# DR5000UX-10V/7500A

**Ultra-stable, high precision (ppm class) fluxgate technology DR Series current transducer for non-intrusive, isolated DC and AC current measurement up to 8000A**


## Features

Linearity error maximum +/- 7ppm

3 pin XLR mini connector for voltage output

Transducer core optimized for high level of immunity against external magnetic fields

Operating temperature

Transducer head 0-60°C

Electronics 0-45°C

Ratio 1V/750A

Aperture diameter 150 mm

2U 19" Control unit with universal (100-240V AC 50/60Hz) AC input voltage or 120-370V DC input voltage

Danisense advanced sensor protection circuit "ASPC"

## Applications:

MPS for particles accelerators

Stable power supplies

Precision drives

Batteries testing and evaluation systems

Power measurement and power analysis

Current calibration purposes

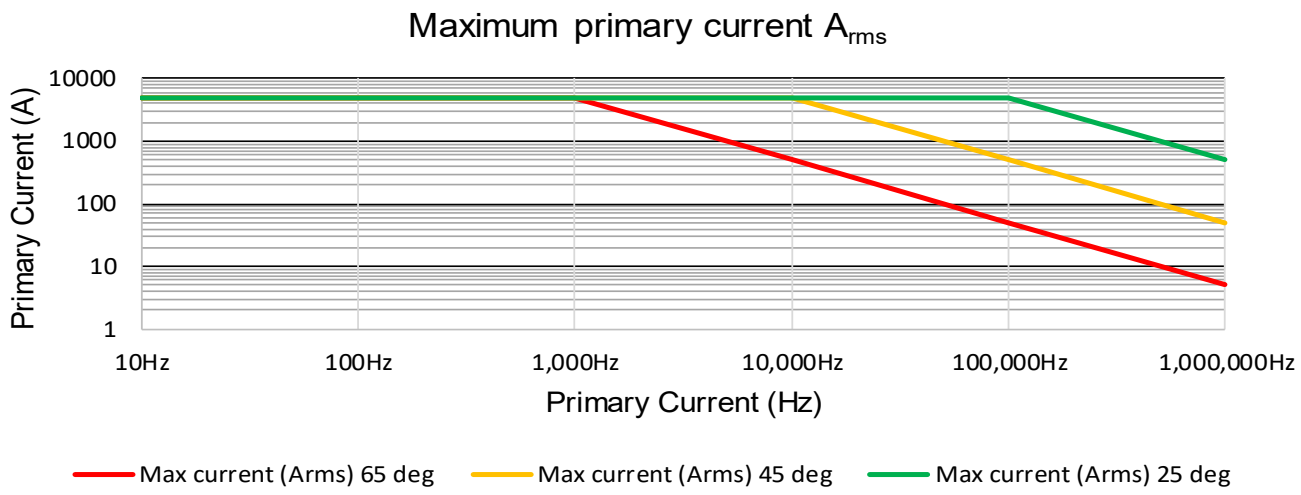
| Specifications highlights (@23ºC) | Symbol | Unit | Min | Typ | Max |
|---|---|---|---|---|---|
| Measuring range (DC or AC peak) | $I_{PM}$ | A | -8000 | | 8000 |
| Nominal primary AC current | $I_{PN}$ AC | Arms | | | 5000 |
| Nominal primary DC current | $I_{PN}$ DC | A | -7500 | | 7500 |
| Nominal output voltage @ 7500A | $V_{SN}$ | V | -10.000 | | 10.000 |
| Primary / secondary ratio | Ratio | V/kA | | 1.333 | |
| Linearity error | $\varepsilon_L$ | ppm | -7 | | 7 |
| Offset current (including earth field) | $V_{OE}$ | ppm | -11 | | 11 |
| DC-10Hz Overall accuracy @25°C (= $\varepsilon_L + I_{OE}$) | $\varepsilon_{DC}$ | ppm | -23 | | 23 |
| AC Max. gain error (10Hz to 1kHz) | $\varepsilon_{AC}$ | % | -0.05 | | 0.05 |
| AC Max. phase shitf error (10Hz to 1kHz) | $\theta$ | º | | | 0.05 |
| Bandwidth | f(-3dB) | kHz | 100 | | |
| Operting temperature transducer head | Ta | ºC | 0 | | 60 |

All ppm (or %) values refer to nominal current 7500A or 10V

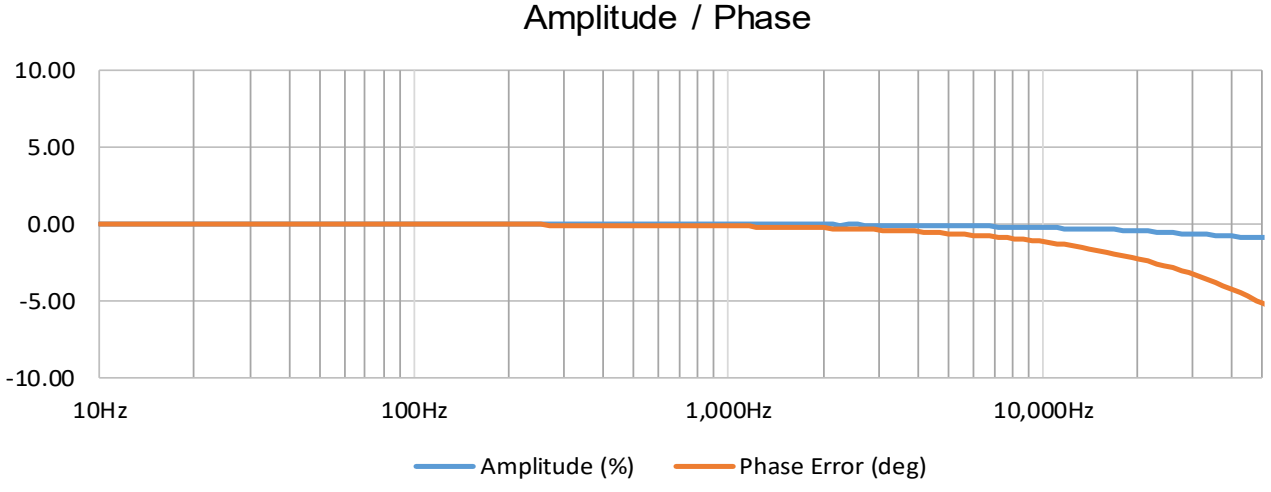
## Electrical specifications at Ta=23°C

| Parameter | Symbol | Unit | Min | Typ. | Max | Comment |
|---|---|---|---|---|---|---|
| Nominal primary AC current | $I_{PN}$ AC | Arms | | | 5000 | Refer to fig. 2 for derating |
| Nominal primary DC current | $I_{PN}$ DC | A | -7500 | | 7500 | |
| Measuring range | $I_{PM}$ | A | -8000 | | 8000 | DC or peak value |
| Overload capacity | $\hat{I}_{OL}$ | A | | | 20000 | Non-measured, 100ms |
| Nominal output voltage | Vout | V | -10 | | 10 | At 7500A nominal DC current |
| Primary / secondary ratio | Ratio | V/kA | -1.333 | | 1.333 | |
| Linearity error | $\varepsilon_L$ | ppm<br>µV | -7<br>-70 | | 7<br>70 | ppm refers to nominal current<br>µV refers to output voltage |
| Bandwidth | f(-3dB) | kHz | 100 | | | Small signal, graphs figure 3 |
| Amplitude error 10Hz –1kHz<br>1kHz -5kHz<br>5kHz - 30kHz | $\varepsilon_G$ | % | | | 0.05%<br>1.50%<br>15.00% | % refers to nominal current |
| Phase shift 10Hz –1kHz<br>1kHz -5kHz<br>5kHz - 30kHz | $\theta$ | ° | | | 0.05°<br>0.50°<br>3.00° | |
| Response time to a step current $I_{PN}$ | tr @90% | µs | | 1 | | di/dt = 100A/µs |
| Noise 0 - 100Hz<br>0 - 1kHz<br>0 - 10kHz<br>0 - 100kHz | noise | ppm rms | | | 0.1<br>0.7<br>5.0<br>7.0 | Measured on secondary current |
| Fluxgate excitation frequency | $f_{Exc}$ | kHz | | 7.82 | | |
| Induced rms voltage on primary conductor | | µV rms | | | 10 | |
| Mains input voltage AC | $V_{AC}$ | V rms | 90 | | 295 | 50 / 60Hz |
| Mains input voltage DC | $V_{DC}$ | V | 127 | | 417 | |
| Operating temperature range / Control unit | Ta | °C | 0 | | 45 | |
| Operating temperature range / Head | Ta | °C | 0 | | 60 | |
| **Offset error** | | | | | | |
| Initial (including earth field) | | ppm<br>µV | -11<br>-110 | | 11<br>110 | ppm refers to nominal current<br>µV refers to output voltage |
| Versus temperature | | ppm/K<br>µV/K | -0.3<br>-3 | | 0.3<br>3 | ppm refers to nominal current<br>µV refers to output voltage |
| Versus time | | ppm/month<br>µV/month | -0.1<br>-1 | | 0.1<br>1 | ppm refers to nominal current<br>µV refers to output voltage |
| **Ratio error** | | | | | | |
| Initial | | ppm<br>µV | -5<br>-50 | | 5<br>50 | ppm refers to nominal current<br>µV refers to output voltage |
| Versus temperature | | ppm/K<br>µV/K | -1.5<br>-15 | | 1.5<br>15 | ppm refers to nominal current<br>µV refers to output voltage |
| Versus time | | ppm/month<br>µV/month | -20<br>-200 | | 20<br>200 | ppm refers to nominal current<br>µV refers to output voltage |

## Frequency and ambient temperature derating (Fig. 2)




## Frequency characteristics (Fig. 3)



## Isolation specifications

| Parameter | Unit | Value |
|---|---|---|
| Rated isolation voltage rms, reinforced isolation<br>IEC 61010-1 standard and with following conditions<br>- Overvoltage category III -Pollution degree 2 | kV | 3 |
| Rms voltage for AC isolation test, 50/60 Hz, 1 min<br>- Between primary and (secondary and shield)<br>- Between secondary and shield | kV | <br>23.7<br>0.2 |
| Impulse withstand voltage | kV | 43.5 |
| Creepage distance / Clearance | mm | 60 / 60 |
| Comparative Tracking Index | CTI | 600 |

## Absolute maximum ratings

| Parameter | Unit | Max | Comment |
|---|---|---|---|
| Primary current | kA | 20 | Maximum 100ms |
| Primary current | kA | 8 | Continous |

## Environmental and mechanical characteristics

| Parameter | Unit | Min | Typ | Max | Comment |
|---|---|---|---|---|---|
| Ambient operating temperature range | °C | 0 | | 45 | Control unit |
| Ambient operating temperature range | °C | 0 | | 60 | Transducer head |
| Storage temperature range | °C | -40 | | 85 | |
| Relative humidity | % | 20 | | 80 | Non-condensing |
| Mass | kg | | 17<br>6 | | Transducer Head<br>Control Unit |
| Connections | 3 pin XLR mini | | | | |
| Standards | EN 61326-1 EMC<br>EN 61010-1:2010 Safety | | | | |

## Advanced Sensor Protection Circuits “ASPC”

Developed to protect the current transducer from typical fault conditions:

- Unit is un-powered and secondary circuit is open or closed
- Unit is powered and secondary circuit is open or interrupted

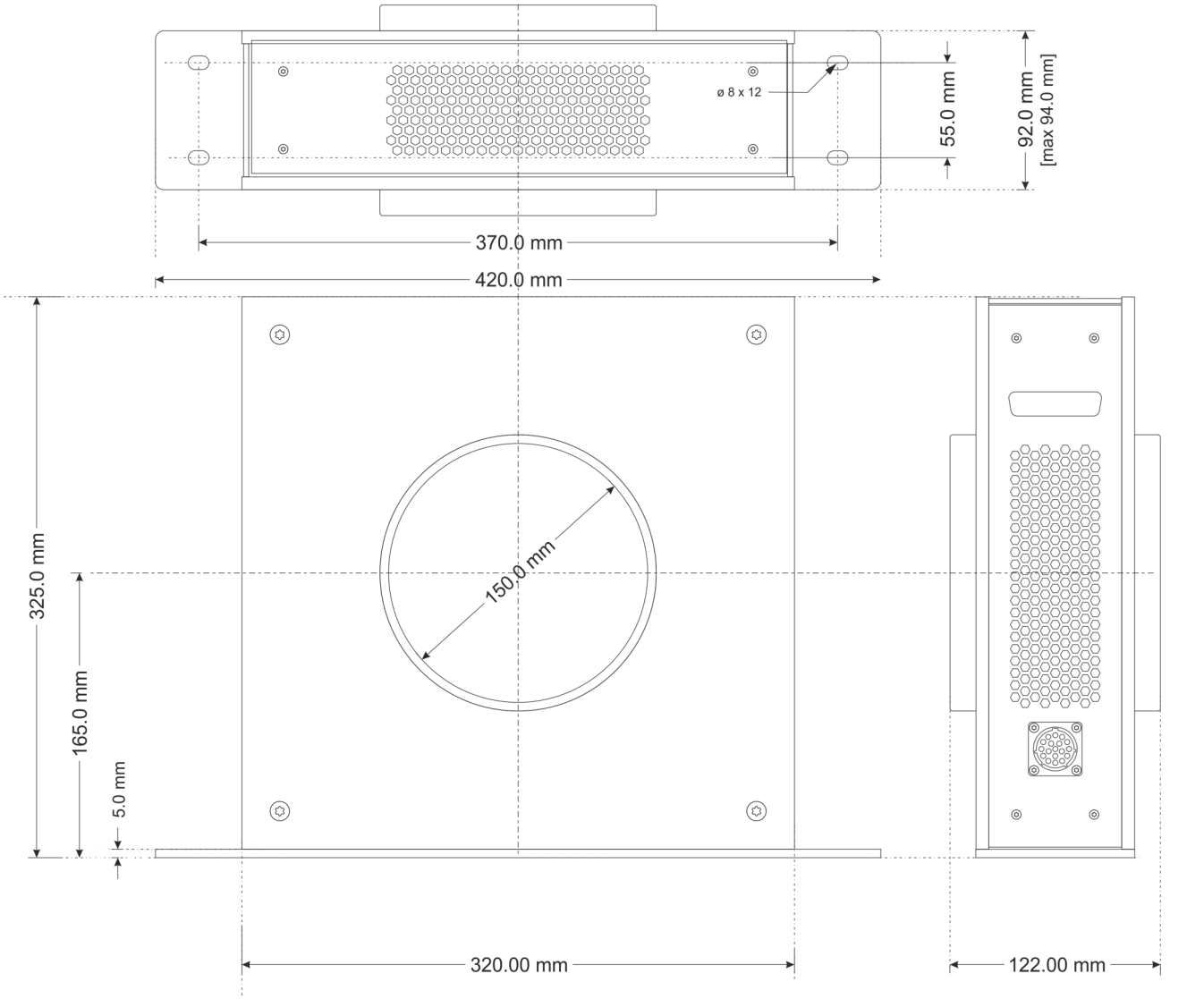
Both DC and AC primary current up to 100% of nominal value can be applied to the current transducers in the above situations without damage to the electronics.
Please notice that the sensor core can be magnetized in all above cases, leading to a small change in output offset current (less than 10ppm)

## Package content

- Transducer head
- Electronics box 19” 2U
- AC power cable - Region specific
- 5m cable between transducer head and electronics box (Custom sizes can be delivered at extra charge)
- 2m XLR cable to connect the voltage output to 4mm banana plugs (+, - and cable shield)

## DR5000 Transducer Head Dimension

General tolerances ±0.3mm






# User Guide

## Intended use:

The DR5000UX-10V/5000A is intended to measure the current flowing through the aperture of the transducer head. The measured current is available as a voltage output on the XLR mini connector (2m cable is included with 4mm safety banana plugs). The voltage output is 10V/5kA.

**Instruction for use:**

1. Do not apply primary current through the transducerhead before everything is connected and powered.
    1. Cable from transducer head to electronics control box must be connected
    2. The electronics control box needs to be mains powered. (Universal input)
2. If the electronics control unit is intended for desk use, mount the rubber feet which are part of the package. If the electronics control unit is intended for Rack mounting, use the screw kit for mounting and do not mount the rubber feet.
3. Connect a precision voltage analyzer to the XLR cable for analysis purposes.
4. Ensure that the BLACK and RED current output connections are shorted

## Indications:

When mains is applied a green light diode on the front under the power symbol will light green, indicating the transducer is working and is tracking the input signal.

## Safety Instructions:

DO NOT TRY TO DISASSEMBLE THE UNIT.

Make sure that the unit is properly connected to earth ground.

Do not block the ventilation openings on the side panels.

If the fan does not operate properly contact Danisense for repair.

If the “POWER” green diode is not operating when mains is applied, disconnect power and contact Danisense for further instruction.

## CE Statement:

This product has been tested and found to comply with the following standards.

| | |
|---|---|
| Electrical safety: | EN 61010-1 2010 |
| Electromagnetic Compatibility: | EN 61326-1 2013 |