$ 0.5 %
I_0	(V)	M3226	Offset current	< 0.05 mA
V_d	(V)	M3014	Test voltage, 1s	2.5 kV _{RMS}
V_e	(AQL 1/S4)		Partial discharge voltage acc. M3024 with V_{vor}	1500 V _{RMS} 1875 V _{RMS}

Type Testing (Precondition acc. to M3236)

V_W			HV transient test according to M3064 (1,2 μs / 50 μs -wave form) 5 pulse $\rightarrow$ polarity +, 5 pulse $\rightarrow$ polarity -	8 kV
V_d			Testing voltage acc. M3014 (5s)	5 kV _{RMS}
V_e			Partial discharge voltage acc. M3024 with V_{vor}	1500 V _{RMS} 1875 V _{RMS}

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Bearb: DJ
designer

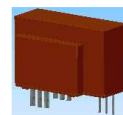
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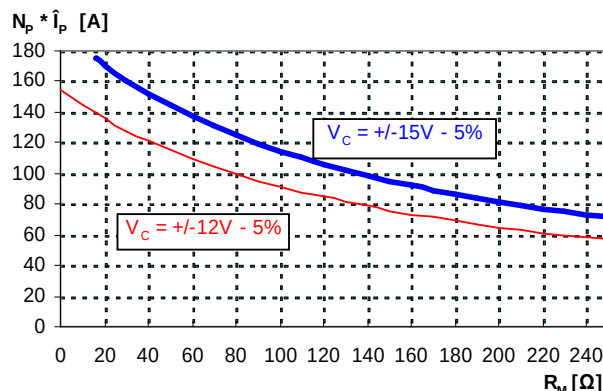
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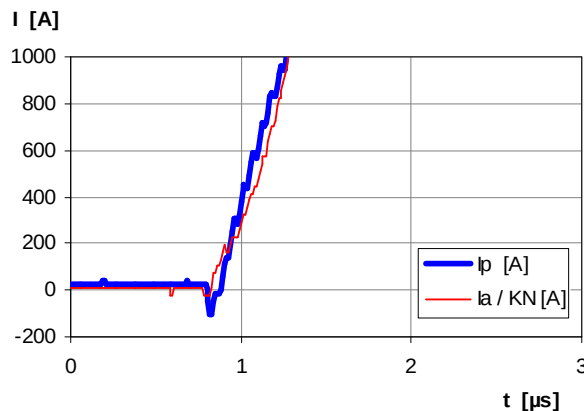
Page 4 of 4

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

@ ambient temperature $T_A = 85^\circ\text{C}$


Maximum measuring range (μs-range)

Output current behaviour of a 3kA current pulse

@ $V_C = \pm 15V$ und $R_M = 25\Omega$


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.

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

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

In this case the response time is enlarged.

It is calculated from:

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

Applicable documents

Temperature of the primary conductor should not exceed 105°C .

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

Constructed and manufactured and tested in accordance with EN 61800.

Further standards UL 508 ; file E317483, category NMTR2 / NMTR8

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