VAC VACUUMSCHMELZE	**SPECIFICATION**	**Item no.:**	**T60404-N4646-X664**

K-no.: 24514	**50 A Current Sensor for 5V- Supply Voltage** For electronic current measurement: DC, AC, pulsed, mixed ..., with a galvanic isolation between primary circuit (high power) and secondary circuit (electronic circuit)	Date: 11.08.2014

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
- 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

I_{PN}	Primary nominal r.m.s. current	50	A
V_{out}	Output voltage @ I_P	V_{Ref} ± (0.625*I_P/I_{PN})	V
V_{out}	Output voltage @ I_P=0, T_A=25°C	V_{Ref} ± 0.000725	V
V_{Ref}	External Reference voltage range	0…4	V
	Internal Reference voltage	2.5 ±0.005	V
K_N	Turns ratio	1…3 : 1400	

Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range	±150			
X	Accuracy @ I_{PN}, T_A= 25°C			0.7	%
ε_L	Linearity			0.1	%
V_{out} - V_{Ref}	Offset voltage @ I_P=0, T_A= 25°C			±0.725	mV
$\Delta V_o / V_{Ref} / \Delta T$	Temperature drift of V_{out} @ I_P=0, V_{Ref} =2,5V, T_A= -40…85°C		0.7	7	ppm/°C
t_r	Response time @ 90% von I_{PN}		300		ns
Δt ($I_{P,max}$)	Delay time at di/dt = 100 A/µs		200		ns
f	Frequency bandwidth	DC…200			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		12		g
V_C	Supply voltage	4.75	5	5.25	V
I_C	Current consumption		15		mA

Constructed and manufactored and tested in accordance with EN 61800-5-1 (Pin 1 - 6 to Pin 7 – 10)
Reinforced insulation, Insulation material group 1, Pollution degree 2

S_{clear}	Clearance (component without solder pad)		7.4		mm
S_{creep}	Creepage (component without solder pad)		8.0		mm
V_{sys}	System voltage	overvoltage category 3	RMS	300	V
V_{work}	Working voltage	(tabel 7 acc. to EN61800-5-1) overvoltage category 2	RMS	650	V
U_{PD}	Rated discharge voltage		peak value	1320	V

Max. potential difference acc. to UL 508	RMS	600	V_{AC}

Date	Name	Issue	Amendment
11.08.14	KRe	83	Marking changed from 4646X664-83 ➔ 4646-X664-83. Electrical data: Vout changed. CN-14-077

Hrsg.: KB-E editor	Bearb: DJ designer		KB-PM: Sn check			freig.: HS released

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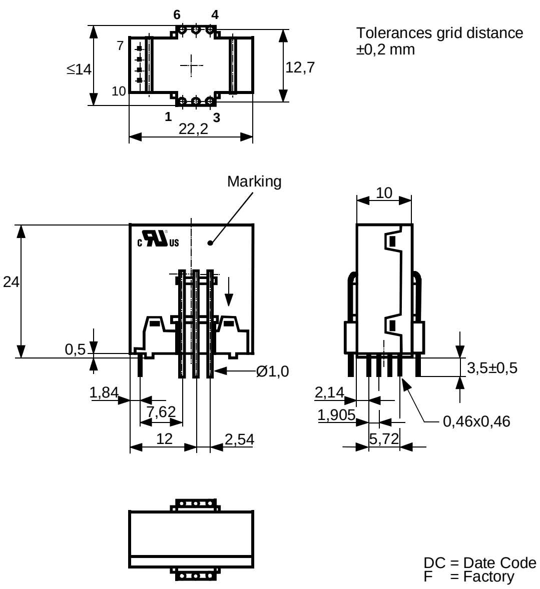
Mechanical outline (mm): General tolerances DIN ISO 2768-c

Connections:

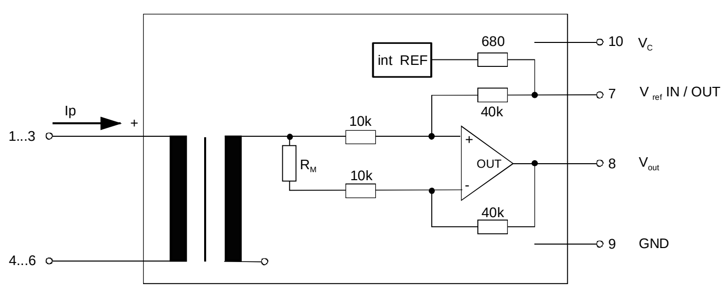
1...6: ∅ 1 mm
7..10: 0,46*0,46 mm



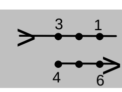
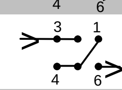
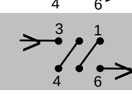
Marking:

VAC UL-sign
4646-X664-83
F DC

Schematic diagram



Possibilities of wiring (@ T_A = 85°C)

primary windings N_P	primary current RMS I_P [A]	primary current maximal $\hat{I}_{P,max}$ [A]	output voltage RMS $V_{out}(I_P)$ [V]	turns ratio K_N	primary resistance R_P [mΩ]	wiring
1	50	±150	2.5±0.625	1:1400	0.33	
2	12	±75	2.5±0.300	2:1400	1.5	
3	8	±50	2.5±0.300	3:1400	3	

Temperature of the primary conductor should not exceed 110°C.
Additional information is obtainable on request.
This specification is no declaration of warranty acc. BGB §443.

Hrsg.: KB-E editor	Bearb: DJ designer		KB-PM: Sn check			freig.: HS released

VACUUMSCHMELZE	Additional Information	Item No.: T60404-N4646-X664

K-No.: 24514	**50 A Current Sensor for 5V- Supply Voltage** For the electronic measurement of currents: DC, AC, pulsed, mixed ..., with a galvanic Isolation between the primary circuit (high power) and the secondary circuit	Date: 11.08.2014

Customer:	Customers Part No.:	Page 1 of 2

Electrical Data

		min.	typ.	max.	Unit
V_{Ctot}	Maximum supply voltage (without function)			7	V
I_C	Supply Current with primary current		$15mA + I_p*K_N+V_{out}/R_L$		mA
$I_{out,SC}$	Short circuit output current		±20		mA
R_P	Resistance / primary winding @ T_A=25°C		1		mΩ
R_S	Secondary coil resistance @ T_A=85°C			35	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}	Longtermdrift of V_0		1		mV
V_{0T}	Temperature drift von V_0 @ T_A = -40 ...+85°C		1		mV
V_{0H}	Hysteresis of V_{out} @ I_P=0 (after an overload of 10 x I_{PN})			1	mV
$\Delta V_0 / \Delta V_C$	Supply voltage rejection ratio			1	mV/V
v_{oss}	Offsetripple (with 1 MHz- filter first order)			35	mV
v_{oss}	Offsetripple (with 100 kHz- filter firdt order)		2	5	mV
v_{oss}	Offsetripple (with 20 kHz- filter first order)		0.6	1	mV
C_k	Maximum possible coupling capacity (primary – secondary)		5	10	pF
	Mechanical stress according to M3209/3 Settings: 10 – 2000 Hz, 1 min/Octave, 2 hours			30g	

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

V_{out} (SC)	(V)	M3011/6:	Output voltage vs. external reference (I_P=3x10As, 40-80Hz)	625±0,7%	mV
V_{out}–V_{Ref} (I_P=0)	(V)	M3226:	Offset voltage	± 0.725	mV
V_d	(V)	M3014:	Test voltage, rms, 1 s pin 1 – 6 vs. pin 7 – 10	1.5	kV
V_e	(AQL 1/S4)		Partial discharge voltage acc.M3024 (RMS) with V_{vor} (RMS)	1400 1750	V V

Type Testing (Pin 1 - 6 to Pin 7 - 10)

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	kV
V_e	Partial discharge voltage acc.M3024 (RMS) with V_{vor} (RMS)		1400 1750	V V

Applicable documents

Current direction: A positive output current appears at point V_{out}, by primary current in direction of the arrow.
Enclosures according to IEC529: IP50.
Further standards UL 508, file E317483, category NMTR2 / NMTR8

Datum	Name	Index	Amendment
11.08.14	DJ	83	Inspection: Vout changed from Ip=50A, 40-80Hz ➔ Ip=3x10As, 40-80Hz and defined as SC measure.
			Offset voltage changed. CN-14-077

Hrsg.: KB-E editor	Bearb: DJ designer		KB-PM: Sn. check			freig.: HS released

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 $I_P = 0{,}9 \cdot I_{PN}$ 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_e

$U_{PD} = \sqrt{2} * V_e / 1{,}5$

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

$V_{vor} = 1{,}875 * U_{PD} / \sqrt{2}$

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

V_{work} Working voltage voltage according to IEC 61800-5-1 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

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

This “Additional information“ is no declaration of warranty according BGB §443.