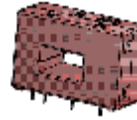


K-No.: 25150

**125 A Current Sensor**

 For the electronic measurement of currents:  
 DC, AC, pulsed, mixed ..., with a galvanic isolation  
 between the primary circuit (high power)  
 and the secondary circuit (electronic circuit)


Date: 20.10.2010

Customer: Standard type

Customers Part no.:

Page 1 of 2

**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
- Uninterruptable Power Supplies (UPS)

**Electrical data – Ratings**

|          |                                      |            |          |
|----------|--------------------------------------|------------|----------|
| $I_{PN}$ | Primary nominal r.m.s. current       | 125        | A        |
| $R_M$    | Measuring resistance $V_C = \pm 12V$ | 5 ... 250  | $\Omega$ |
|          | $V_C = \pm 15V$                      | 18 ... 400 | $\Omega$ |
| $I_{SN}$ | Secondary nominal r.m.s. current     | 125        | mA       |
| $K_N$    | Turns ratio                          | 1: 1000    |          |

**Accuracy – Dynamic performance data**

|                        |   | min.      | typ. | max. | Unit    |
|------------------------|---|-----------|------|------|---------|
| $I_{P,max}$            | Max. measuring range  |           |      |      |         |
|                        | @ $V_C = \pm 12V$ , $R_M = 14 \Omega$ ( $t_{max} = 10sec$ ) | $\pm 201$ |      |      | A       |
|                        | @ $V_C = \pm 15V$ , $R_M = 25 \Omega$ ( $t_{max} = 10sec$ ) | $\pm 214$ |      |      | A       |
| X                      | Accuracy @ $I_{PN}$ , $T_A = 25^\circ C$                    |           | 0.1  | 0.5  | %       |
| $\epsilon_L$           | Linearity   |           |      | 0.1  | %       |
| $I_0$                  | Offset current @ $I_P = 0$ , $T_A = 25^\circ C$             |           | 0.03 | 0.1  | mA      |
| $t_r$                  | Response time   |           | 1    |      | $\mu s$ |
| $\Delta t (I_{P,max})$ | Delay time at $di/dt = 100 A/\mu s$                         |           | 0.5  |      | $\mu s$ |
| f                      | Frequency bandwidth   | DC...100  |      |      | kHz     |

**General data**

|             |  | min.       | typ.            | max.        | Unit       |
|-------------|--|------------|-----------------|-------------|------------|
| $T_A$       | Ambient operating temperature  | -40        |                 | +85         | $^\circ C$ |
| $T_S$       | Ambient storage temperature  | -40        |                 | +90         | $^\circ C$ |
| m           | Mass   |            | 30              |             | g          |
| $V_C$       | Supply voltage   | $\pm 11.4$ | $\pm 12/\pm 15$ | $\pm 15.75$ | V          |
| $I_C$       | Current consumption  |            | 18              |             | mA         |
|             | Constructed and manufactured and tested in accordance with EN 61800-5-1 (Pin 1- 4 to inner hole)<br>Reinforced insulation, Insulation material group 1, Pollution degree 2 |            |                 |             |            |
| $S_{clear}$ | Clearance (component without solder pad)   | 12         |                 |             | mm         |
| $S_{creep}$ | Creepage (component without solder pad)  | 12         |                 |             | mm         |
| $V_{sys}$   | System voltage overvoltage category 3  |            |                 | 600         | V          |
| $V_{work}$  | Working voltage (table 7 acc. to EN61800-5-1)  |            |                 |             |            |
|             | Over voltage category 2  |            | RMS             | 1000        | V          |
| $U_{PD}$    | Rated discharge voltage  |            | peak value      | 1225        | V          |

**Maximal continuous and peak currents at defined temperatures**
**Supply voltage  $\pm 12V$ :**

| $T_A$       | 85 $^\circ C$ | 85 $^\circ C$ | 70 $^\circ C$ | 55 $^\circ C$ |
|-------------|---------------|---------------|---------------|---------------|
| $I_P$       | 125 A         | 100 A         | 130 A         | 150 A         |
| $I_{P,max}$ | 205 A         | 224 A         | 255 A         | 262 A         |
| $R_M$       | 14 $\Omega$   | 10 $\Omega$   | 5 $\Omega$    | 5 $\Omega$    |

**Supply voltage  $\pm 15V$ :**

| $T_A$       | 85 $^\circ C$ | 85 $^\circ C$ | 70 $^\circ C$ | 55 $^\circ C$ |
|-------------|---------------|---------------|---------------|---------------|
| $I_P$       | 125 A         | 80 A          | 100 A         | 125 A         |
| $I_{P,max}$ | 176 A         | 218 A         | 223 A         | 255 A         |
| $R_M$       | 39 $\Omega$   | 25 $\Omega$   | 25 $\Omega$   | 18 $\Omega$   |

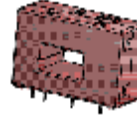
| Date     | Name | Issue | Amendment  |
|----------|------|-------|--|
| 20.10.10 | Le   | 81    | Mechanical outline – Error correction – distance of fastening bores (41,4 to 40,64) lapidary change. |

|                       |                         |  |                     |  |                          |
|-----------------------|-------------------------|--|---------------------|--|--------------------------|
| Hrsg.: KB-E<br>editor | Bearb.: Le.<br>designer |  | KB-PM: KRe<br>check |  | freig.: prs.<br>released |
|-----------------------|-------------------------|--|---------------------|--|--------------------------|

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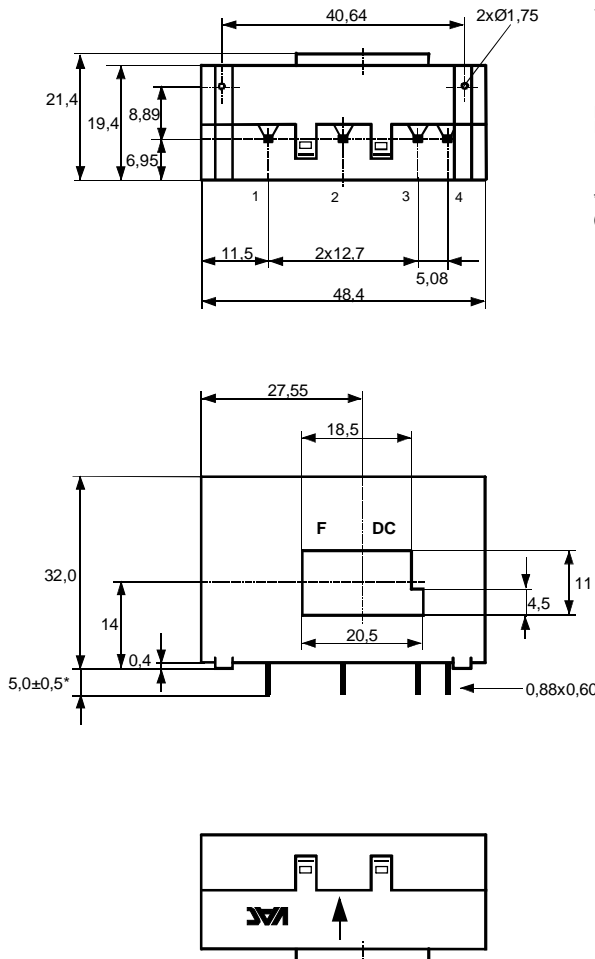
Customer: Standard type

Customers Part no.:

Page 2 of 2

**Mechanical outline (mm):**

General tolerances DIN ISO 2768-c



Toleranz der Stiftabstände ±0,2mm  
(Tolerances grid distance)

DC = Date Code  
F = Factory

\*= vorläufig  
(preliminary)

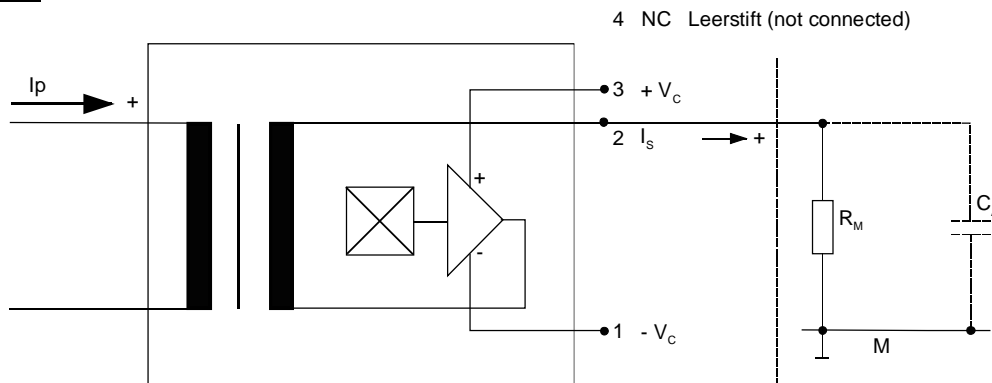
Connections:

1...4: 0,6 x 0,88 mm

Marking:

4646X200  
F DC

**Schematic diagram**



Temperature of the primary conductor should not exceed 110°C  
Additional indications are obtainable on request.  
This specification is no declaration of warranty acc. BGB §443 dar.

Hrsg.: KB-E  
editor

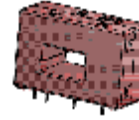
Bearb: Le.  
designer

KB-PM: KRe  
check

freig.: prs.  
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**Customer:**
**Customers Part No.:**
**Page** 1 **of** 3

**Electrical Data (investigate by a type checking)**

|                         |   | min. | typ.  | max.     | Unit     |
|-------------------------|---|------|-------|----------|----------|
| $V_{Ctot}$              | Maximum supply voltage (without function)<br>$\pm 15.75$ to $\pm 18$ V: for 1s per hour |      |       | $\pm 18$ | V        |
| $R_S$                   | Secondary coil resistance @ $T_A=85^\circ\text{C}$                                      |      |       | 41       | $\Omega$ |
| $X_{Ti}$                | Temperature drift of X @ $T_A = -40 \dots +85^\circ\text{C}$                            |      |       | 0.1      | %        |
| $I_{0ges}$              | Offset current (including $I_0, I_{0t}, I_{0T}$ )                                       |      |       | 0.14     | mA       |
| $I_{0t}$                | Long term drift Offset current $I_0$  |      | 0.05  |          | mA       |
| $I_{0T}$                | Offset current temperature drift $I_0$ @ $T_A = -40 \dots +85^\circ\text{C}$            |      | 0.05  |          | mA       |
| $I_{0H}$                | Hysteresis current @ $I_P=0$ (caused by primary current $10 \times I_{PN}$ )            |      | 0.05  | 0.1      | mA       |
| $\Delta I_0/\Delta V_C$ | Supply voltage rejection ratio  |      |       | 0.01     | mA/V     |
| $i_{loss}$              | Offset ripple (with 1 MHz- filter first order)  |      |       | 0.1      | mA       |
| $i_{loss}$              | Offset ripple (with 100 kHz- filter first order)  |      | 0.015 | 0.04     | mA       |
| $i_{loss}$              | Offset ripple (with 20 kHz- filter first order)   |      | 0.007 | 0.01     | mA       |
| $C_k$                   | Maximum possible coupling capacity (primary – secondary)                                |      | 7     |          | pF       |

**Inspection** (Measurement after temperature balance of the samples at room temperature)

|                |            |         |   |               |        |
|----------------|------------|---------|---|---------------|--------|
| $K_N(N_1/N_2)$ | (V)        | M3011/6 | Transformation ratio ( $I_P=100\text{A}$ , 40-80 Hz)              | 1: 995...1005 |        |
| IP             | (V)        | M3011/4 | Primary current   | 100           | A      |
| $I_0$          | (V)        | M3226   | Offset current  | < 0.1         | mA     |
| $V_d$          | (V)        | M3014:  | Test voltage, rms, 1 s<br>pin 1 – 3 vs. hole                      | 1.8           | kV     |
| $V_e$          | (AQL 1/S4) |         | Partial discharge voltage acc.M3024 (RMS)<br>with $V_{vor}$ (RMS) | 1300<br>1625  | V<br>V |

**Type Testing** (Pin 1 - 3 to hole)

|       |  |  |  |              |        |
|-------|--|--|--|--------------|--------|
| $V_W$ |  |  | HV transient test according to M3064 (1,2 $\mu\text{s}$ / 50 $\mu\text{s}$ -wave form) | 8            | kV     |
| $V_d$ |  |  | Testing voltage to M3014   | (5 s)        | 3.6 kV |
| $V_e$ |  |  | Partial discharge voltage acc.M3024 (RMS)<br>with $V_{vor}$ (RMS)                      | 1300<br>1625 | V<br>V |

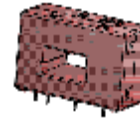
| Datum    | Name | Index | Änderung      |
|----------|------|-------|---------------|
| 20.10.10 | Le   | 81    | Date updated. |

|                       |                        |  |                     |  |                          |
|-----------------------|------------------------|--|---------------------|--|--------------------------|
| Hrsg.: KB-E<br>editor | Bearb.: Le<br>designer |  | KB-PM: KRe<br>check |  | freig.: prs.<br>released |
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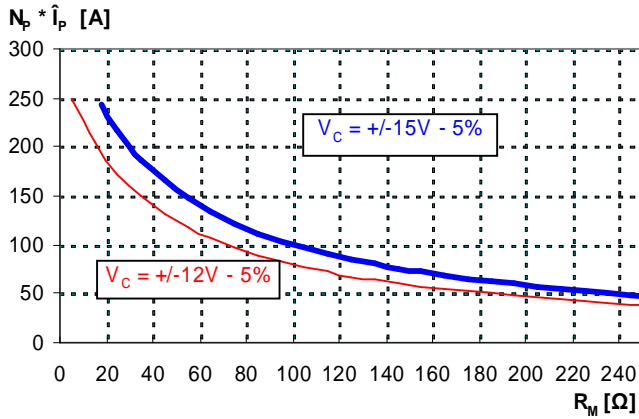
Customer:

Customers Part No.:

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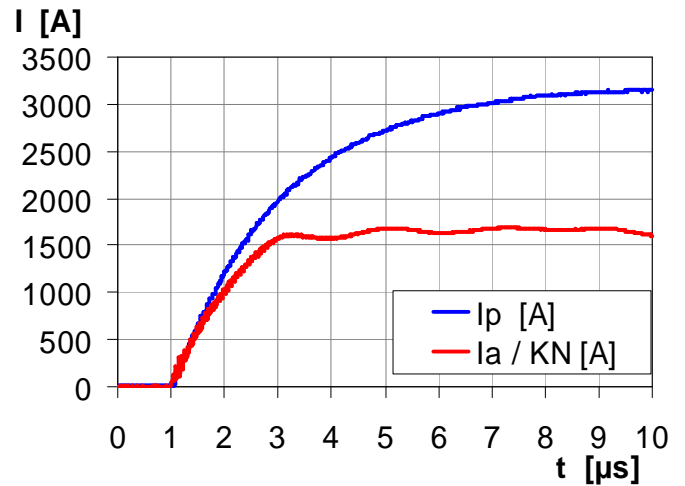
**Limit curve of measurable current  $\hat{I}_p(R_M)$**

@ ambient temperature  $\leq 85^\circ\text{C}$



**Maximum measuring range (μs-range)**

Output current behaviour of a 3kA current pulse  
@  $V_C = \pm 15\text{V}$  und  $R_M = 10\Omega$



Fast increasing currents (higher than the specified  $I_{p,max}$ ), e.g. in case of a short circuit, can be transmitted because the currents are transformed directly and be limited by diodes only.

The offset ripple can be reduced by an external low pass. Simplest solution is a passive low pass filter of 1st order with

$$f_g = \frac{1}{2p \cdot R_M \cdot C_a}$$

In this case the response time is enlarged.

It is calculated from:

$$t'_r \leq t_r + 2,5R_M C_a$$

**Applicable documents**

Current direction: A positive output current appears at point  $I_s$ , by primary current in direction of the arrow.

Housing and bobbin material UL-listed: Flammability class 94V-0.

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check

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