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	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}	External Reference voltage range	0…4	V
	Internal Reference voltage	2.5 ±0.005	V
K_N	Turns ratio	1…3 : 1100	

Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{P,max}$	Max. measuring range	±200			
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			±2.5	mV
$\Delta V_o / V_{Ref} / \Delta V$	Temperature drift of V_{out} @ I_P=0, T_A= -40…85°C		3	10	ppm/°C
t_r	Response time @ 90% von I_{PN}		500		ns
Δt ($I_{P,max}$)	Delay time at di/dt = 100 A/µs		500		ns
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 (acc to M3101)	-40		+85	°C
m	Mass		15		g
V_C	Supply voltage	4.75	5	5.25	V
I_C	Current consumption		16		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)	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) overvoltage category 2			1020	V_{RMS}
U_{PD}	Rated discharge voltage			1400	V_P
Max. potential difference acc. to UL 508		RMS		600	V_{AC}

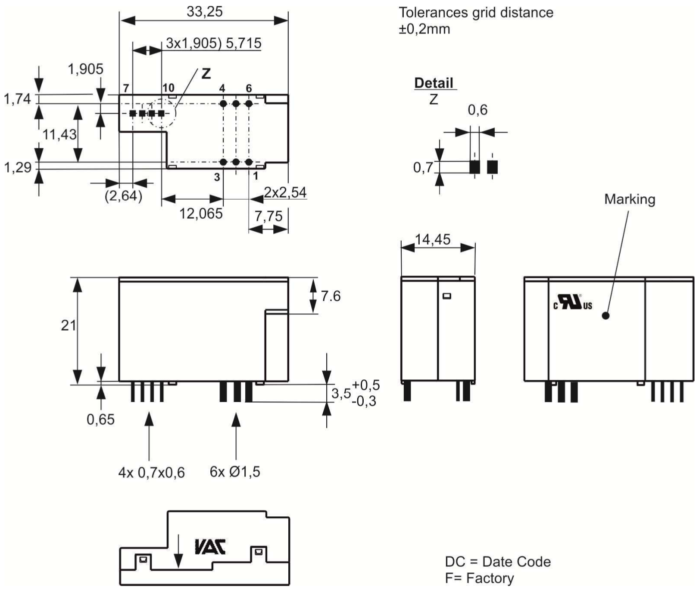
Date	Name	Issue	Amendment
24.04.17	DJ	85	Page A2, Mechanical outline changed (3,5 +/- 0,5 deleted) typo. Minor change
02.02.17	DJ	85	Page A1, M-sheet M3101 added (storage temperature) minor change.

VACUUMSCHMELZE	**SPECIFICATION**	**Item no.:** **T60404-N4646-X461**

K-no.: 24620	**100 A Current Sensor Module for 5V- Supply Voltage** For electronic current measurement: DC, AC, pulsed, mixed ..., with a galvanic isolation between primary circuit (short power) and secondary circuit (electronic circuit)	Date: 24.04.2017

Customer: Standard type	Customers Part no.:	

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



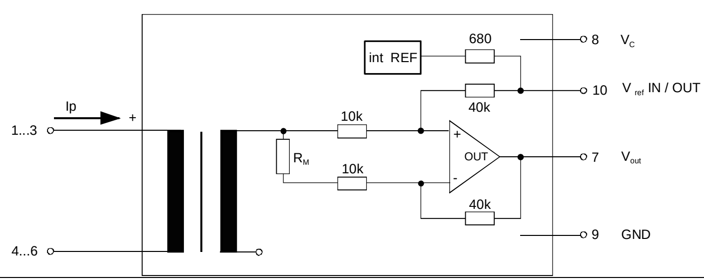
Connections:

1...6: ∅ 1.5 mm
7..10: 0.7*0.6 mm

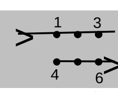
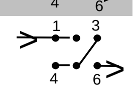
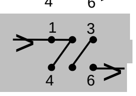
Marking:

UL-sign
4646-X461
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 current RMS I_S (I_P) [mA]	turns ratio K_N	primary resistance R_P [mΩ]	wiring
1	100	±200	2.5±0.625	1:1100	0.1	
2	50	±100	2.5±0.625	2:1100	0.45	
3	33.3	±66	2.5±0.625	3:1100	1	

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

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_P	Resistance / primary winding @ T_A=25°C			0.3	mΩ
R_S	Secondary coil resistance @ T_A=85°C			15	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
$\Delta X_{Ti} / \Delta V$	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}	Hystereses of V_{out} @ I_P=0A (after an overload of 10 x I_{PN})			0.5	mV
$\Delta V_0/\Delta V_C$	Supply voltage rejection ratio			1	mV/V
v_{oss}	Offsetripple (with 1 MHz- filter first order)			21	mV
v_{oss}	Offsetripple (with 100 kHz- filter firdt order)		3.5	6	mV
v_{oss}	Offsetripple (with 20 kHz- filter first order)		1	1.5	mV
C_k	Maximum possible coupling capacity (primary – secondary)	5	pF		

Mechanical stress according to M3209/3 30g
Settings: 10 – 2000 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. reference (I_P=3x10A_{Peak}, 40-80Hz)	625±0,7%	mV
$V_{out}-V_{Ref}$	(V)	M3226:	Offset voltage (I_P=0A)	± 0.0025	V
V_d	(V)	M3014:	Test voltage, 1 s pin 1 – 6 vs. pin 7 – 10	2.5	kV_{RMS}
V_e	(AQL 1/S4)		Partial discharge voltage acc.M3024 with V_{vor}	1500 1875	V_{RMS} V_{RMS}

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)	5	kV
V_e	Partial discharge voltage acc.M3024 with V_{vor}		1500 1875	V_{RMS} V_{RMS}

Applicable documents

Temperature of the primary conductor should not exceed 100°C.
Current direction: A positive output current appears at point V_{out}, by primary current in direction of the arrow.
Further standards UL 508 ; file E317483, category NMTR2 / NMTR8

Enclosures according to IEC529: IP50.

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

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