

Data sheet

Top level inclination sensor

DST X730



The Danfoss DST X730 high level Inclination sensors are developed to ensure a robust and high-performance solution for applications such as agricultural- and construction machines, as well as material handling equipments. These sensors are typically used in safety applications in order to keep the inclination of a machine, or just a part of it, a safety zone for working people, under control.

Danfoss DST X730 series uses MEMS technology for single and dual axis with measurement ranges up to 360° in both single and redundant versions, with extended resolution and linearity.

All sensors are designed for off-highway applications and resistant to shock and vibrations and with high electromagnetic compatibility and comes with either analogue or CANopen output.

Single and redundant sensor types are available, making the complete portfolio suitable for safety-critical applications.

Features

- MEMS technology for almost infinite sensor life time
- Single or Redundant ranges up to 360° ($\pm 180^\circ$)
- Output: Analogue or CANopen
- Electrical connector: M12, 5-pin or cable
- IP protection IP67, IPX9K
- Accuracy: $< \pm 0.15\% \text{ FS} \leq \pm 60^\circ$ dual axis and 180° single axis; $0.3 \text{ FS} \pm 85^\circ$ dual axis
- Resolution 0.01°

Conformity

- CE
- RoHS

Technical data
Performance

| | |
|--|--|
| Measuring range | $\pm 10^\circ \pm 15^\circ \pm 20^\circ \pm 30^\circ \pm 45^\circ \pm 60^\circ \pm 85^\circ$ (single axis Z / XY dual axis) $360^\circ (\pm 180^\circ)$ (single Z axis) |
| Accuracy (Factory verification @25 °C) | Single axis: $< \pm 0.15\%$ FS Dual axis: $< \pm 0.15\%$ FS in the range $\leq \pm 60^\circ$, $\pm 0.3\%$ FS otherwise |
| Temperature coefficient @ 0° | Typical $< \pm 0.006^\circ/\text{°K}$ |
| Long term repeatability | Single axis: Typical $< \pm 0.5^\circ$ in the range $\pm 180^\circ$ Dual axis: Typical $< \pm 0.5^\circ$ in the range $\leq \pm 60^\circ$, $\pm 2^\circ$ otherwise |
| Resolution | CANopen output; 0.01°; 12 bit analog output |

Electrical specifications

| | |
|------------------------|--|
| Electrical connections | M12 connector or cable |
| Output signal | CANopen, Ratiometric 10-90% of Vs, 0.5 - 4.5 Vdc, 0-10 Vdc or 4-20mA |
| Supply voltage | CANopen, 0.5–4.5 Vdc, 4–20 mA: 10–36 Vdc, 0–10 Vdc : 11–36 Vdc Ratiometric: 10-90% of Vs: 5 Vdc |
| Current consumption | Analogue: $< 20 \text{ mA/ pr. channel (no load)}$ CANopen/J1939: $< 15 \text{ mA/per channel (no load)}$ |
| MTTFd [Years]: | CANopen: 631 (Single channel) Analogue: 731 (Single channel) |

Environmental conditions

| | | | |
|-----------------------------|---------------------|-------------------------|----------------|
| Operating temperature range | | -40 – 85 °C | |
| EMC | Emission | | EN 55011 |
| | Immunity | | EN 61236-3-2 |
| Vibration stability | Sinusoidal | 20 g, 10 Hz – 2,000 kHz | IEC 60068-2-6 |
| Shock resistance | Impulsive on 3 axes | 50 g, 11 ms | IEC 60068-2-27 |
| Enclosure | | | IP67, IPX9K |

Mechanical characteristics

| | | |
|------------|-----------|----------------------------------|
| Materials | Enclosure | PBT (Polybutylene terephthalate) |
| Net weight | | 0.245 kg (without cable) |

Ordering

| Type | Output signal | Cofigurations | Code no. |
|----------|---------------|---|----------|
| DST X730 | 36 V CANopen | 1 x M12 5p; Single axis; $\pm 180^\circ$; 36V | 098G3500 |
| | 36 V CANopen | 2 x M12 5p; Single axis; Redundant; $\pm 180^\circ$; 36V | 098G3501 |
| | 36 V CANopen | 1 x M12 5p; Dual axis; $\pm 85^\circ$; 36V | 098G3502 |
| | 36 V CANopen | 2 x M12 5p; Dual axis; Redundant; $\pm 85^\circ$; 36V | 098G3503 |

Others on request

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**Ordering code -
on request**

| Electrical connections | |
|-------------------------------------|---|
| M12 connector output | M |
| Cable output (specify cable length) | F |

| Axis type | |
|----------------------|---|
| Dual axis (XY axis) | O |
| Single axis (Z axis) | V |

| Circuit type | |
|--------------|---|
| Single | S |
| Redundant | R |

| Output 1 Measuring range (Output for single circuit) | |
|---|-----|
| Measuring range (indicate) single axis always 360° dual axis $\pm 10^\circ \pm 15^\circ \pm 20^\circ \pm 30^\circ \pm 45^\circ \pm 60^\circ \pm 85^\circ$ | xxx |

| Output 2 Measuring range (Only for redundant version) | |
|---|-----|
| Measuring range (indicate) single axis always 360° dual axis $\pm 10^\circ \pm 15^\circ \pm 20^\circ \pm 30^\circ \pm 45^\circ \pm 60^\circ \pm 85^\circ$ | xxx |

| Supply voltage | |
|---|---|
| +5Vdc (only for A1 output) | L |
| +10...+36V DC (see output signal for right supply voltage) | H |

| Output type | |
|---|----|
| +0.5...+4.5Vdc output (available with supply L = ratiometric output and with supply H = 0.5...4.5V output) | A1 |
| 0...+10Vdc output (powered at +11...36V DC) | A2 |
| 4...20mA output (powered at +10...36V DC) | A3 |
| CANopen output (powered at +10...36V DC) | C1 |

| Reserved | |
|------------|---|
| Always "0" | 0 |

| Certificate | |
|--------------------------------|---|
| No certificate attached | 0 |
| Linearity curve to be attached | L |

| Version | |
|----------|-----|
| Standard | 033 |

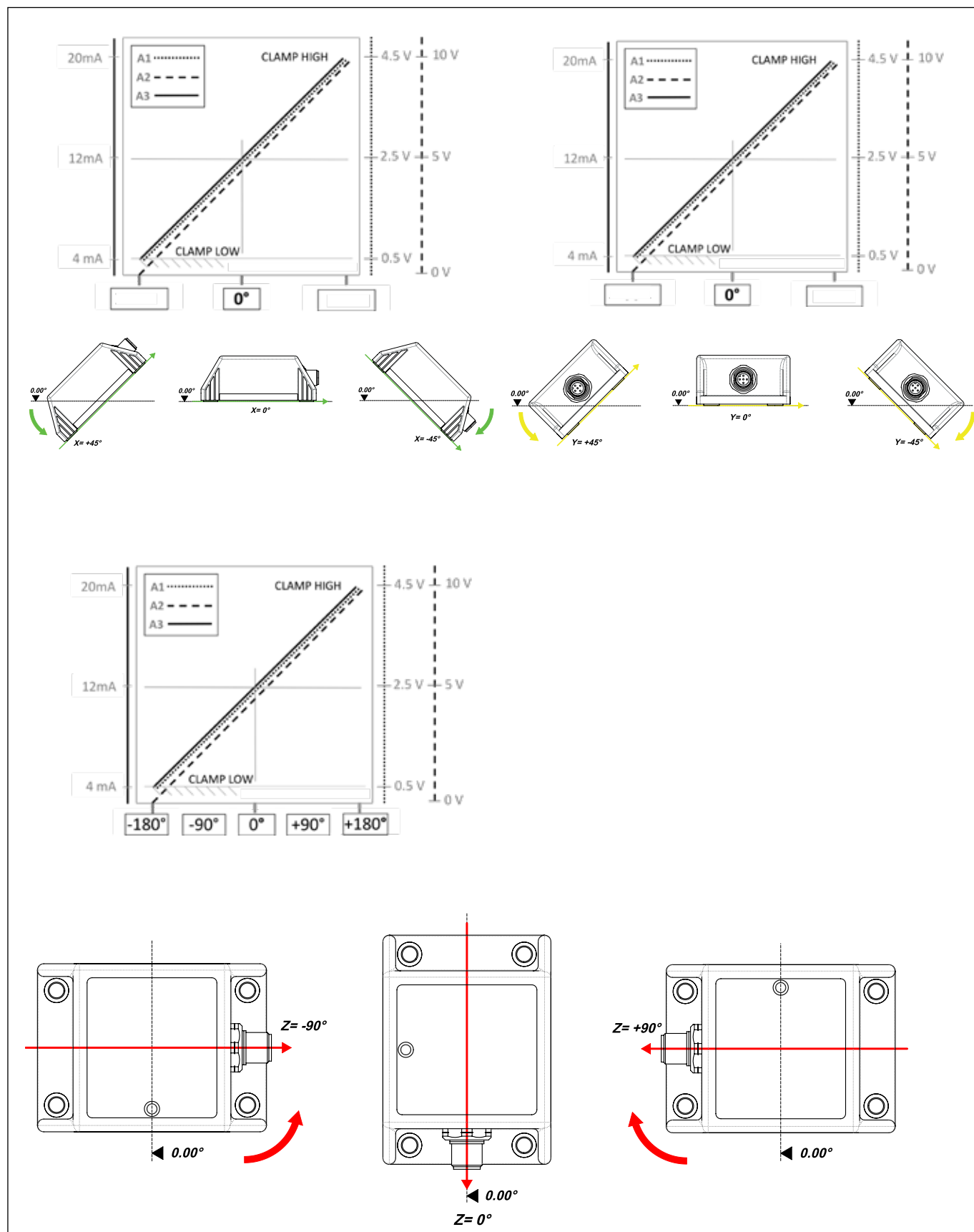
| Accessories | |
|-------------------------|---|
| No accessories | X |
| Magnetic pen (PKIT 312) | Y |

| Cable length | |
|-------------------------|-------|
| 100 mm | 01 |
| 200 mm | 02 |
| 500 mm | 05 |
| 1 m | 10 |
| 2 m | 20 |
| Other length on request | |

Example of ordering:
DST X730-MVR360360HC10 0033X00

| | |
|-----|----------------------------------|
| M | M12 connector |
| V | Single (Z axis) |
| R | Redundant |
| 360 | $\pm 185^\circ$ |
| 360 | $\pm 185^\circ$ |
| H | +5 Vdc |
| A1 | +10 - +36 V DC |
| C1 | CANopen |
| 0 | Reserved |
| 0 | No certificate |
| 033 | Standard |
| X | No accessories |
| 00 | Not defined (only cable version) |

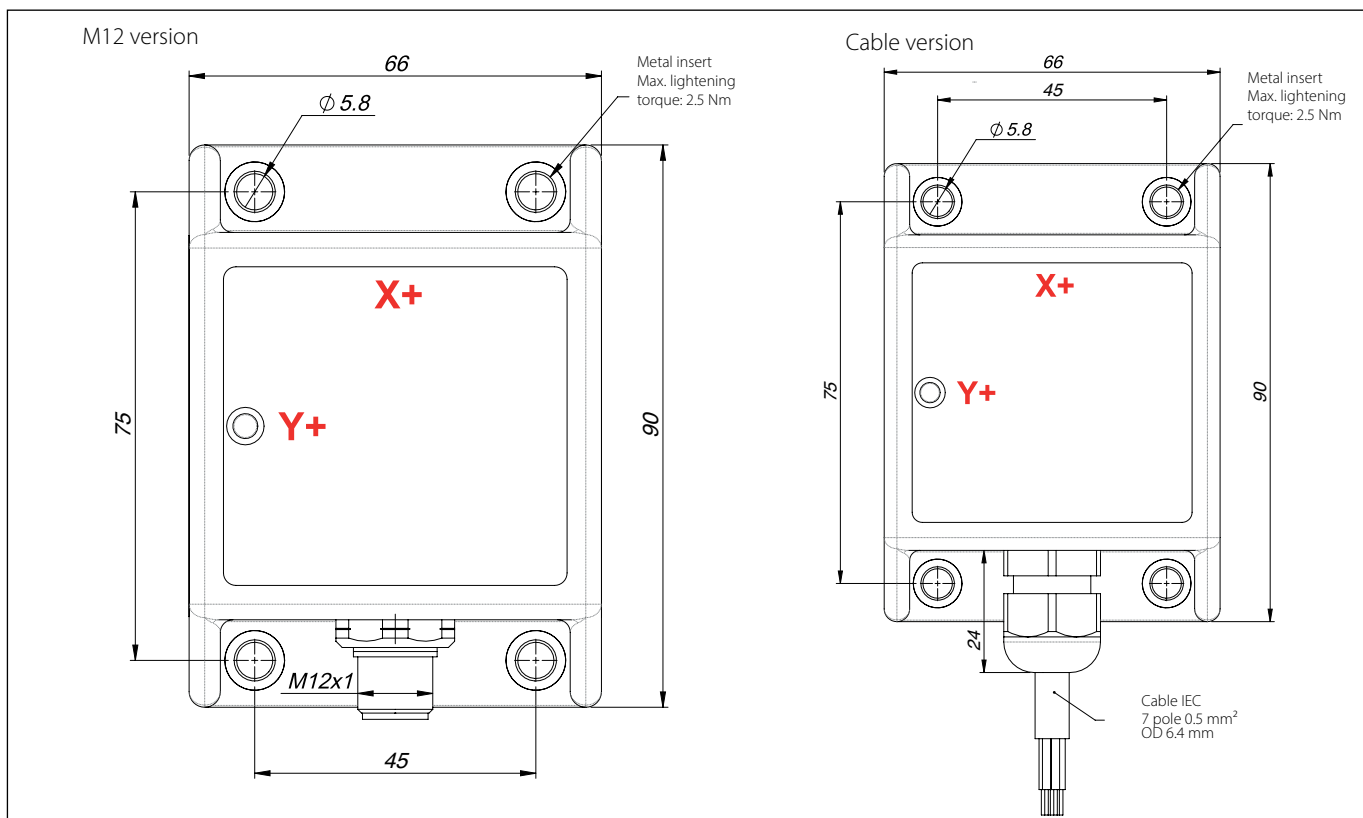
Output signals graphs



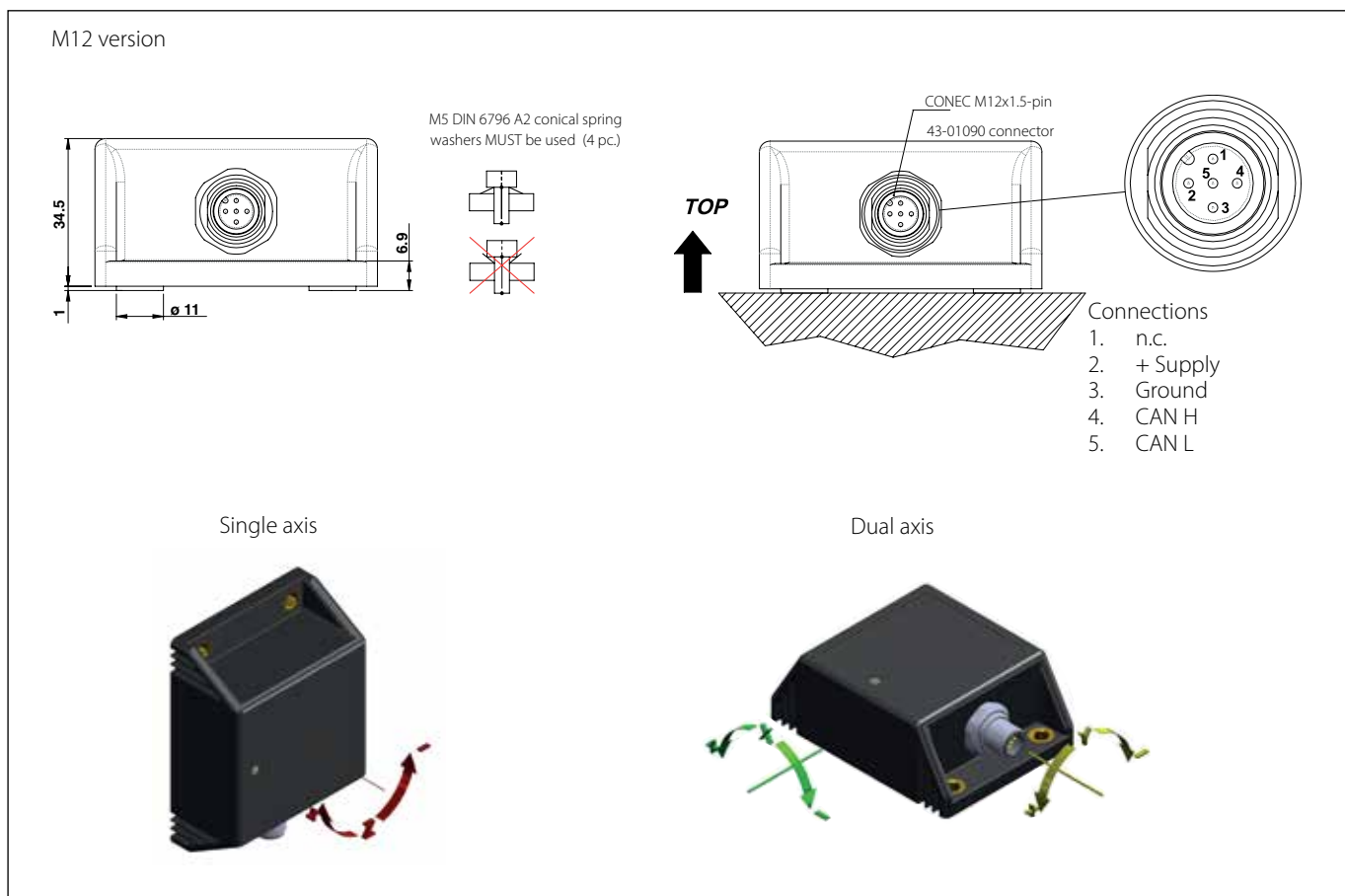
Load conditions

+0.5Vdc...+4.5 Vdc output with power +10...36Vdc and +0..10Vdc output with power +11..36Vdc: apply a load resistance > 100Kohm

Dimensions



Electrical connections



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Cable version

M5 DIN 6796 A2 conical spring washers **MUST** be used (4 pc.)

| Connections | | CAN Connections | |
|-------------|----------|-----------------|----------|
| White | + Supply | White | + Supply |
| Yellow | Ground | Yellow | Ground |
| Grey | Output X | Grey | Can H |
| Blue | Output Y | Blue | Can L |
| Pink | n.c. | Pink | n.c. |
| Green | n.c. | Green | n.c. |
| Brown | n.c. | Brown | n.c. |

Single axis

Dual axis

Zero function

Available for analog single circuit versions in DST X730
XY configuration (dual axis)



To activate the Autozero function make sure that:

- sensor is powered
- fixing surface is free of dust or grease
- sensor is fixed on the horizontal plane with suitable screws

ATTENTION!

The Autozero function can be defined within a maximum range of $\pm 4.5^\circ$ from the original zero position (factory set).

Hold the **magnetic pen** (accessory to order PKIT312) to the **ZERO POINT** indicated on the product label.
Hold the position for **at least 3-5 seconds** so that the operation is successful.

