VACUUMSCHMELZE	Datasheet	Item no.: T60404-N4647-P985

K-No.:30261	**3A Differential Current Sensor for 5V Supply Voltage** For the electronic measurement of current: DC, AC, pulsed ..., with galvanic isolation between the primary and the secondary circuit	Date: 18.02.2022

Customer: Standard type	Customers Part no:	Page 1 of 3

Description

- Closed loop (compensation) Current Sensor with magnetic probe
- Printed circuit board mounting
- Casing and materials UL-listed

Characteristics

- excellent accuracy
- very low offset current
- very low temperature dependency and offset drift
- very low hysteresis of offset current
- short response time and wide frequency bandwidth
- compact design
- reduced offset ripple

Applications

Mainly used for stationary operation in industrial applications:

- Solar inverter

Electrical data - Ratings

I_{PN}	Primary nominal RMS current	200	A
$I_{\Delta N}$	Differential rated RMS current	3	A
V_{OUT}	Output voltage @ $I_{\Delta P}$	$V_{REF} \pm (1.2 * I_{\Delta P} / I_{\Delta N})$	V
$V_{OUT}(0)$[1]	Output voltage @ I_P=0A, ϑ_A=25°C	$V_{REF} \pm 0.01$	V
V_{OUT}(Error)	in case of error (current sensor) V_{OUT} < 0.5V is set	< 0.5	V
V_{REF}	internal reference voltage	2.5 ± 0.005	V
	external reference voltage range	1.4…3.5	V
V_{REF}(test current)[2]	Reference voltage (external)	0 … 0.1	V
V_{OUT}(test current)[2]	Output voltage @ V_{REF} = 0…0.1V	$V_{OUT}(0)$ + 0.17±0.06	V
K_N	Transformation ratio	1 : 1 : 1 : 1000	
	Turns count for test winding	20	

[1] with switching on and after “test current” the sensor is degaussed by an internal AC-current for about 110ms. In this time the output is set to V_{OUT} < 0.5V.
[2] If V_{REF} is set external to 0…0.1V an internal test current is generated.

Accuracy – Dynamic performance data

		min.	typ.	max.	Unit
$I_{\Delta P,max}$	Max. measuring range (differential current)	±5			A
X	Accuracy @ I_{PN}, ϑ_A = 25°C			1.5	%
ε_L	Linearity			1	%
V_O	Offset voltage @ I_P = 0A, ϑ_A = 25°C			10	mV
$\Delta V_O/\Delta\vartheta$	Temperature drift of V_{OUT} @ I_P=0A, ϑ_A		0.06		mV/°C
t_r	Response time @ 90% of $I_{\Delta N}$		30		µs
f	Frequency bandwidth	DC…10			kHz

General data

		min.	typ.	max.	Unit
ϑ_A	Ambient operation air temperature	-40		105	°C
ϑ_S	Ambient storage temperature (acc. to M3101)	-40		105	°C
ϑ_{busbar}	Permissible temperature of primary conductor			115	°C
m	Mass		175		g
V_C	Supply voltage	4.75	5	5.25	V
I_C	Supply current at I_P = 0A and RT		15		mA
1)$s_{clear, pri-sec}$	Clearance (component without solder pad)	12			mm
1)$s_{creep, pri-sec}$	Creepage (component without solder pad)	13			mm
1)$s_{clear, pri-pri}$	Clearance	7			mm
1)$s_{creep, pri-pri}$	Creepage	10			mm
1)$U_{sys, re}$	System Voltage (reinforced insulation)			600	V_{RMS}
1)$U_{work, re}$	Working voltage (reinforced insulation)			1000	V_{RMS}
1)U_{PD}	Rated discharge voltage			1414	V_{PEAK}
1)$U_{sys, basic}$	System Voltage (basic insulation)			1500	V_{RMS}
1)$U_{work, basic}$	Working voltage (basic insulation)			2500	V_{RMS}

1)Constructed and manufactured and tested in accordance with IEC 61800-5-1:2007
Insulation material group 1, Pollution degree 2, Overvoltage category III

Date	Name	Issue	Amendment
18.02.2022	NSch.	81	Other instructions on sheet 3 changed. The color of the plastic material… added. Minor change
15.03.2021	DJ	81	Typo ➔ $I_{\Delta N,max}$ chaned to $I_{\Delta P,max}$. Minor change

Editor: R&D-PD NPI D	Designer: DJ	MC-PM: NSch.			Released: SB

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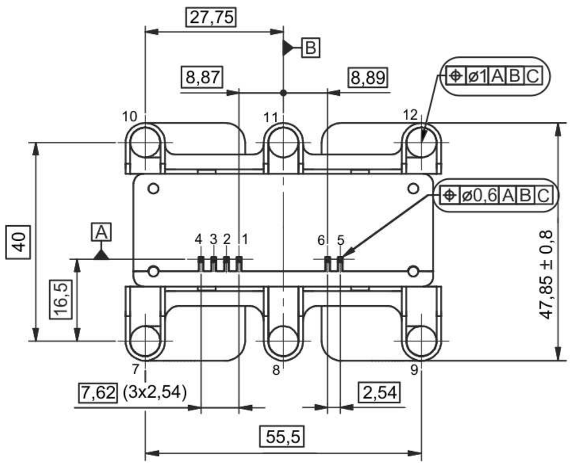
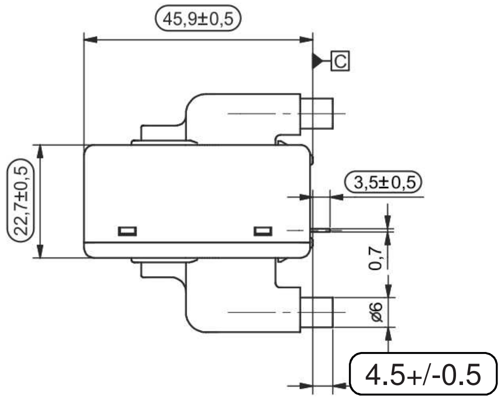
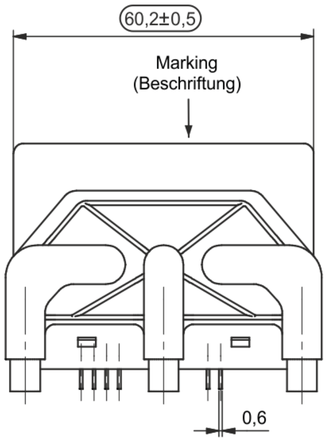
Mechanical outline (mm): General tolerances DIN ISO 2768-c







DC = Date Code
F = Factory

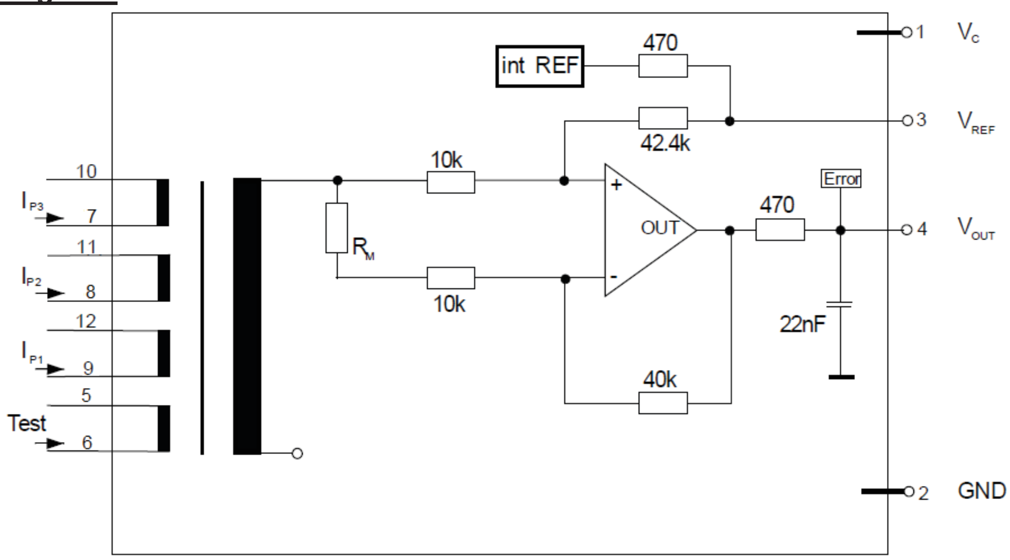
test dimension

Marking:

VAC UL-sign
4647-P985
F DC

Format DC: YYWW

Schematic diagram:



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Electrical data: (investigate by a type checking)

		min.	typ.	max.	Unit
$V_{C,max}$	maximum supply voltage (without function)			6	V
I_C	Supply current with primary current	$15mA+I_{\Delta P}*K_N+V_{OUT}/R_L$			mA
$I_{OUT,SC}$	Short circuit output current		±20		mA
R_S	Secondary coil resistance @ ϑ_A = 85°C		55		Ω
R_P	Resistance of primary conductor @ ϑ_A = 25°C		0.07		mΩ
$R_{i,REF}$	Internal resistance of reference input		470		Ω
$R_{i,OUT}$	Output resistance of V_{OUT}		470		Ω
$\Delta X_{\vartheta}/\Delta\vartheta$	Temperature drift of X @ ϑ_A = -40°C ... 85°C			400	ppm/K
$\Delta V_{REF}/\Delta\vartheta$	Temperature drift of V_{REF} @ ϑ_A = -40°C ... 85°C		5	50	ppm/K
$\Delta V_O = \Delta(V_{OUT}-V_{REF})$	Sum of any offset drift included:		10		mV
V_{Ot}	Long term drift of V_O		5		mV
$V_{O\vartheta}$	Temperature drift of V_O @ ϑ_A = -40°C … 85°C		5		mV
$\Delta V_O/\Delta V_C$	Supply voltage rejection ratio		4		mV/V
V_{OH}	Hysteresis of V_{OUT} @ I_P = 0 (after an overload of 800x $I_{\Delta N}$)		25	40	mV
$V_{OH,\ Demag}$	Hysteresis after Degaussing		5	15	mV
v_{OSS}	Offsetripple (without external filter)		32		mV_{PP}
v_{OSS}	Offsetripple (with 70 kHz-Filter, first order)		15		mV_{PP}
v_{OSS}	Offsetripple (with 1.6 kHz-Filter, first order)		0.6		mV_{PP}
	Mechanical stress according to M3209/3 Settings: 10-2000Hz, 1min/Octave, 2 hours		2		g

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

V_{OUT} (SC)	(100%) M3011/6	Output voltage	1182 … 1218	mV
V_O	(100%) M3226	Offset voltage	±10	mV
U_d	(100%) M3014	Test voltage, 1s	1.8	kV_{RMS}
U_{PDE} U_{PDE}*1.875	(AQL 1/S4) M3024	Partial discharge voltage (extinction)	1.5 1.875	kV_{RMS}

Type Tests: (Precondition acc. M3236, Tested between primary and secondary circuit)

$\hat{U}_{W,\ basic}$	M3064	HV Impulse voltage (1.2µs/50µs wave form) 5 pulses -> polarity +, 5 pulses -> polarity -	10.5	kV
$U_{d,\ basic}$	M3014	Test voltage, 60s	5	kV_{RMS}
U_{PDE} U_{PDE}*1.875	M3024	Partial discharge voltage (extinction)	1.5 1.875	kV_{RMS}

Other instructions

- A positive output voltage appears at point V_{OUT} vs. V_{REF}, if primary current flows in direction of the arrow.
- Requirement to fulfil UL requirements: operation temperature range: -40 … 70°C
- Housing and bobbin material UL-listed: Flammability class 94V-0.
- Housing without red phosphorous.
- Further standards: UL 508 file E317483, category NMTR2 / NMTR8
- 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