

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

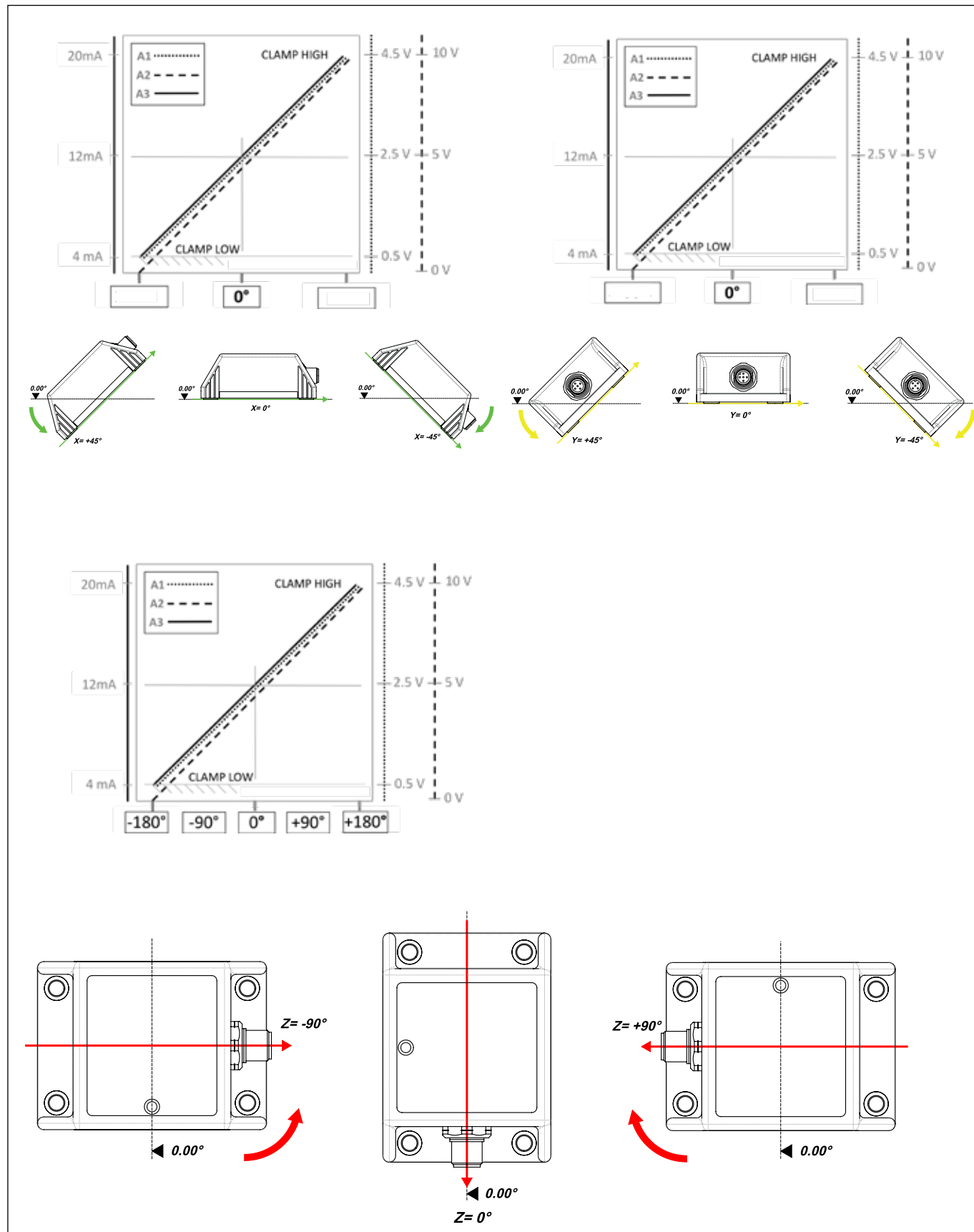
Accessories	
No accessories	X
Magnetic pen (PKIT 312)	Y

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 - +36V DC
C1	CANopen
0	Reserved
0	No certificate
033	Standard
X	No accessories
00	Not defined (only cable version)

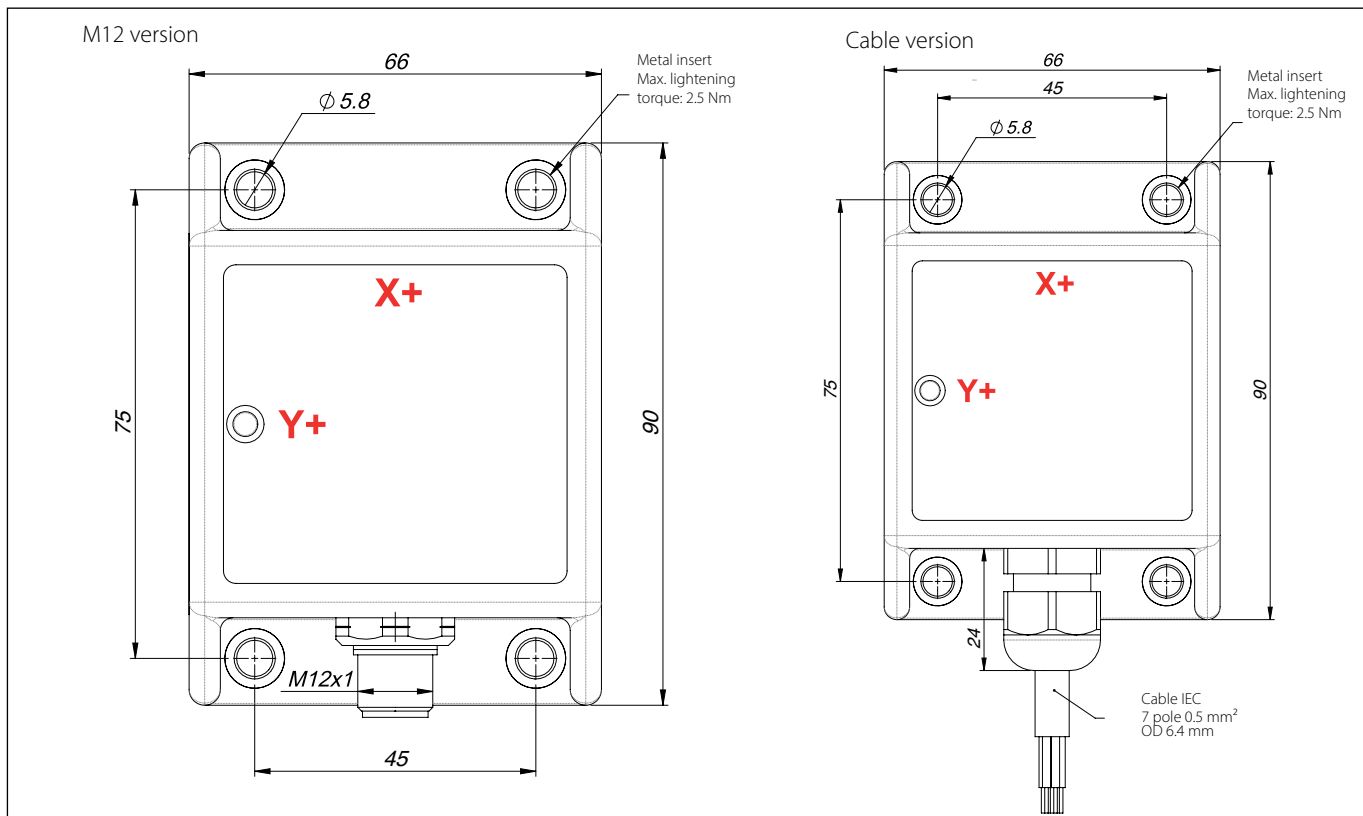
Output signals graphs



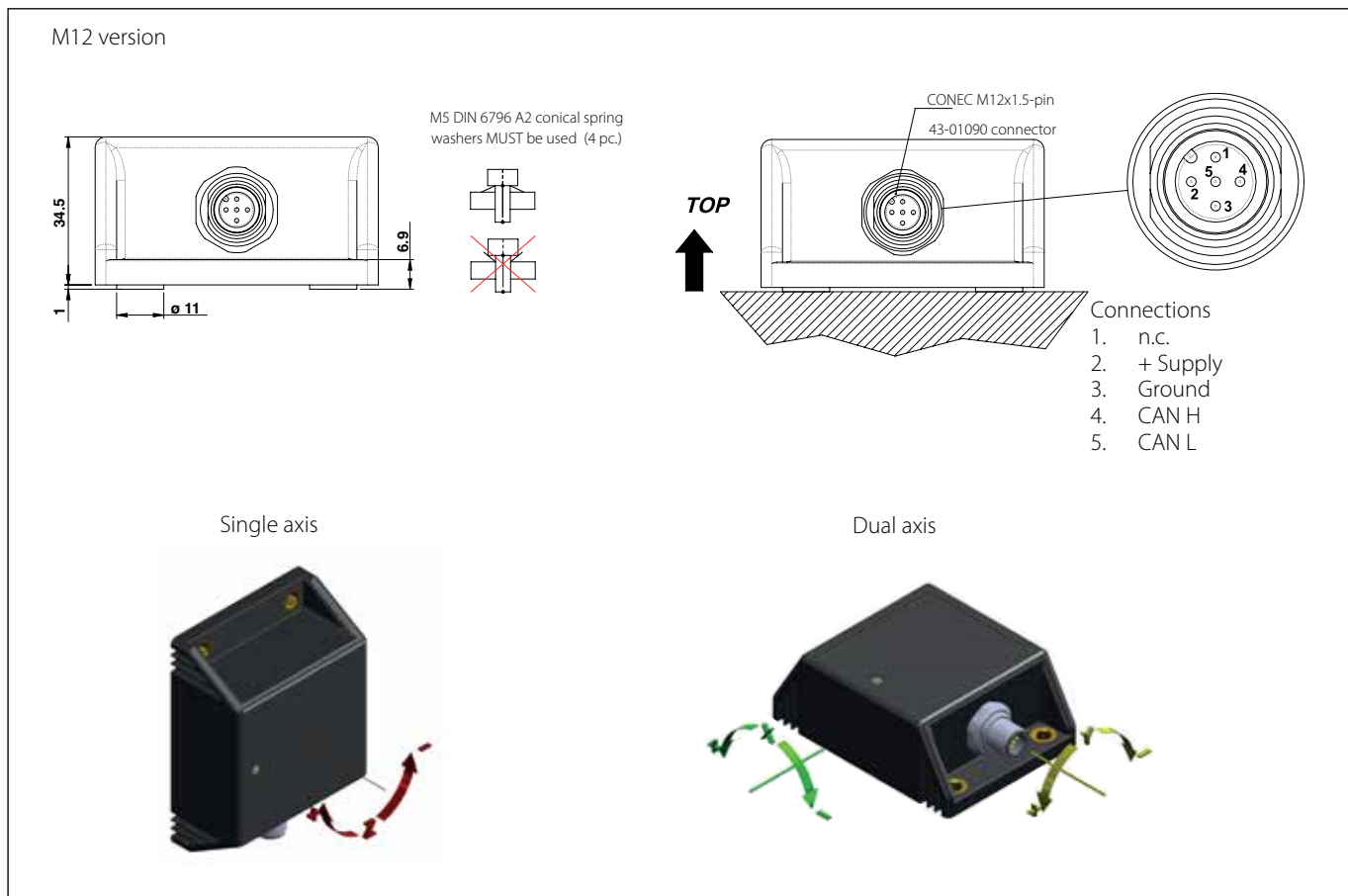
Load conditions

+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.

