VAC 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: 24.01.2022
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

I_{PN}	Primary nominal r.m.s. current	100	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} ± 0.0025	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
Δ V_o / V_{Ref} / Δ 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
24.01.2022	NSch.	85	Applicable document on sheet 3 changed. „The color of the plastic material… added. Minor change.
24.04.17	DJ	85	Page A2, Mechanical outline changed (3,5 +/- 0,5 deleted) typo. Minor change

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

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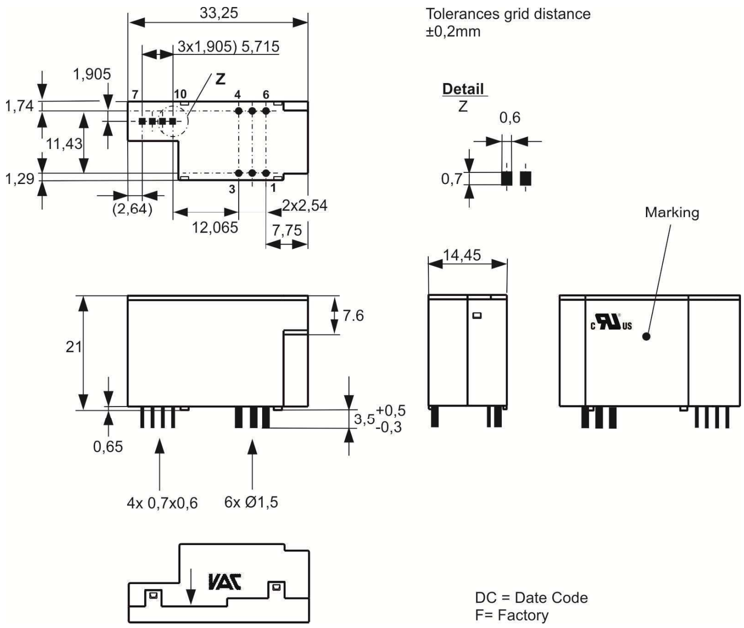
Mechanical outline (mm): General tolerances DIN ISO 2768-c



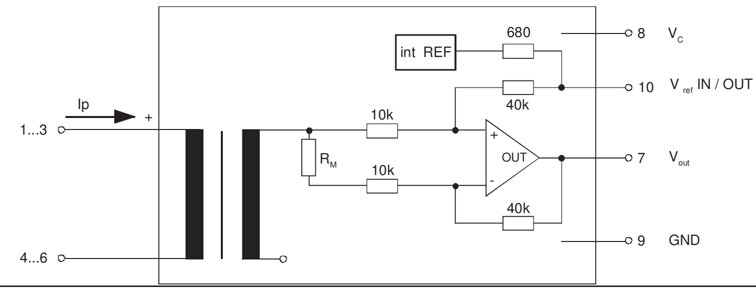
Connections:

1...6: ∅ 1.5 mm
7..10: 0.7*0.6 mm

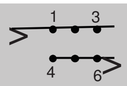
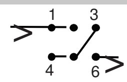
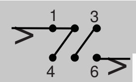
Marking:

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]	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.: SB 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.
„The color of the plastic material is not specified and the current sensor can be supplied in different colors (e.g. brown, black, white, natural). This has no effect on the specifications or UL approval."

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

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