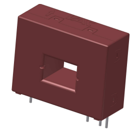
VACUUMSCHMELZE	SPECIFICATION	Item no.:	T60404-N4646-X160

K-No.: 24959

100 A Current Sensor Module for 5V-Spply Voltage

For electronic current measurement:
DC, AC, pulsed, mixed ...,
with a galvanic isolation between
primary circuit (high power) and
secondary circuit (electronic circuit)



Date: 23.09.2016

Customer: Standard type

Customers Part no.:

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
- 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
- Uninterruptible Power Supplies (UPS)

Electrical data – Ratings

		min.	typ.	max.	Einheit
I_{PN}	Primary nominal r.m.s. current		100		A
V_{out}	Output voltage @ I_P		$V_{Ref} \pm (0.625 * I_P / I_{PN})$		V
V_{out}	Output voltage @ I_P=0, T_A=25°C		$V_{Ref} \pm 0.0025$		V
V_{Ref}	Reference voltage external	0		4	V
V_{Ref}	Reference voltage internal		2.5 ± 0.005		V
K_N	Turns ratio		1 : 1000		

Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range	±230			
X	Accuracy @ I_{PN}, T_A= 25°C			1	%
ε_L	Linearity			0.1	%
V_{out} -2,5V	Offset voltage @ I_P=0, T_A= 25°C			±2.5	mV
ΔV_{out} /2,5V/ΔT	Temperature drift of V_{out} @ I_P=0, T_A= -40…85°C		3	10	ppm/K
t_r	Response time @ 80% von I_{PN}		1		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		18		g
V_C	Supply voltage	4.75	5	5.25	V
I_{C0}	Current consumption		16		mA
S_{clear}	Clearance (component without solder pad)	12			mm
S_{creep}	Creepage (component without solder pad)	12			mm
V_{sys}	System voltage overvoltage category III			600	V_{RMS}
V_{work}	Working voltage (table 3 acc. to IEC 61800-5-1:2007) overvoltage category 2			1000	V_{RMS}
U_{PD}	Rated discharge voltage			1414	V_{peak}
	Max. potential difference acc to UL 508			600	V_{RMS}

Constructed and manufactored and tested in accordance with IEC 61800-5-1:2007 (Primary to Secondary)
Reinforced insulation, Insulation material group 1, Pollution degree 2, Overvoltage category III

Date	Name	Issue	Amendment
23.09.16	Ockajak	81	Typo: changed test voltage from M3024 to M3014. Minor change.
07.04.15	DJ	81	Sensor changed back to issue “81”. Data sheet changed. CN-15-276

Hrsg.: MC-PD editor	Bearb: DJ designer		MC-PM: KRe. check			freig.: BEF released

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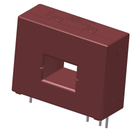
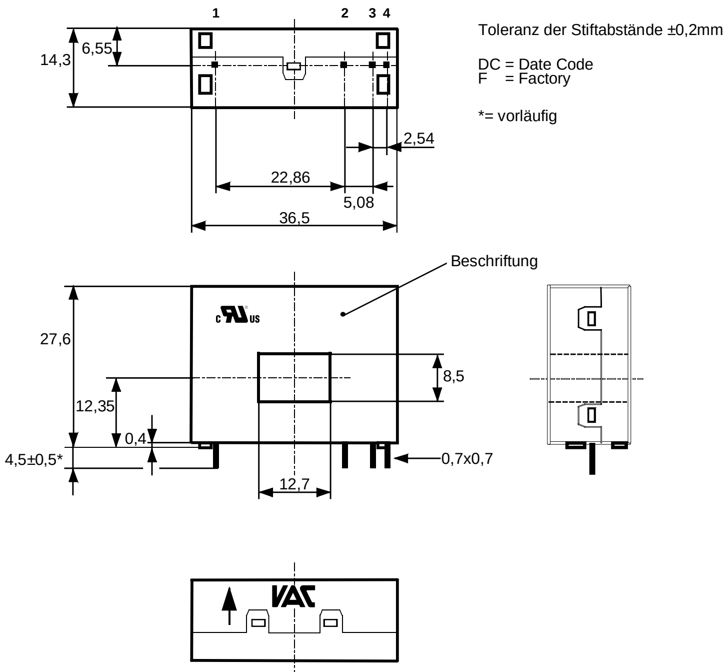
K-No.: 24959	**100 A Current Sensor Module for 5V-Spply Voltage** For electronic current measurement: DC, AC, pulsed, mixed ..., with a galvanic isolation between primary circuit (high power) and secondary circuit (electronic circuit)	Date: 23.09.2016



Customer: Standard type	Customers Part no.:	Page 2 of 4

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



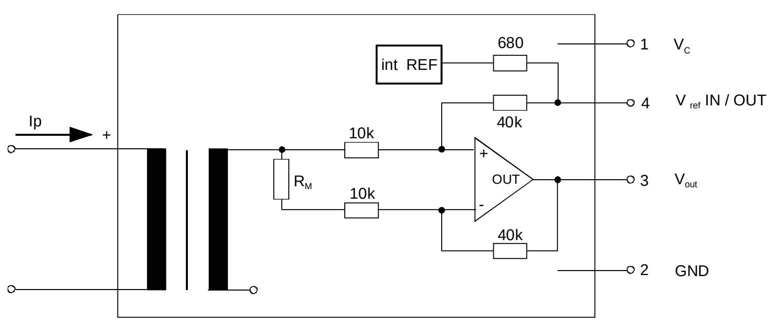
Connections:

1..4 = 0.7 x 0.7mm

Marking:

UL-sign
4646-X160
F DC

Schematic diagram



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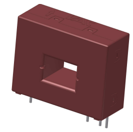

Electrical Data

		min.	typ.	max.	Unit
V_{Ctot}	Maximum supply voltage (without function)			6	V
I_C	Supply Current with primary current		$16mA + I_p{*}K_N + V_{out}/R_L$		mA
$I_{out,SC}$	Short circuit output current		±20		mA
R_S	Secondary coil resistance @ T_A=85°C			14	Ω
$R_{i,Ref}$	Internal resistance of Reference input		670		Ω
R_i,(V_{out})	Output resistance of V_{out}			1	Ω
R_L	External recommended resistance of V_{out}	1			kΩ
C_L	External recommended capacitance of V_{out}			500	pF
$\Delta X_{Ti}/\Delta T$	Temperature drift of X @ T_A = -40 ... +85 °C			40	ppm/K
$\Delta V_0 = \Delta(V_{out} - V_{Ref})$	Sum of any offset drift including:		2	6	mV
V_{0t}	Long term drift of V_0		1		mV
V_{0T}	Temperature drift von V_0 @ T_A = -40 ...+85°C		1		mV
V_{0H}	Hystereses of V_{out} @ I_P=0 (after an overload of 10 x I_{PN})			0.7	mV
$\Delta V_0/\Delta V_C$	Supply voltage rejection ratio			1	mV/V
V_{oss}	Offsetripple (with 1 MHz- filter first order)			20	mV
V_{oss}	Offsetripple (with 100 kHz- filter firdt order)		2.5	6	mV
V_{oss}	Offsetripple (with 20 kHz- filter first order)		0.7	1.5	mV
C_k	Maximum possible coupling capacity (primary – secondary)		6		pF
	Mechanical stress according to M3209/3				
	Settings: 10 Hz, 1 min/Oktave, 2 hours				

Inspection

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

V_{out} (SC)	(V)	M3011/6:	Output voltage vs. internal reference (I_P=100A, 40-80Hz)	625±0.7%	mV
$V_{out} - V_{Ref}$ (I_P=0)	(V)	M3226:	Offset voltage	± 0.0025	V
V_d	(V)	M3014:	Test voltage, RMS, 1 s pin 1-4 to inner hole	1.8	kV
V_e	(AQL 1/S4):		Partial discharge voltage acc.M3024 with V_{vor}	1500 1875	V_{RMS} V_{RMS}

Type Testing

(Pin 1-4 to inner hole)

V_W	HV transient test according to M3064 (1,2 µs / 50 µs-wave form)		8	kV
V_d	Testing voltage to M3014	(5 s)	3.6	kV
V_e	Partial discharge voltage acc.M3024 with V_{vor}		1500 1875	V_{RMS} V_{RMS}

Applicable documents

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

Enclosures according to IEC529: IP50.

Temperature of the primary conductor should not exceed 110°C

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

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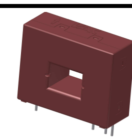

Explanation of several of the terms used in the tablets (in alphabetical order)

t_r: Response time (describe the dynamic performance for the specified measurement range), measured as delay time at $I_P = 0.8 \cdot I_{PN}$ between a rectangular current and the output voltage V_{OUt} (I_p)

Δt (I_{Pmax}): Delay time (describe the dynamic performance for the rapid current pulse rate e.g short circuit current) measured between I_{Pmax} and the output voltage $V_{out}(I_{Pmax})$ with a primary current rise of $di_P/dt \geq 100$ A/µs.

U_{PD} Rated discharge voltage (recurring peak voltage separated by the insulation) proved with a sinusoidal voltage V_{work}

$U_{PD} = \sqrt{2} * V_{work}$

V_{vor} Defined voltage is the RMS valve of a sinusoidal voltage with peak value of 1.875 * U_{PD} required for partial discharge test in IEC 61800-5-1:2007

$V_{vor} = 1.875 * U_{PD} / \sqrt{2}$

V_{sys} System voltage value of rated voltage according to IEC 61800-5-1:2007.

V_{work} Working voltage voltage according to IEC 61800-5-1:2007 which occurs by design in a circuit or across insulation.

V_0: Offset voltage between V_{out} and the rated reference voltage of V_{ref} = 2.5V.
$V_o = V_{out}(0) - 2.5V$

V_{0H}: Zero variation of V_o after overloading with a DC of tenfold the rated value

V_{0t}: Long term drift of V_o after 100 temperature cycles in the range -40 bis 85 °C.

X: Permissible measurement error in the final inspection at RT, defined by

$$X = 100 \cdot \left| \frac{V_{out}(I_{PN}) - V_{out}(0)}{0{,}625V} - 1 \right| \%$$

$X_{ges}(I_{PN})$: Permissible measurement error including any drifts over the temperature range by the current measurement I_{PN}

$$X_{ges} = 100 \cdot \left| \frac{V_{out}(I_{PN}) - 2{,}5V}{0{,}625V} - 1 \right| \% \quad \text{or} \quad X_{ges} = 100 \cdot \left| \frac{V_{out}(I_{PN}) - V_{ref}}{0{,}625V} - 1 \right| \%$$

ε_L: Linearity fault defined by

$$\varepsilon_L = 100 \cdot \left| \frac{I_P}{I_{PN}} - \frac{V_{out}(I_P) - V_{out}(0)}{V_{out}(I_{PN}) - V_{out}(0)} \right| \%$$