### 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
- Low 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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{PN}$</td>
<td>100 A</td>
</tr>
<tr>
<td>$R_M$</td>
<td>10 Ω - 200 Ω</td>
</tr>
<tr>
<td>$V_{C}=±12V$</td>
<td>10 Ω - 400 Ω</td>
</tr>
<tr>
<td>$I_{SN}$</td>
<td>66.7 mA</td>
</tr>
<tr>
<td>$K_N$</td>
<td>1...3 : 1500</td>
</tr>
</tbody>
</table>

### Accuracy – Dynamic Performance Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>min.</th>
<th>typ.</th>
<th>max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{P,max}$</td>
<td>±165</td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>$X$</td>
<td>0.1</td>
<td>0.5</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>$r_l$</td>
<td>0.1</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_0$</td>
<td>0.02</td>
<td>0.1</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>$t_r$</td>
<td>500</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta t (I_{P,max})$</td>
<td>200</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$f$</td>
<td>DC...200 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### General Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>min.</th>
<th>typ.</th>
<th>max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_A$</td>
<td>-40</td>
<td>+70</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>$T_S$</td>
<td>-40</td>
<td>+90</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>$m$</td>
<td>13.5</td>
<td>g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_C$</td>
<td>±11.4</td>
<td>±12 or ±15</td>
<td>±15.75</td>
<td>V</td>
</tr>
<tr>
<td>$I_C$</td>
<td>18.5</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$S_{clear}$</td>
<td>10.2</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$S_{creep}$</td>
<td>10.2</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{sys}$</td>
<td>RMS</td>
<td>600</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>$V_{work}$</td>
<td>RMS</td>
<td>1020</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>$UpD$</td>
<td>RMS</td>
<td>1400</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Max. potential difference acc. to UL 508</td>
<td>600</td>
<td>V_{AC}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes
- Date: 18.04.2013
- Date Name Issue Amendment
- KB-PM IA: KRe.
- Released: HS

Copying of this document, disclosing it to third parties or using the contents there for any purposes without express written authorization by use illegally forbidden. Any offenders are liable to pay all relevant damages.
100 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)

Customer: Standard type
Customers Part no.: Page 2 of 2

Mechanical outline (mm):

General tolerances DIN ISO 2768-c

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

Possibilities of wiring for \( V_C = \pm 15V \) (@ \( T_a = 70°C, R_M = 15 \Omega \))

<table>
<thead>
<tr>
<th>primary windings</th>
<th>primary current RMS</th>
<th>maximal output current RMS</th>
<th>turns ratio</th>
<th>primary resistance</th>
<th>primary wiring</th>
</tr>
</thead>
<tbody>
<tr>
<td>( N_p )</td>
<td>( I_p ) [A]</td>
<td>( I_{p,max} ) [A]</td>
<td>( I_s ) [mA]</td>
<td>( K_n )</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>100</td>
<td>208</td>
<td>66.7</td>
<td>1:1500</td>
<td>0.12</td>
</tr>
<tr>
<td>2</td>
<td>35</td>
<td>104</td>
<td>46.7</td>
<td>2:1500</td>
<td>0.54</td>
</tr>
<tr>
<td>3</td>
<td>25</td>
<td>69</td>
<td>50</td>
<td>3:1500</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Additional information is obtainable on request.

This specification is no declaration of warranty acc. BGB §443 dar.
K-No.: 24831

**100 A Current Sensor**

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

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>min.</th>
<th>typ.</th>
<th>max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{Ctot}$</td>
<td>±16</td>
<td>±17.5</td>
<td>±18</td>
<td>V</td>
</tr>
<tr>
<td>$R_S$</td>
<td>88</td>
<td></td>
<td></td>
<td>$\Omega$</td>
</tr>
<tr>
<td>$R_P$</td>
<td>0.36</td>
<td></td>
<td></td>
<td>$\text{m}\Omega$</td>
</tr>
<tr>
<td>$X_{T1}$</td>
<td>0.1</td>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>$I_{logas}$ (including $I_{0}$, $I_{0t}$, $I_{0T}$)</td>
<td>0.12</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$I_o$ (Long term drift Offset current)</td>
<td>0.04</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$I_{OT}$ (Offset current temperature drift)</td>
<td>0.04</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$I_{OH}$ (Hysteresis current @ $I=0$)</td>
<td>0.03</td>
<td>0.07</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$\Delta I_{0}/ \Delta V_C$ (Supply voltage rejection ratio)</td>
<td>0.01</td>
<td></td>
<td></td>
<td>mA/V</td>
</tr>
<tr>
<td>$I_{loss}$ (Offset ripple* with 1 MHz - filter first order)</td>
<td>0.15</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$I_{loss}$ (Offset ripple* with 100 kHz - filter first order)</td>
<td>0.035</td>
<td>0.05</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$I_{loss}$ (Offset ripple* with 20 kHz - filter first order)</td>
<td>0.009</td>
<td>0.012</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$C_k$ (Maximum possible coupling capacity)</td>
<td>5</td>
<td></td>
<td></td>
<td>$\text{pF}$</td>
</tr>
</tbody>
</table>

**Inspection**

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

- $K_{N}(N_1/N_2)$ (V) M3011/6
- $I_o$ (V) M3226 Offset current
- $V_{P,off}$ (V) M3014 Test voltage, rms, 1s
- $V_e$ (AQL 1/S4) Partial discharge voltage acc. M3024 (RMS)

**Type Testing**

(Pin 1 - 6 to Pin 7 – 9)

Designed according standard EN 61800 with insulation material group 1

- $V_W$ (HV transient test according to M3064) (1.2 $\mu$s / 50 $\mu$s-wave form) 8 kV
- $V_d$ (Testing voltage acc. M3014 (RMS)) (5 s) 5 kV
- $V_e$ (Partial discharge voltage acc. M3024 (RMS)) with $V_{vor}$ (RMS) 1500 V
  1875 V

Datum Name Index Änderung
18.04.13 KRe. 81 Applicable document: further standards added. CN-662
28.01.08 Le 81 Page 3: write error in $X_{ges}$ ($I_{PN}$). changed. Insignificant

Hrsg.: KB-E editor
Bearb: Le. designer
KB-PM IA: KRe. check
freig.: HS released

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### Limit curve of measurable current $i_p(R_M)$

@ ambient temperature $T_a \leq 85 \, ^\circ C$

$$N_p \cdot i_p \,[A]$$

![Graph showing limit curve of measurable current](image)

- $V_C = \pm 15V - 5\%$
- $V_C = \pm 12V - 5\%

### Maximum measuring range ($\mu s$-range)

Output current behaviour of a 3kA current pulse

@ $V_C = \pm 15V$ und $R_M = 25\,\Omega$

- $I \,[A]$
- $t \,[\mu s]$

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.

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

$$f_r = \frac{1}{2\pi \cdot R_M \cdot C_a}$$

In this case the response time is enlarged.

It is calculated from:

$$t' \leq t_r + 2.5R_M C_a$$

### Applicable documents

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

Constructed and manufactured and tested in accordance with EN 61800.

Further standards UL 508 ; file E317483, category NMTR2 / NMTR8
**100 A Current Sensor**

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

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**ME**

- $A=km$
- $1=St$
- $2=kg$
- $3=g$
- $4=l$
- $5=m$
- $6=m^2$
- $7=m^3$
- $8=mm$
- $9:Paar$

---

- $I_{QV}$: Zero variation of $I_o$ after overloading with a DC of tenfold the rated value ($R_M = R_{MN}$)
- $I_{QT}$: Long term drift of $I_o$ after 100 temperature cycles in the range -40 bis 85 °C.
- $t_r$: Response time (describe the dynamic performance for the specified measurement range), measured as delay time at $I_P = 0.9 \cdot I_{P_{max}}$ between a rectangular current and the output current.
- $\Delta (I_{P_{max}})$: Delay time (describe the dynamic performance for the rapid current pulse rate e.g short circuit current) measured between $I_{P_{max}}$ and the output current $I_o$ with a primary current rise of $di_P/dt = 100 A/\mu s$.

**$X_{ges}(I_{PN})$**: The sum of all possible errors over the temperature range by measuring a current $I_{PN}$:

$$X_{\text{ges}} = 100 \cdot \left| \frac{I_S (I_{PN})}{K_N \cdot I_{PN}} - 1 \right| \%$$

**$X$**: Permissible measurement error in the final inspection at RT, defined by

$$X = 100 \cdot \left| \frac{I_{SB}}{I_{SN}} - 1 \right| \%$$

where $I_{SB}$ is the output DC value of an input DC current of the same magnitude as the (positive) rated current ($I_o = 0$).

**$X_{Ti}$**: Temperature drift of the rated value orientated output term. $I_{SN}$ (cf. Notes on $F_1$) in a specified temperature range, obtained by:

$$X_{Ti} = 100 \cdot \left| \frac{I_{SB}(T_{A2}) - I_{SB}(T_{A1})}{I_{SN}} \right| \%$$

**$\epsilon_L$**: Linearity fault defined by

$$\epsilon_L = 100 \cdot \left| \frac{I_P}{I_{PN}} - \frac{I_S}{I_{SN}} \right| \%$$

Where $I_P$ is any input DC and $I_S$ the corresponding output term. $I_{SN}$: see notes of $F_1$ ($I_o = 0$).

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