

Data sheet

# Mid level inclination sensor

## DST X720



The Danfoss DST X720 mid 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 X720 series uses MEMS technology for single and dual axis with measurement ranges up to 360° in both single and redundant versions.

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° (±180°)
- Output: Analogue or CANopen
- Electrical connector: M12, 5 pin or cable
- Accuracy <math>\pm 0.5\%</math> FS
- Resolution 0.01°
- IP protection IP67, IPX9K

### 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 / dual axis XY) $360^\circ (\pm 180^\circ)$ single axis Z
Accuracy (Factory verification @25 °C)	$\leq \pm 0.5\%$ FS
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	0.01° CANopen output; 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: $< 20$ mA/ pr. channel (no load) CANopen/J1939: $< 15$ 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
IP rating			IP67, IPX9K

*Mechanical characteristics*

Materials	Enclosure	PBT (Polybutylene terephthalate)
Net weight		0.26 kg (without cable)

**Ordering**

Type	Output signal	Configurations	Code no.
DST X720	36 V CANopen	1 x M12 5p; Single axis; $\pm 180^\circ$ ; 36V	098G3000
	36 V CANopen	2 x M12 5p; Single axis; Redundant; $\pm 180^\circ$ ; 36V	098G3001
	36 V CANopen	1 x M12 5p; Dual axis; $\pm 85^\circ$ ; 36V	098G3002
	36 V CANopen	2 x M12 5p; Dual axis; Redundant; $\pm 85^\circ$ ; 36V	098G3003

Others on request

**Data sheet | Mid level inclination sensor DST X720**
**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) ±10° ±15° ±20° ±30° ±45° ±60° ±85° (single axis Z for analogue output-dual axis XY); 360° (±180°) for single Z axis only	xxx

Output 2 Measuring range (Only for redundant version)	
Measuring range (indicate) ±10° ±15° ±20° ±30° ±45° ±60° ±85° (single axis Z for analogue output-dual axis XY); 360° (±180°) for single Z axis only	xxx

Supply voltage	
+5Vdc (only for A1 output)	L
+10...+36Vdc (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...36Vdc)	A2
4...20mA output (powered at +10...36Vdc)	A3
CANopen output (powered at +10...36Vdc)	C1

Reserved	
Always	0

Certificate	
No certificate attached	0
Linearity curve to be attached	L

Version	
Standard	033

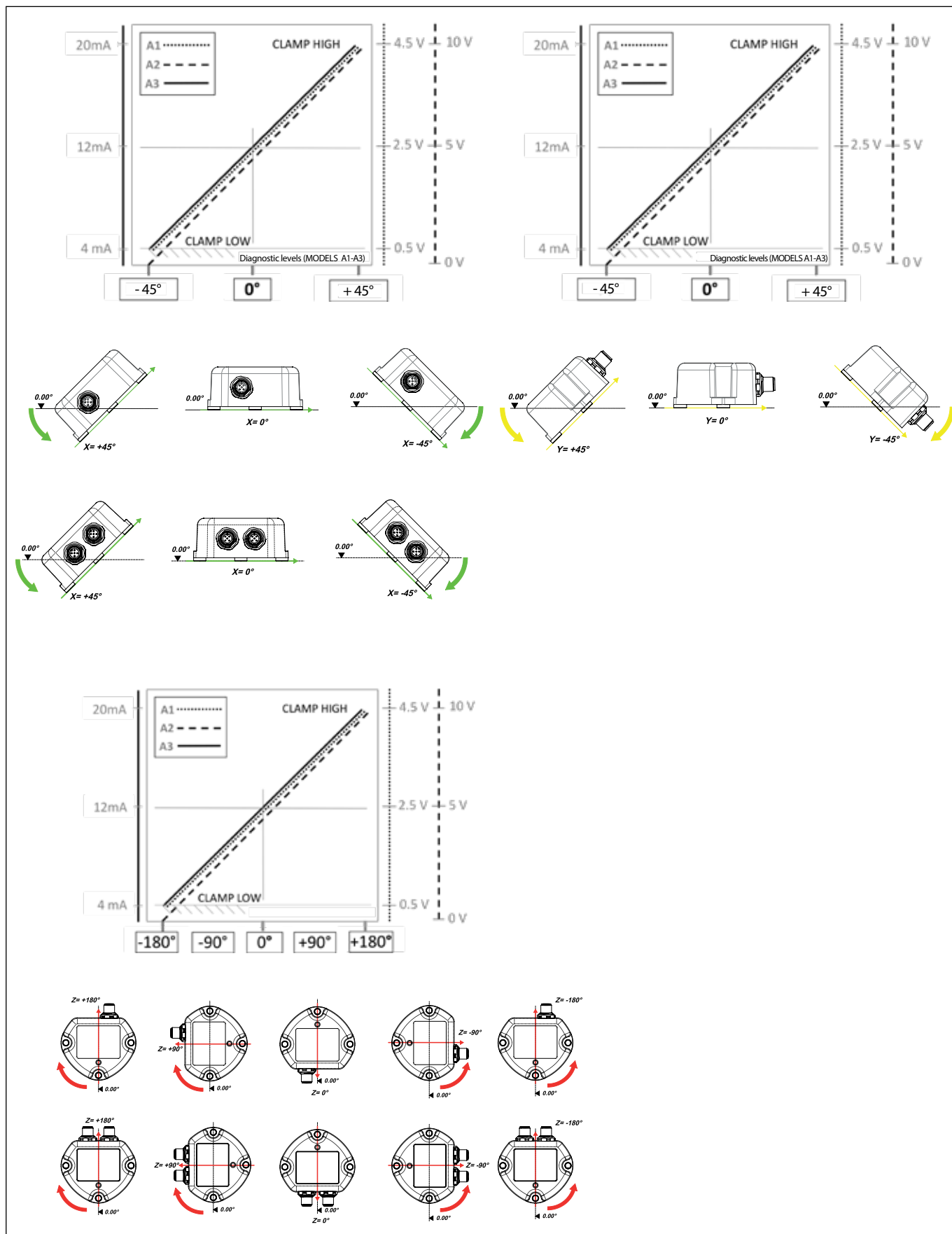
Accessories	
No accessories	X
Magnetic pen (PKIT 312)	Y

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 X720-MOR045045LA10 0033X00

M	M12 connector
0	Dual Axis (XY axis)
R	Redundant
045	±045°
045	±045°
L	+5 Vdc
A1	Ratiometric 10-90% of Vs
0	M12 version
0	No certificate
033	Standard
X	No accessories
00	Not defined (only cable version)

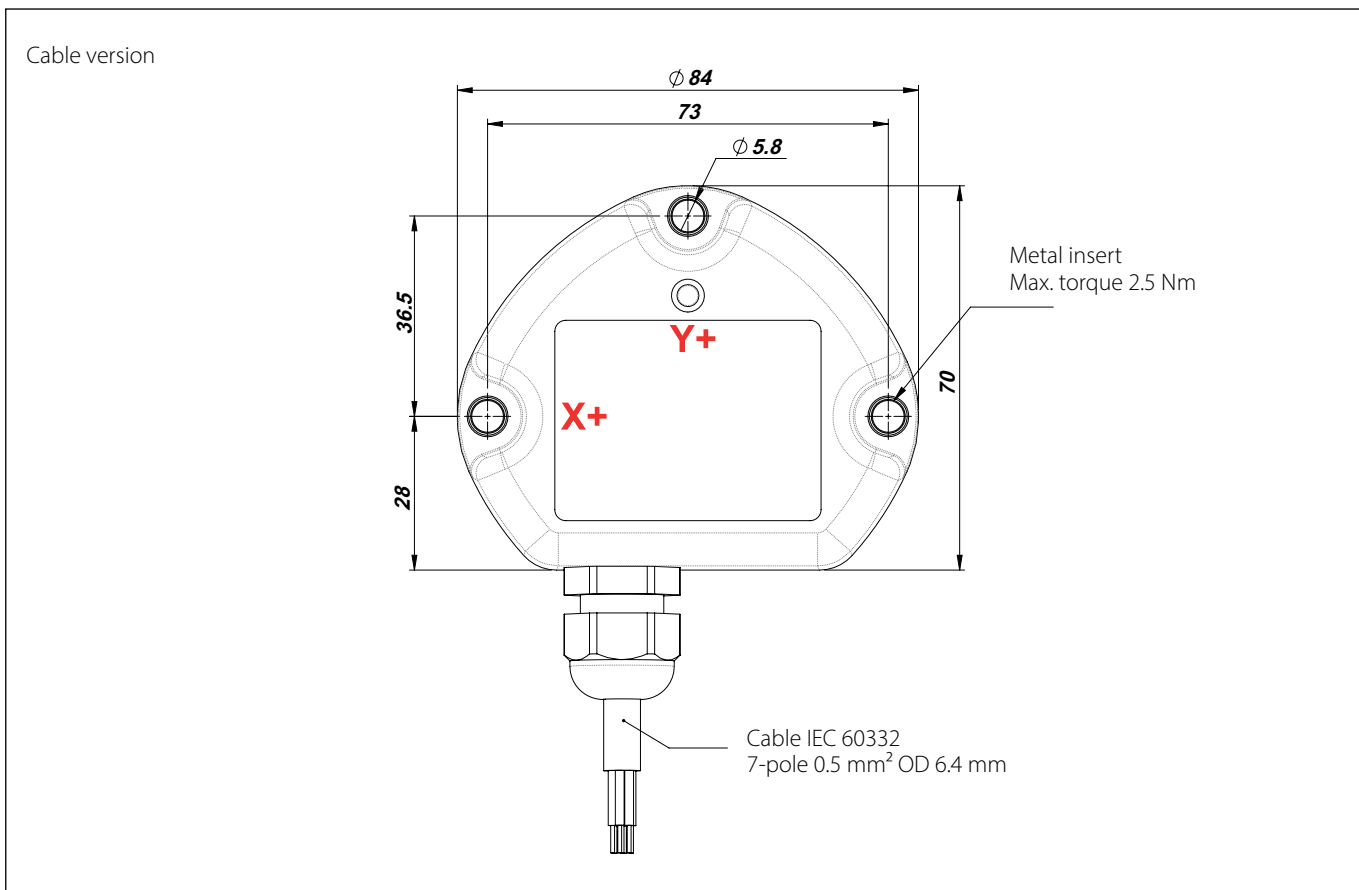
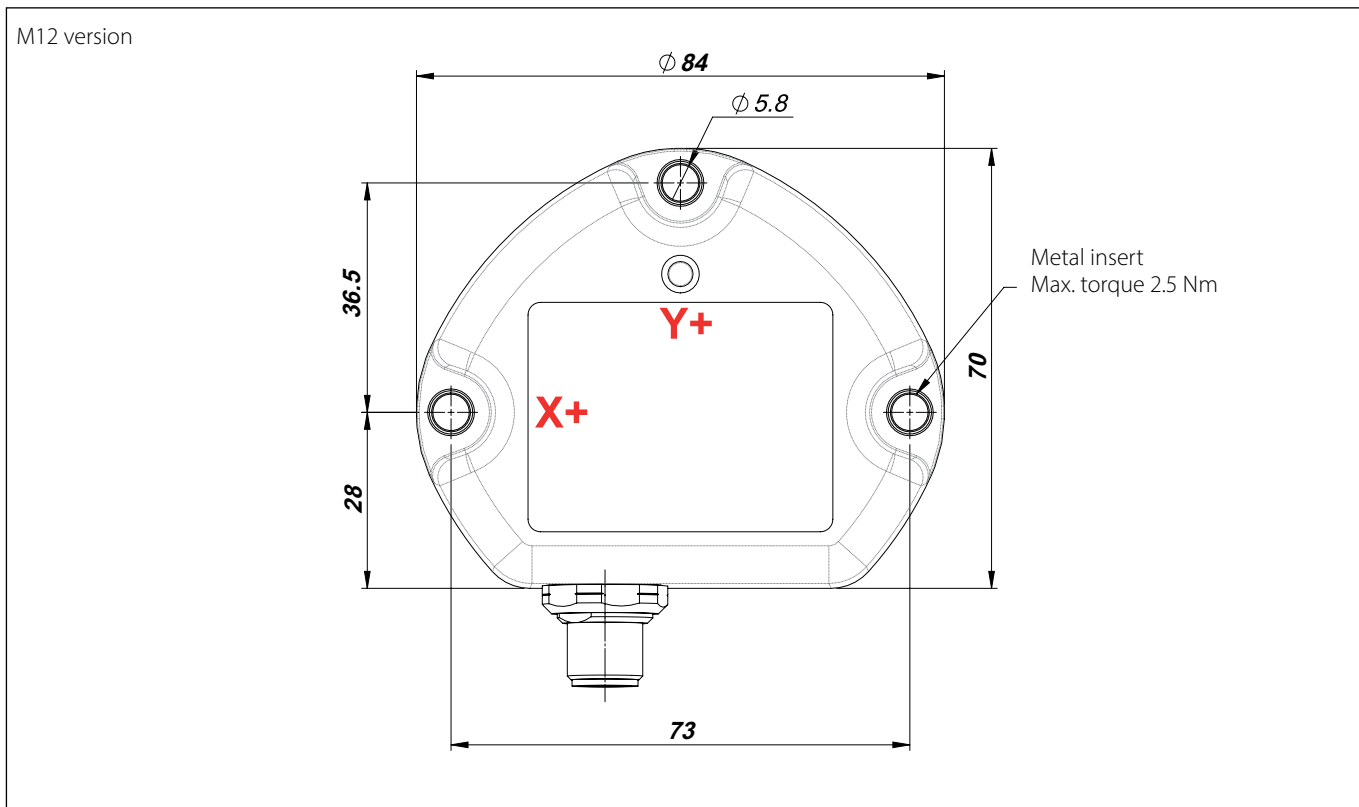
Output signals graphs



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

M12 version

M5 DIN 6796 A2 conical spring washers MUST be used (3 pc.)

CONEC M12x1.5-pin 43-01090 connector

<b>Connection</b>	<b>CAN Connection</b>
1. + Supply	1. n.c.
2. Output Y	2. + Supply
3. Ground	3. Ground
4. Output X	4. CAN H
5. n.c.	5. CAN L

Single axis

Dual axis

Cable version

CH 19

$\Phi 21.1$

35

8.8

2.9

$\Phi 10.9$

<b>Connection</b>	<b>CAN Connection</b>
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 point

Available for analog single circuit versions in DST X720  
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.

