ENGINEERING TOMORROW

Data Sheet

Inclination position sensor Type **DST X710**

For mobile hydraulic applications

The Danfoss DST X710 entry 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 X710 series uses contactless MEMS technology for both single and dual axis with measurement ranges up to 360°.

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.

Danfoss DST X710 is designed to be double mounted with specific spacers in order to have a full redundant space-saving version.

Features

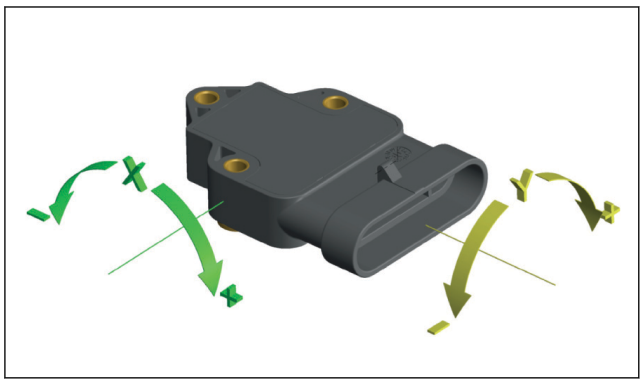
- MEMS technology for almost infinite sensor life time
- Dual axis up to ±85°, Single axis 360° (±180°)
- Output: Analogue or CANopen
- Electrical connector: AMP Superseal 6p 282108-1 or cable
- Accuracy: < ± 0.5% FS
- Resolution; 0.01°
- IP protection level IP67 - IPX9K with female mating connector

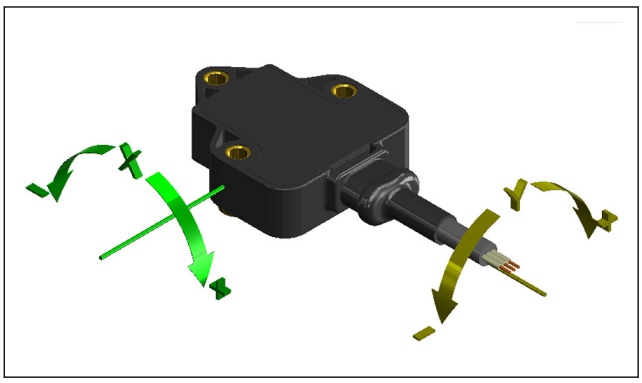
Functions

Zero function

Available for analog single circuit versions in DST X710

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 ±4.5° 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.

Figure 1: Magnetic pen

Product specification

Technical data

Table 1: Performance

Measuring range	±10° ±15° ±20° ±30° ±45° ±60° ±85° (single axis Z / dual axis XY) 360° (±180°) single axis Z
Accuracy (Factory verification @25 °C)	< ± 0.5% FS
Temperature coefficient @ 0°	Typical < ±0.006°/°K
Long term repeatability	Single axis: Typical <±0.5° in the range ±180° Dual axis: Typical <±0.5° in the range ≤ ± 60°, ± 2° otherwise
Resolution	0.01° CANopen output; 12 bit analog output

Table 2: Electrical specifications

Electrical connections	AMP Superseal 6P 282108-1, cable or cable +M12 5Pin
Output signal	CANopen, Ratiometric 10-90% of Vs, 0.5 - 4.5 V DC, 0-10 V DC or 4-20 mA
Supply voltage	CANopen, 0.5 – 4.5 V DC, 4 – 20 mA: 10 – 36 V DC; 0–10 V DC : 11–36 V DC Ratiometric: 10 - 90% of Vs: 5 V DC
Current consumption	Analogue: < 20 mA (no load) CANopen: < 15 mA (no load)
MTTFd [Years]	CANopen: 496 Analogue: 554

Table 3: Environmental conditions

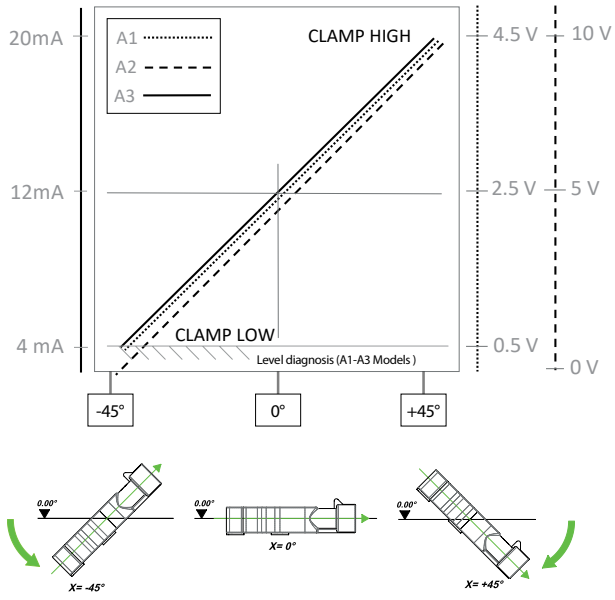
Operating temperature range			-40 – 85 °C
EMC		Emission	EN 55011
		Immunity	EN 61236-3-2
		Transient on supply lines	ISO 7637-2
		Bulk current injection	ISO 11452-4
Vibration stability	Sinusoidal	20 g, 10 Hz – 2,000 kHz	IEC 60068-2-6
Shock resistance	Impulsive on 3 axes	50 g, 11 ms	IEC 60068-2-27
IP rating			IP67 - IPX9K with female mating connector

Table 4: Mechanical characteristics

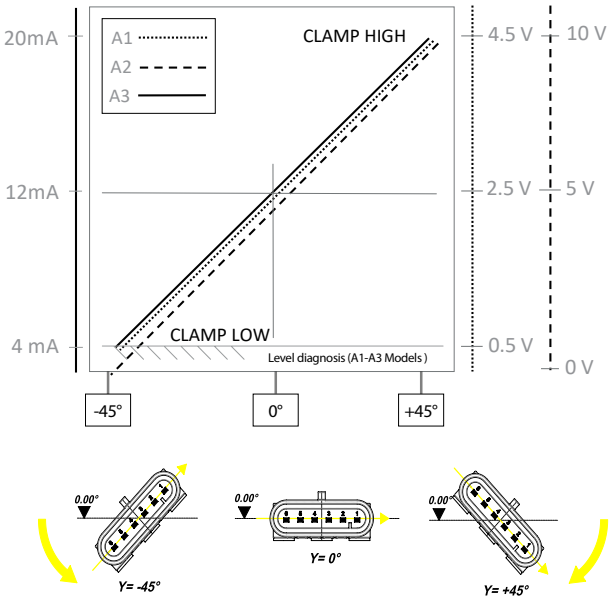
Materials	Enclosure	PBT (Polybutylene terephthalate)
Net weight		0.036 kg (without cable)

Sensor output graph

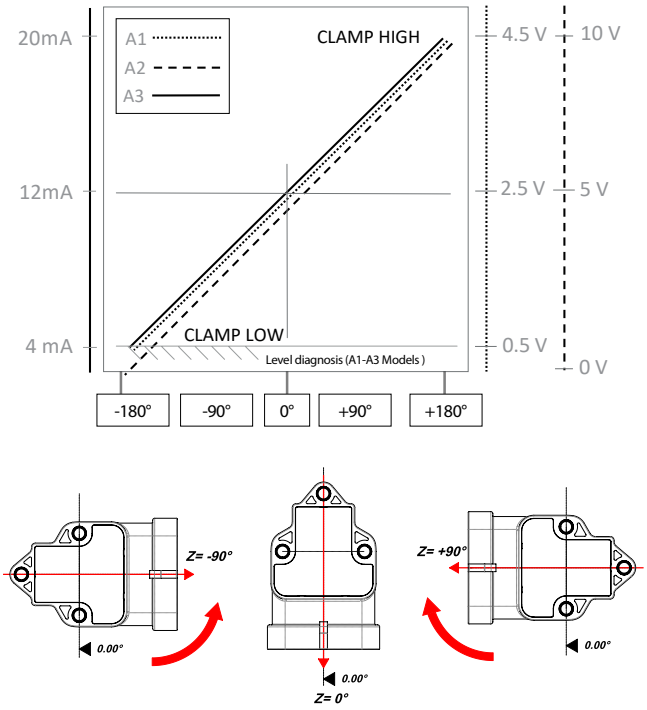
Dual axis tilt sensor (XY) X-axis



Dual axis tilt sensor (XY) - Y-axis



Single axis tilt sensor (±180°) - Z-axis



Load conditions

0.5 - 4.5 V DC output with power + 5 V DC: It is recommended a load resistance > 10 KΩ

Dimensions

Figure 2: AMP version

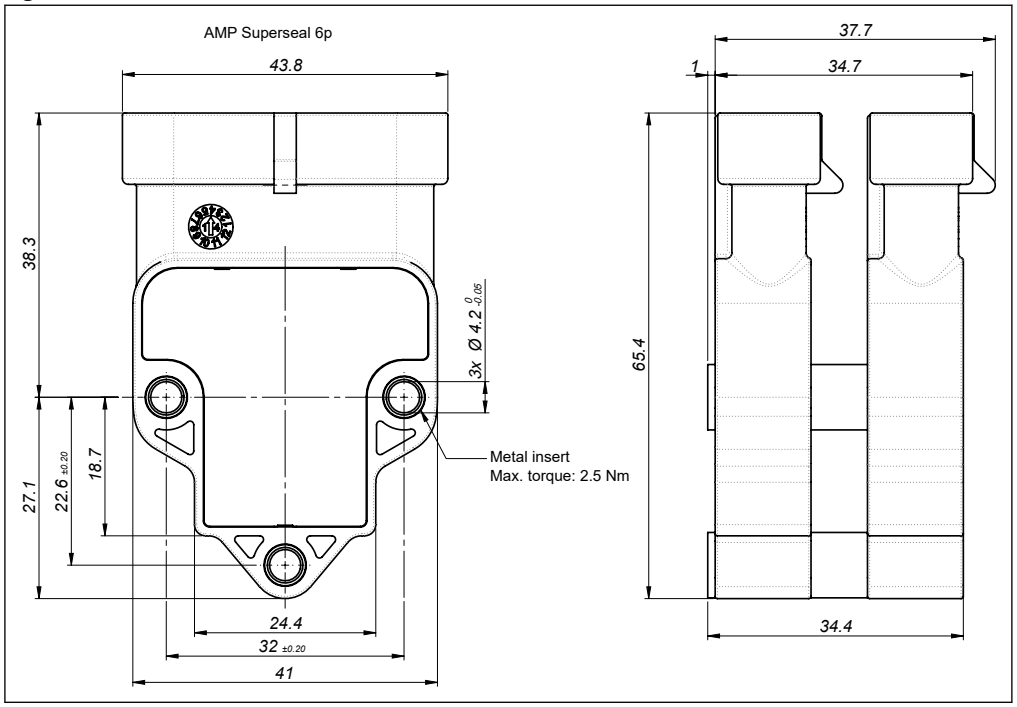
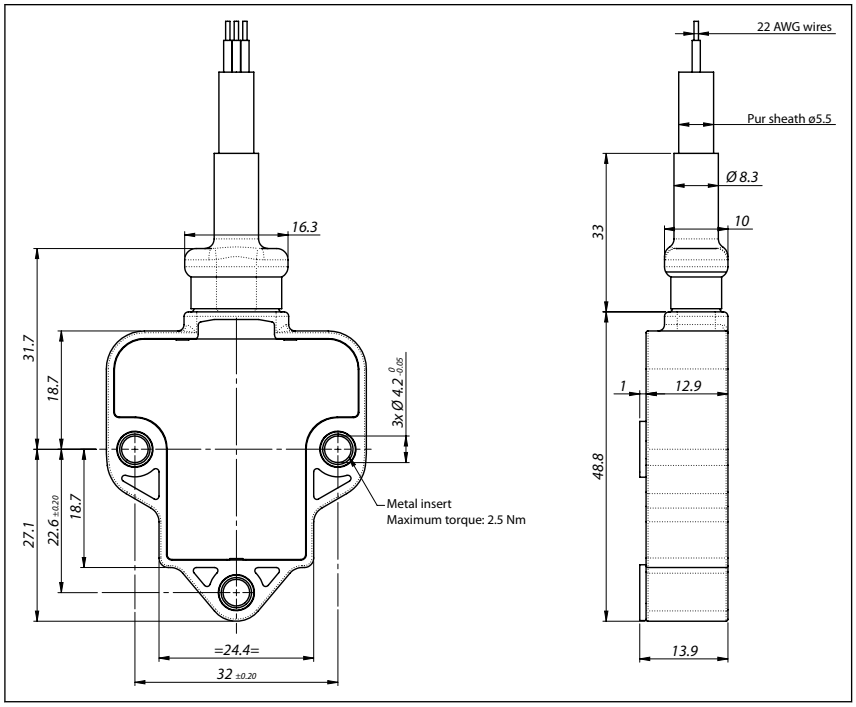
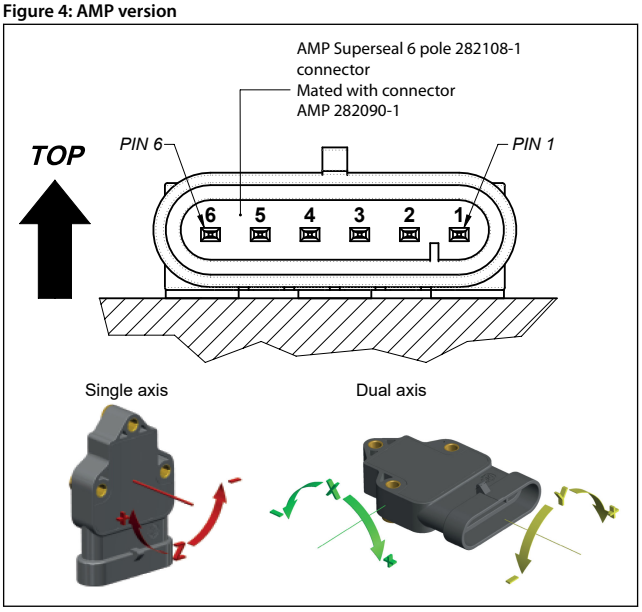


Figure 3: Cable version



Electrical connections

Figure 4: AMP version



Connections

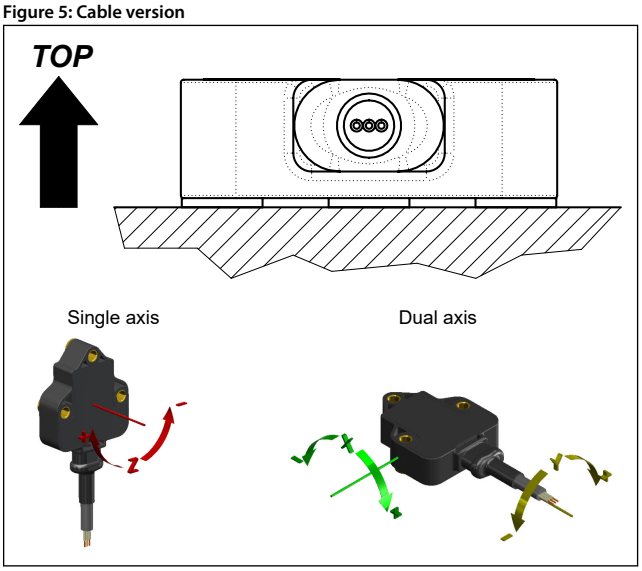
1	Ground
2	± Supply
3	Output X (dual axis)/Z(single axis)
4	Output Y (dual axis)/n.c (single axis)
5	n.c.
6	n.c.

CAN Connections

1	Ground
2	± Supply
3	n.c.
4	n.c.
5	CAN L
6	CAN H

Items marked n.c. should not be connected

Figure 5: Cable version



Connections

Black	Ground
Red	± Supply
Yellow	Output X
Green	Output Y
Blue	n.c.
White	n.c.

CAN Connections

Black	Ground
Red	± Supply
Blue	CAN L
White	CAN H

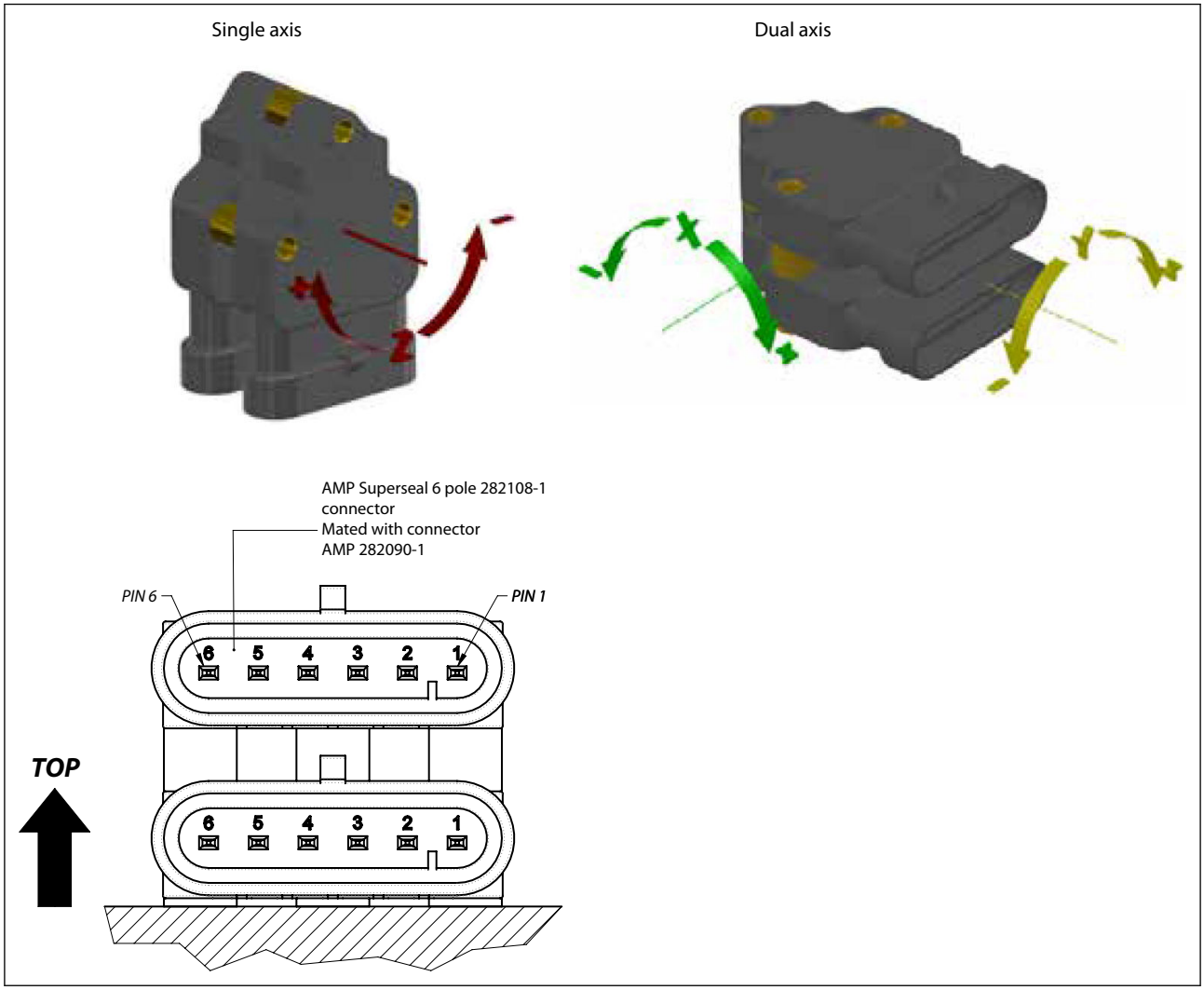
AMP full redundant version

Danfoss DST X710 tilt sensor is designed to be double mounted with specific spacers (BUS027) in order to have a full redundant space-saving version.

Please pay attention how to install the two DST X710 sensors:

Please position them both always face up or both face down.

Figure 6: DST X710 sensors



Connections

1	Ground
2	± Supply
3	Output Xn.c.
4	Output Y
5	n.c.
6	n.c.

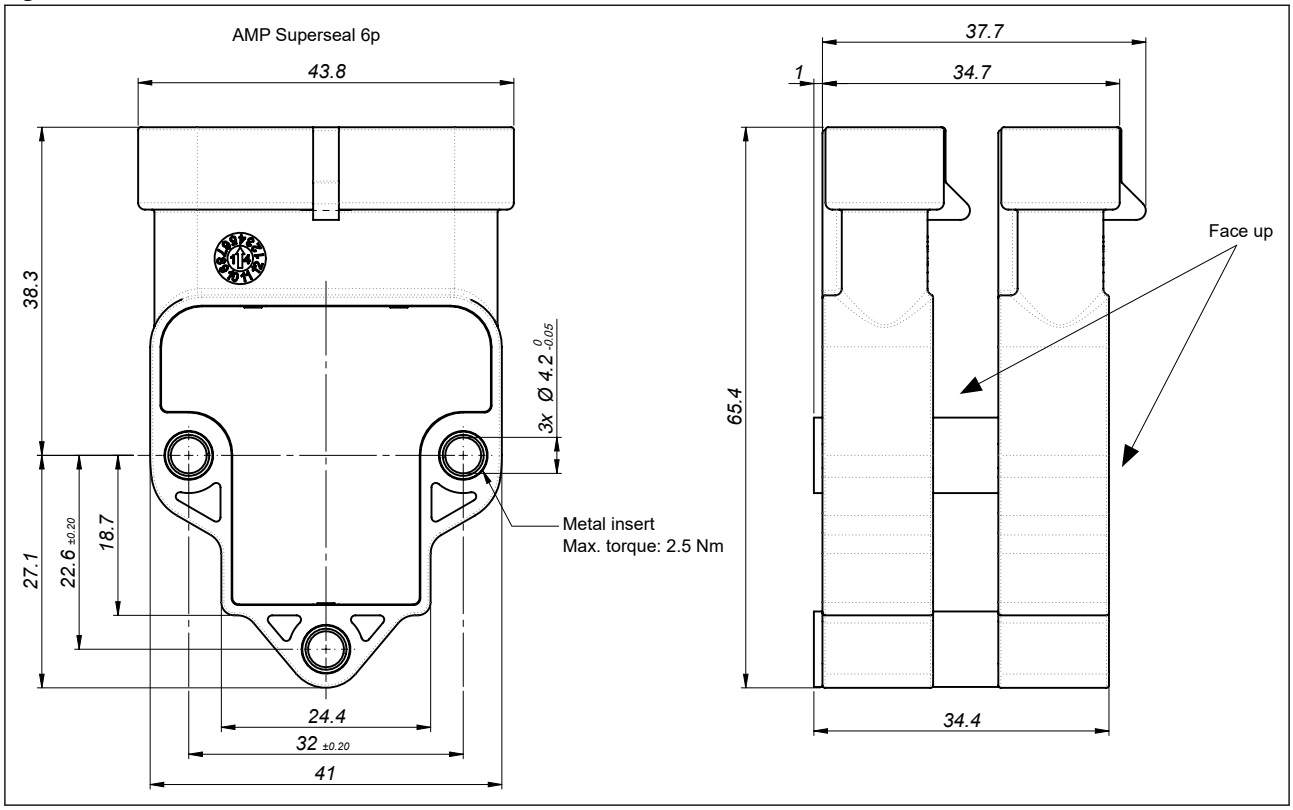
CAN Connections

1	Ground
2	± Supply
3	n.c.
4	n.c.
5	CAN L
6	CAN H

Items marked n.c. should not be connected

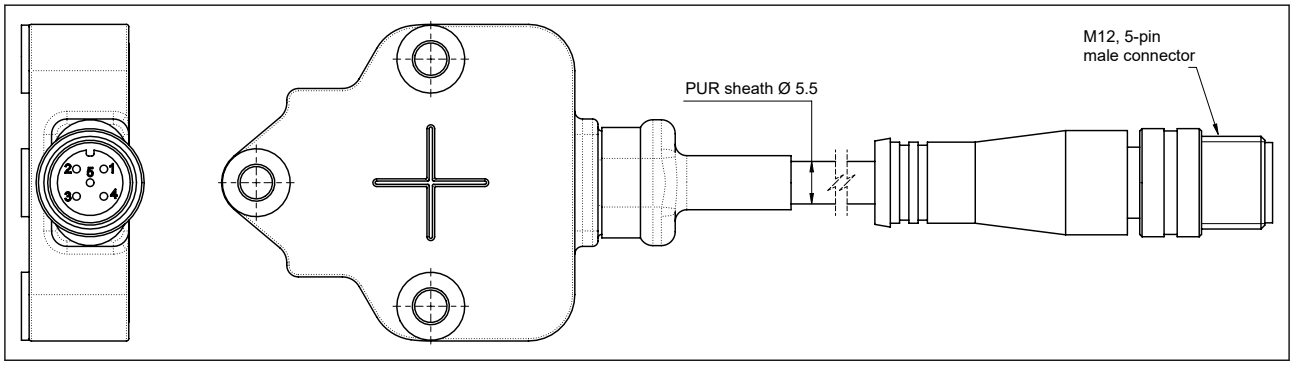
AMP Dimensions

Figure 7: AMP Version



Cable + M12 version

Figure 8: M12 connection pin



Analog connection		CAN connection	
1	+ Supply	**1**	n.c.
3	Output X	**3**	+ Supply
2	Ground	**2**	Ground
4	Output Y	**4**	CAN L
5	n.c.	**5**	CAN H

Ordering

Table 5: Ordering type

Type	Output signal	Cofigurations	Code no.
DST X710	CANopen	Single axis; ±180°; 36V	**098G2500**
	CANopen	Dual axis; ±85°; 36V	**098G2501**

Others on request

Ordering code - on request

Electrical connections	
AMP Superseal 6P connector	A
Cable (specify cabel length)	F

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

Measuring range	
(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

Measuring range (Not available)	
(Redundant option not available)	000

Supply voltage	
+5Vdc (only for A1 output)	L
+10…+36Vdc (see output signal for right supply voltage)	H

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

Cable	
Cable without connector (always "0" in case of DST X710 A MP Superseal)	0
Cable (100 mm) + M12, 5-pin male overprinted connector	1

Certificate	
No certificate attached	0
Linearity curve to be attached	L

Version	
Standard	033

Accessories	
No accessories	X
Magnetic pen (PKIT 312)	Y
3 x spacers for redundant version (BUS027)	A

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

Table 6: Example of ordering: DST X710-A0045000HC10 0033X00

A	AMP Superseal 6p
0	Dual Axis (XY axis)
045	±45°
000	NA
H	9 - 36 V DC
C1	CANopen
0	AMP version
0	No certificate
033	Standard
X	No accessories
00	Not defined (only cable version)

Certificates, declarations, and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at danfoss.com or contact your local Danfoss representative if you have any questions.

Table 7: Declarations

Document name	Document type	Document topic	Approval authority
098R0009	EU Declaration	EMCD/ROHS	Danfoss

Conformity

- CE
- RoHS

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