



## AC/DC-sensitive Differential Current Sensors (DI-Sensors)

- Closed loop sensors with magnetic probe for highest accuracy and reliability
- Differential current range typically 30 to 300 mA
- Full load current to 50 A
- Single +5 V voltage supply
- Voltage output for direct connection at A/D – converters
- Automatic demagnetization of the sensor core for offset decrease
- Self-monitoring and test functions
- Measuring accuracy 1.5%
- Smallest temperature drift, highest long-term stability
- Metal screen against external fields
- Frequency range DC to 10 kHz
- Variants with passing through opening and with integrated primary conductors, with or without test winding
- Active sensors with integrated electronics
- Economical construction



### Applications

Control devices with AC/DC-sensitive differential current sensors are used primarily in transformerless solar inverters. An important safety function of these

devices is the monitoring of the leakage current of the entire system from photovoltaic - modules and inverter against earth. A defective system can become dangerous for people or release fires. Before it comes so far, the inverter must disconnect from the grid. The leakage current contains DC and AC components. Therefore an AC/DC-sensitive monitoring unit is necessary. Their heart is the VAC differential current sensor, whose output voltage is evaluated by the control system of the solar inverter.

Generally protection devices with AC/DC-sensitive differential current sensors can be used everywhere, where flat or pulsating DC can develop, whose amount is permanently greater than zero. Further examples are power supplies producing high DC voltages or uninterruptable power supplies.

### Variants of the VAC Sensors

It is both a type available with an opening for the primary conductor, as well as types with built-in primary conductors for PCB mounting. There are versions with two or four conductors for single and three phase systems.

The additional functions demagnetization, error signaling and internal test power are accessible through defined levels at the inputs / outputs  $V_{out}$  and  $V_{ref}$ .



### Functional description, technical data, available Types

Item no.	T60404-N4646-			
	... X950	... X960	... X975	...X976
<b>Style</b>				
<b>Dimensional diagram no.</b>	1	2	3	4
<b>Primary conductor style</b>	opening	via PCB. Two conductors A= 6,2 mm <sup>2</sup> for operating current	via PCB. Two conductors A= 6,2 mm <sup>2</sup> for operating current, one conductor for external test current	via PCB. Four conductors A= 4,9 mm <sup>2</sup> for operating current, one conductor for external test current
<b>Properties</b>				
<b>Supply voltage</b>	5 V			
<b>Supply current</b>	typ. 17 mA			
<b>Maximum primary current</b>	50 A			
<b>Nominal differential current</b>	300 mA			
<b>Output voltage</b>	reference voltage $\pm$ (0,74 x differential current / 300 mA)			
<b>Measuring range</b>	$\pm$ 850 mA			
<b>Output voltage range</b>	0,5 V ... 4,5 V			
<b>Reference voltage</b>	2,5 V reference voltage, internally generated or Vref=1.4 to 3.5 from external source			
<b>Frequency range</b>	0 ... 10 kHz, limited by internal low pass filter. An additional external filter with e.g. 5 kHz roll off frequency is recommended.			
<b>Measuring error</b> at T <sub>amb</sub> = 25°C	< 1,5 % of nominal differential current			
<b>Temperature drift</b> -40 ... +85°C	< 0,1 mV/°C			
<b>Response time</b> (up to 90% of nominal differential current)	< 35 $\mu$ s			
<b>Isolation strength</b> acc. to EN50178 (primary- and test current conductor vs. signal and supply voltage connections)	to be maintained by a proper insulation of the primary onductor			
- system voltage - working voltage			600 V 1.000 V	
<b>Additional functions</b>				
<b>Error condition</b>				
- indicated by - criteria	- output voltage < 0,5 V - break or short circuit of the magnetic probe, supply voltage smaller 4 Volts, during the demagnetization cycle.			
<b>Demagnetization</b> of the Sensor core				
- triggered by - duration of cycle	- feeding the supply voltage <i>or</i> transition from <1 V to 2,5 V (normal voltage) at the reference voltage input, i.e. after test current cycle - 120 ms			
<b>Internal DC test current</b> for self test				
- triggered by - output signal at test current	- setting reference voltage to 0 V (<1 V) - U <sub>DC</sub> = +0,25 V at V <sub>ref</sub> = 0 V. A possibly appearing primary current is superimposed			



**Maßbilder**

Maßbild Nr. 1

Typen  
**T60404-N4646-X950**

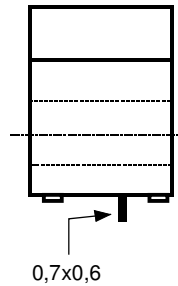


Toleranz der Stiftabstände  
 $\pm 0,2$ mm  
(Tolerances grid distance)

Marking:  
UL Mark  
Excerpt from  
Item no.  
F DC, in which  
F = Factory  
DC = Date Code

Connections:  
1 ... 4:  $0,7 \times 0,6$  mm

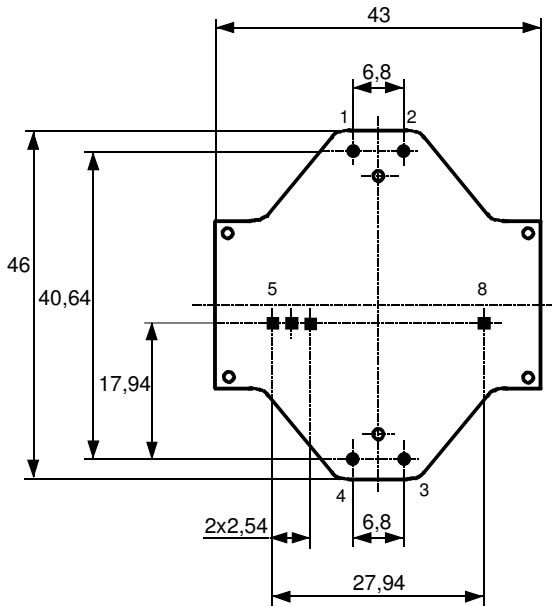
Pin Assignments  
1  $V_c +5 V$   
2 GND  
3  $V_{ref}$  In/Out  
4  $V_{out}$





Maßbild Nr. 2

Typ  
T60404-N4646-X960



Toleranz der Stiftabstände  $\pm 0,2\text{mm}$   
(Tolerances grid distance)

Marking:  
UL Mark  
Excerpt from  
Item no.  
F DC, in which  
F = Factory  
DC = Date Code

Connections:  
1 ... 4:  $\text{Ø } 2,8 \text{ mm}$   
5 ... 8:  $0,7 \times 0,6 \text{ mm}$

Pin Assignments  
1 ... 4: primary current  
5  $V_{\text{out}}$   
6  $V_{\text{ref}}$   
7 GND  
8  $V_c +5 \text{ V}$



Maßbild Nr. 3

Typ  
T60404-N4646-X975

Toleranz der Stiftabstände  $\pm 0,3\text{mm}$   
(Tolerances grid distance)

Prüfmaß  
(test dimension)

Beschriftung  
(marking)

DC = Date Code  
F = Factory



Marking:

UL Mark  
Excerpt from  
Item no.  
F DC, in which  
F = Factory  
DC = Date Code

Connections:

1 ... 4:  $\varnothing 2,8\text{ mm}$   
5 ... 8:  $0,7 \times 0,6\text{ mm}$   
9, 10:  $\varnothing 0,8\text{ mm}$

Pin Assignments

1 ... 4: primary current  
9, 10: test current  
5  $V_{out}$   
6  $V_{ref}$   
7 GND  
8  $V_c +5\text{ V}$



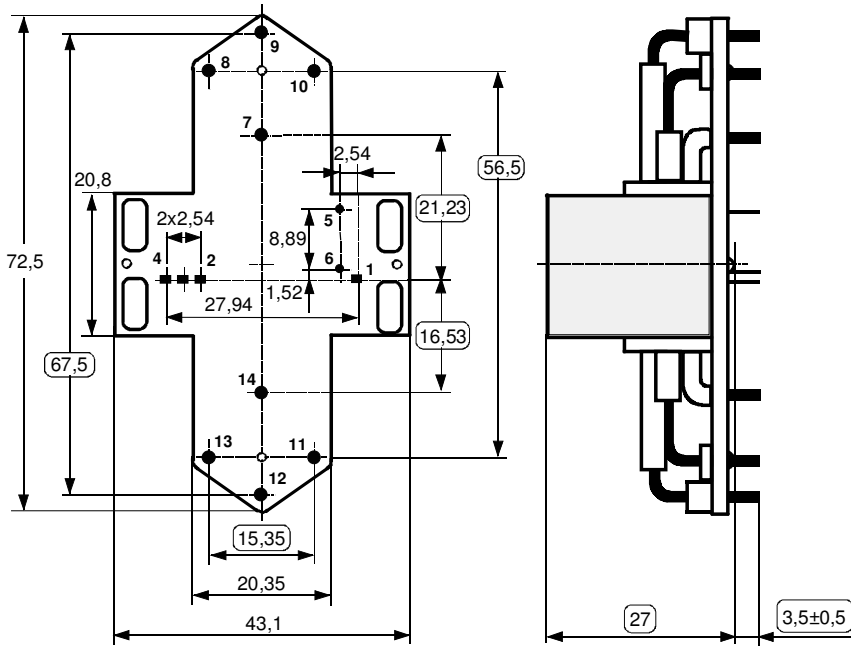
**Maßbild Nr. 4**

**Typ  
T60404-N4646-X976**

Toleranz der Stiftabstände  
 Pin 1...6 = ±0,2mm  
 Pin 7...14 = ±0,3mm  
 (Tolerances grid distance)

DC =Date Code  
 F =Factory

○ Prüfmaß  
 (test dimension)



Beschriftung  
 (marking)



**Marking:**  
 UL Mark  
 Excerpt from  
 Item no.  
 F DC, in which  
 F = Factory  
 DC = Date Code

**Connections:**  
 1 ... 4: 0,6 x 0,7 mm  
 5 ... 6: Ø 0,8 mm  
 7 ... 14: Ø 2,5 mm

**Pin Assignments**  
 1 V<sub>c</sub> +5 V  
 2 GND  
 3 V<sub>ref</sub>  
 4 V<sub>out</sub>  
 5, 6: test current  
 7 ... 14: primary current



**VACUUMSCHMELZE GMBH & CO. KG**

GRÜNER WEG 37  
D-63450 HANAU  
PHONE +49 6181 38 0  
FACSIMILE +49 6181 38 2645  
INFO@VACUUMSCHMELZE.COM  
WWW.VACUUMSCHMELZE.COM

**VAC SALES USA LLC**

2935 DOLPHIN DRIVE  
SUITE 102  
42701 ELIZABETHTOWN KY / USA  
PHONE +1 270 769-1333  
FACSIMILE +1 270 765 3118  
INFO-USA@VACUUMSCHMELZE.COM

**VACUUMSCHMELZE SALES OFFICE SINGAPORE**

61 KAKI BUKIT AVENUE 1 #04-16  
SHUN LI INDUSTRIAL PARK  
SINGAPORE 417943  
TELEFON +65 6391 2600  
FAX +65 6391 2601  
VACSINGAPORE@VACUUMSCHMELZE.COM

## **VACUUMSCHMELZE GmbH & Co. KG**

### **ADVANCED MATERIALS – THE KEY TO PROGRESS**

Published by VACUUMSCHMELZE GmbH & Co. KG, Hanau  
© VACUUMSCHMELZE 2012. All rights reserved.

As far as patents or other rights of third parties are concerned, liability is only assumed for products per se, not for applications, processes and circuits implemented within these products. The information describes the type of product and shall not be considered as assured characteristics. Terms of delivery and rights to change design reserved.

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9