VACUUMSCHMELZE	SPECIFICATION	Item no.: T60404-N4646-X460

K-no.: 24619	**50 A Current Sensor 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.:	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
- 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} ± 0.0025	V
V_{Ref}	External Reference voltage range	0…4	V
	Internal Reference voltage	2.5 ±0.005	V
K_N	Turns ratio	1…3 : 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			±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		-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	RMS		600	V
V_{work}	Working voltage	(table 7 acc. to EN61800-5-1) overvoltage category 2	RMS		1020	V
U_{PD}	Rated discharge voltage		peak value		1400	V
	Max. potential difference acc. to UL 508		RMS		600	V_{AC}

Date	Name	Issue	Amendment
24.01.2022	NSch.	83	Applicable documents changed on sheet 3. „The color of the plastic material… added. Minor change.
15.05.14	DJ	83	Marking changed from 4646X460 ➔ 4646-X460. CN-14-009

Hrsg.: KB-E (editor)	Bearb: DJ (designer)		KB-PM: KRe. (check)			freig.: SB (released)

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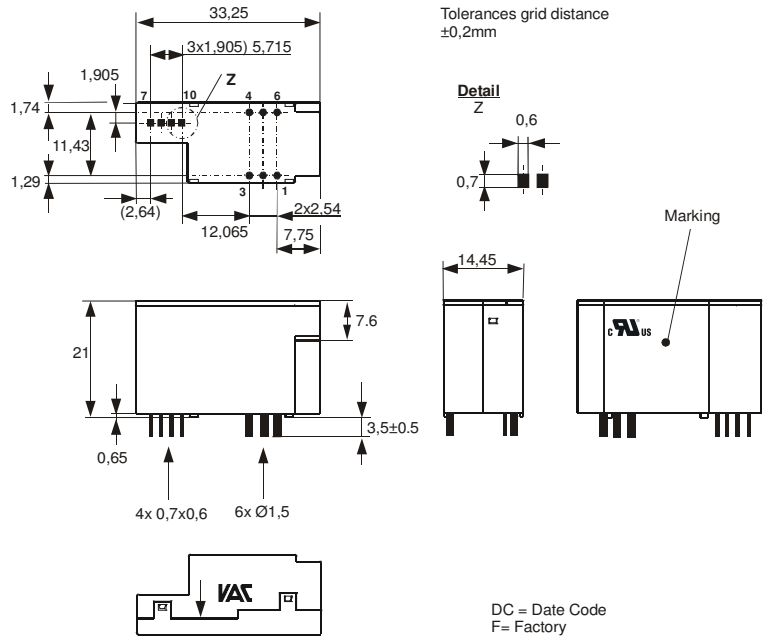
Mechanical outline (mm): General tolerances DIN ISO 2768-c



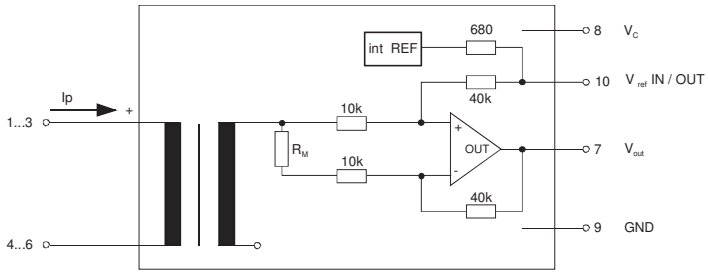
Connections:

1...6: ∅ 1.5 mm
7..10: 0.7*0.6 mm

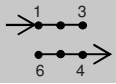
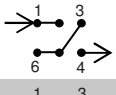
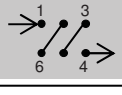
Marking:

UL-sign
4646-X460
F DC

Schematic diagram



Possibilities of wiring (@ T_A = 85°C)

primary windings	primary current RMS	primary current maximal	output voltage RMS	turns ratio	primary resistance	wiring
N_P	I_P [A]	$\hat{I}_{P,max}$ [A]	V_{out} (I_P) [V]	K_N	R_P [mΩ]	
1	50	±150	2.5±0.625	1:1400	0.1	
2	25	±75	2.5±0.625	2:1400	0.45	
3	16,7	±50	2.5±0.625	3:1400	1	

Hrsg.: KB-E editor	Bearb: DJ designer		KB-PM: KRe. 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			30	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
ΔX_{Ti} / ΔV	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=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)			22	mV
v_{oss}	Offsetripple (with 100 kHz- filter firdt order)		3	8	mV
v_{oss}	Offsetripple (with 20 kHz- filter first order)		0.6	1.5	mV
C_k	Maximum possible coupling capacity (primary – secondary)		5		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)

V_{out} (I_P=I_{PN})	(V)	M3011/6:	Output voltage vs. reference (I_P=3x10As, 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 – 6 vs. pin 7 – 10	2.5	kV
V_e	(AQL 1/S4)		Partial discharge voltage acc.M3024 (RMS) with V_{vor} (RMS)	1500 1875	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)	5	kV
V_e	Partial discharge voltage acc.M3024 (RMS) with V_{vor} (RMS)		1500 1875	V V

Applicable documents

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.
Temperature of the primary conductor should not exceed 100°C
„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 sever al 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

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

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

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

ε_L: Linearity fault defined by

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