



ULTRASTAB 867-400I Precision Current Transducer

The Ultrastab 867-400I Current Transducer is a model in the Ultrastab Current Transducer program.

It is the second generation of current transducers from Danfysik with transducer head and SMD based electronics integrated in one assembly.

The 867-400I features a new zero flux detector construction with extreme low noise feed back, compact in size and competitive in price.

It ranges 0-400A from DC to 100kHz with a temperature drift lower than 0.5ppm/°C. Powered with $\pm 15V$ it produces an analog output current of 200mA at 400A primary current.

Output noise and noise feed back to the main conductor are both extremely low, and electrostatic shielding ensures maximum immunity against external electrostatic fields.

The 867 features

- Bandwidth DC to 100kHz
- Linearity better than 3ppm
- Traceable absolute calibration
- Temperature drift less than 0.1ppm/°C
- Bipolar - up to 400A primary current with 200mA output current
- Low noise on output signal
- Noise feed-back to main conductor $< 5\mu V$
- Resolution better than 0.05ppm

Applications

- Feed back element in high performance gradient amplifiers
- Feed back element in precision current regulated power supplies

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Working principle

The Ultrastab 867 Current Transducer system is a unique design, based on the zero flux principle for galvanically isolated current measurement.

The Ultrastab 867 has a built-in free-running oscillator, which drives the zero flux detector circuitry.

With the primary current conductor through the transducer head center hole and current flowing, the electronics will generate a current in the built-in compensation winding counterbalancing the primary ampere turns.

A very sensitive and extremely low noise detector circuit will detect when zero flux is obtained, and an analog current signal will be generated at the output terminals in direct proportion to the primary current.

Installation

The Ultrastab 867-400I unit is fully self-contained, requiring only $\pm 15V$ voltage supply. All connections via a 9-pole D-sub socket.

It can be installed in any orientation and has a high immunity against external magnetic and electrostatic fields.

With the 867 delivered with the standard transfer ratio of 2000:1, a 400A primary current will generate a 200mA compensation current. Wired up with a 2.5 Ohm Burden resistor, an 0.5V analog output signal will be available.

If e.g. a max. 300A primary current is to be measured, the Burden resistor can be increased to 6.6 Ohm producing an 1V analog signal. From Fig. 1 on the attached installation data sheet it can be seen that the 867-400I can operate with higher resistance values of Burden resistors, but in order to get the best performance out of the Burden resistors, we recommend to keep the power loss as low as possible.

Standard features

The Ultrastab 867 is equipped with opto insulator for status interlock reading. A LED on the front shows NORMAL OPERATION i.e. interlock status ok.

The Ultrastab 867 has a built-in scanning/lock in circuit for automatic recovery to normal operation after overload condition.

Accessories

- 9-pol D-sub with 2m shielded cable
- 2.5 Ohm Burden resistor (4 x 10 Ohm //), 0.1%, $T_c < 3\text{ppm}/^\circ\text{C}$
- $\varnothing 25$ busbar

Ordering information standard

- 867-400I current transducer
- 866/867-BR2,5 Burden resistor
- 866/867-SC, 2m shielded cable
- 866/867-BB bus bar

Ultrastab 867-400I

Last update: 13.01.2009

Current transducer

| Parameter | Symbol | Condition | Value | Unit |
|---------------------------------|-------------------------|---------------|-----------|-------------------|
| Primary current | I_p | | ± 400 | A |
| Nominal primary current | | | | |
| Polarity | | | Bipolar | |
| Secondary current | I_s | | ± 200 | mA |
| Nominal secondary current | | | | |
| External burden resistor | R_b | | 2.5 | Ω |
| Max. | | $R_{b, \max}$ | | |
| Min. | $R_{b, \min}$ | | 0 | Ω |
| Current transfer ratio | N | | 2000 | |
| Overload capacity | | | | |
| Max. nondestructive overload | $I_{p, \max}$ | @ 0.1s | 500 | %I _p n |
| Min. overload trip value | $I_{p, \text{trip}}$ | | 110 | %I _p n |
| DC accuracy | | | | |
| Offset | | | | |
| Initial | I_{so} | | < 30 | ppm |
| Drift vs. Temp. | $I_{so, \text{temp}}$ | | < 0.5 | ppm / K |
| Drift vs. Time | $I_{so, \text{time}}$ | | < 1 | ppm / month |
| Drift vs. supply voltage | $I_{so, \text{supply}}$ | | < 3 | ppm / % |
| Linearity | | | | |
| Deviation | X_d | | < 3 | ppm |
| Output noise | $I_{s, \text{noise}}$ | 0 - 10Hz | < 0.05 | ppm (RMS) |
| | | 0 - 100Hz | < 0.5 | ppm (RMS) |
| | | 0 - 1kHz | < 1 | ppm (RMS) |
| | | 0 - 10kHz | < 3 | ppm (RMS) |
| | | 0 - 50kHz | < 5 | ppm (RMS) |

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Current transducer

| Parameter | Symbol | Condition | Value | Unit |
|-------------------------------------|----------------------|------------------------|-----------|--------------|
| Dynamic response | | | | |
| Slew rate | dI/dt | 10 - 90% | > 80 | A / μ S |
| Bandwidth | | | | |
| ± 1 dB | f | <0.5%I _{pn} | 10 | kHz |
| ± 3 dB | | < 0.5% I _{pn} | 100 | kHz |
| Busbar noise | | | | |
| Measured on primary cable, one turn | U_b | DC - 50kHz | < 5 | μ V RMS |
| Busbar free zone | | | | |
| Lenght | l | | 150 | mm |
| Radius | r | | 75 | mm |
| Test voltages | | | | |
| Busbar to GND | V _{t, b} | | 5000 | VAC RMS |
| Power supply | | | | |
| Supply voltage | V _s | $\pm 5\%$ | ± 15 | V |
| Maximum quiescent current | I _q | | ± 70 | mA |
| Maximum current consumption | I _{max} | | ± 270 | mA |
| Operating environment | | | | |
| Temperature | T _a | | 10 - 50 | $^{\circ}$ C |
| Humidity | RH _a | Noncondensing | 20 - 80 | %RH |
| Storage environment | | | | |
| Temperature | T _s | | -20 - 85 | $^{\circ}$ C |
| Humidity | RH _s | Noncondensing | 20 - 80 | %RH |

Ultrastab 867-400I

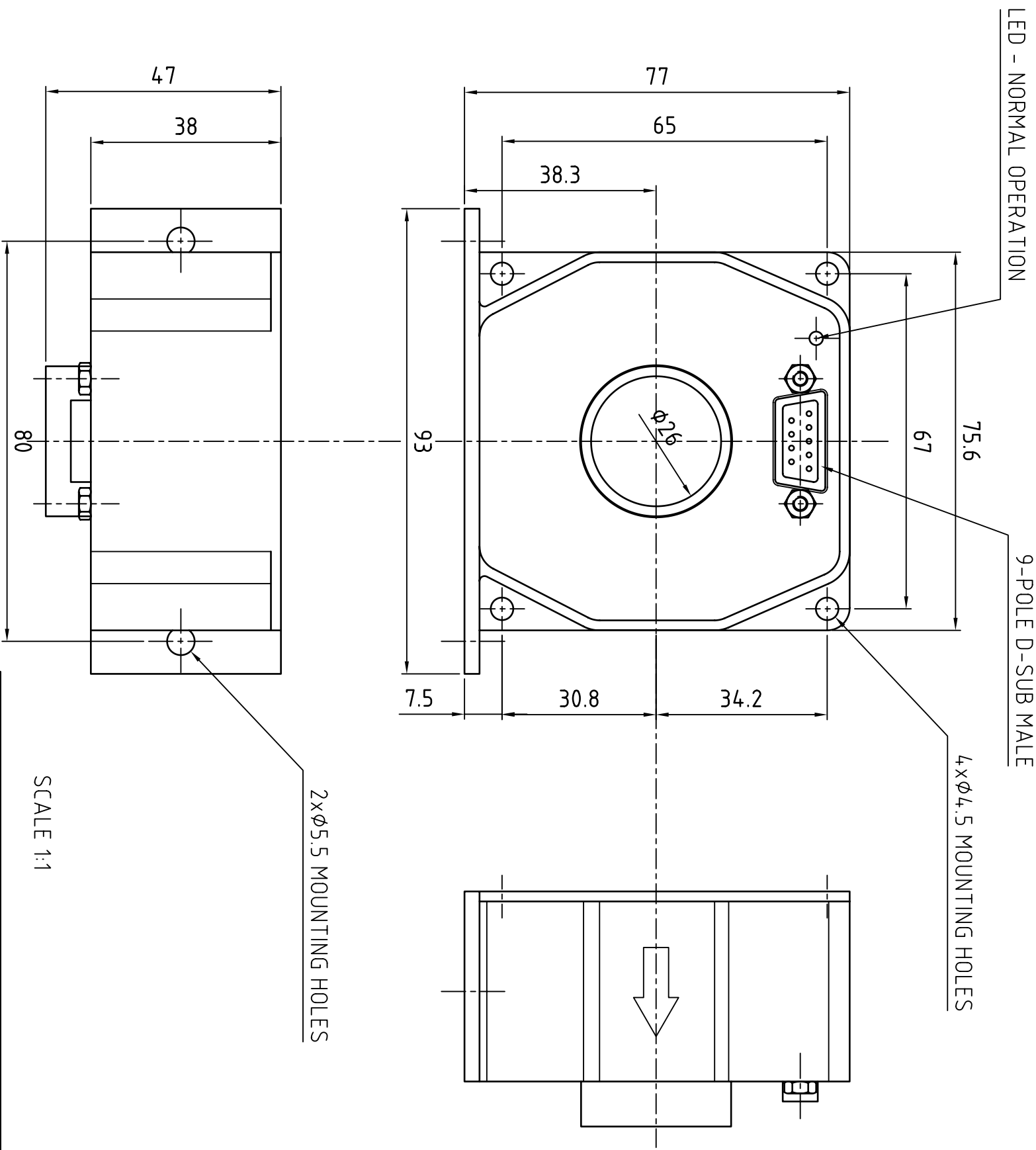
Last update: 13.01.2009

Current transducer

| Parameter | Symbol | Condition | Value | Unit |
|-----------------------------|--------|-----------|-------|------|
| Mechanical dimension | | | | |
| Width | W | | 93 | mm |
| Height | H | | 78 | mm |
| Depth | D | | 47 | mm |
| Weight (approx.) | m | | 0.3 | kg |
| Inner hole diameter | O | | 26 | mm |

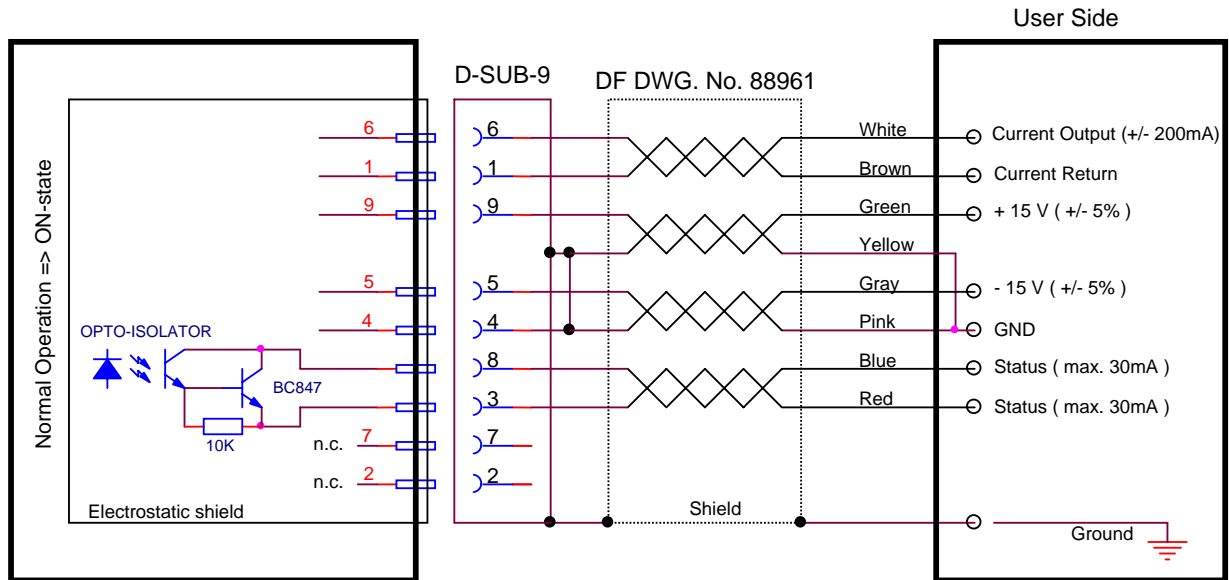
Notes:

- 1: All ppm figures refer to nominal current
- 2: Specifications are subject to change without notice



| | | | | | | | | | | | |
|--|--|-------------|--|--|--|----------------------------|--|---|--|-------------------------|--|
| <p>DANFYSIK DK-4040 Jyllinge, Denmark Homepage: www.danfysik.dk e-mail: danfysik@danfysik.dk Phone: +45 4679 0000 Fax: +45 4679 0001</p> | | Projection: | | Dimensions without tolerance indication: EN 22768-mk | | Scale: 1:1 | | Customer: | | Size: A3 | |
| Important: This document contains informations which is the property of DANFYSIK A/S. It is submitted to you in confidence that it will not be disclosed or transmitted to others or used for manufacturing without DANFYSIK's authorization in writing. | | Date: | | Name: TS | | Drawing No.: 88729B | | Description: CURRENT TRANSDUCER Assembly Ultrafab 200/4001 | | AutoCAD Mechanical 2002 | |
| Drawn by: 29-09-2004/bmk | | Des. App. | | Date: | | Plot Date: 24-06-2004 | | CAD File Type: AutoCAD Mechanical 2002 | | Sheet 1 of 1 | |

ULTRASTAB 867-400I INSTALLATION



Pin configuration for 9 pole D_SUB :

| | | | |
|-------|-------------------------|-------|-------------------------|
| Pin 1 | Current return | Pin 6 | Current output |
| Pin 2 | N.C. | Pin 7 | N.C. |
| Pin 3 | Normal operation status | Pin 8 | Normal operation status |
| Pin 4 | GND | Pin 9 | +15V supply voltage |
| Pin 5 | -15V supply voltage | House | Electrostatic shield |

Electrical specification - power :

| | | |
|--|---|--|
| Supply voltage pin 9 to pin 4 | : | + 15 V +/- 5 % |
| Supply voltage pin 5 to pin 4 | : | - 15 V +/- 5 % |
| Supply current pin 9 to pin 4 | : | + 70 mA + output current (200 mA nom.) |
| Supply current pin 5 to pin 4 | : | - 70 mA - output current (200 mA nom.) |
| Test voltage secondary (pin 4) to shield | : | 200 VDC |

Electrical specification – status signal :

| | | |
|--|---|----------------|
| Fault level (off-state) | : | $I_p > 110 \%$ |
| Max. voltage pin 8 to pin 3 , off-state | : | 45 V |
| Max. current pin 8 to pin 3 , on-state | : | 30 mA |
| Reverse voltage pin 8 to pin 3 , off-state | : | 5 V |
| On-voltage pin 8 to pin 3 , $I = 5 \text{ mA}$ | : | 1 V max. |
| Test voltage secondary (pin 4) to pin 8 | : | 300 VDC |

Accessories :

- 9 pole D-sub plug with 2m shielded cable (Part No. 65889610)
- 2.5 Ω Burden Resistor (4 x 10 Ω) , 0.05% , $T_c < 3 \text{ ppm}/^\circ\text{C}$
- \varnothing 25mm busbar

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