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

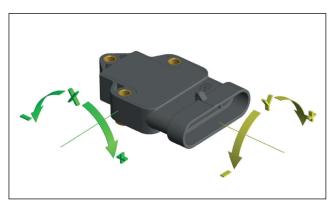


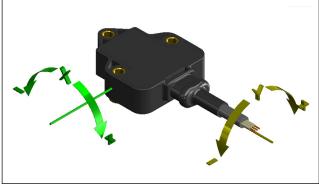
Functions

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 $\pm 4.5^{\circ}$ 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.

Figure 1: Magnetic pen





Product specification

Technical data

Table 1: 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° ($\pm 180^{\circ}$) single axis Z
Accuracy (Factory verification @25 °C)	$<\pm 0.5\%$ FS
Temperature coefficient @ 0°	Typical < ±0.006°/°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

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

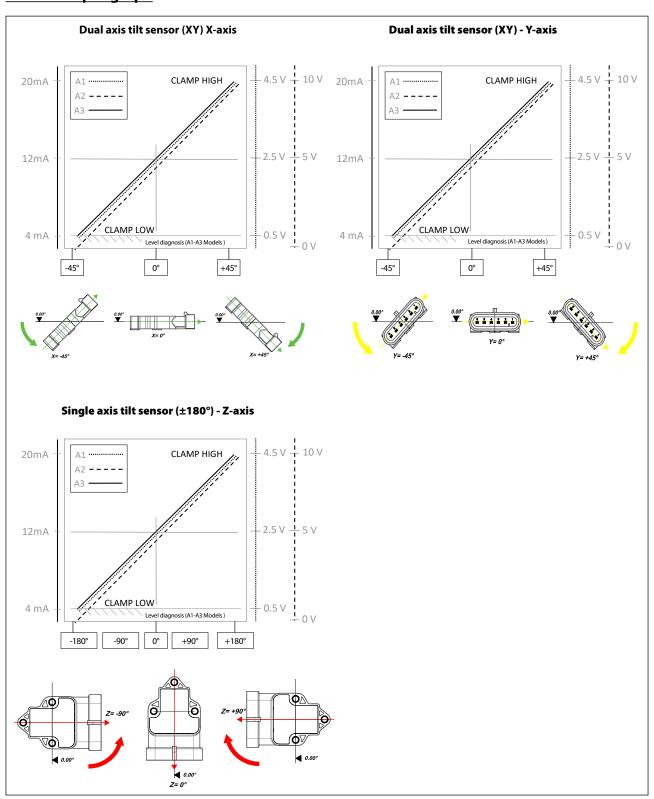
Operating temperature range			-40 – 85 °C
		Emission	EN 55011
EMC		Immunity	EN 61236-3-2
		Transient on supply lines	ISO 7637-2
		Bulk current injection	ISO 11452-4
Vibration stability	Sinusoidal	20 g, 10 Hz – 2,000 kHz	IEC 60068-2-6
Shock resistance	Impulsive on 3 axes	50 g, 11 ms	IEC 60068-2-27
IP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



Load conditions

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



Dimensions

Figure 2: AMP version

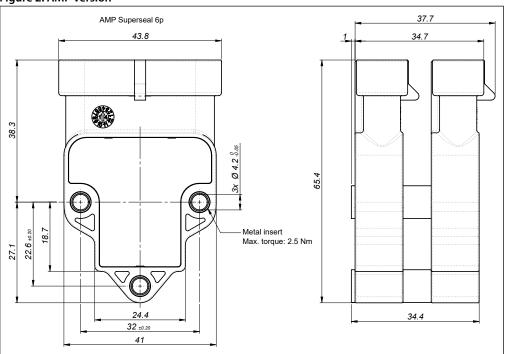
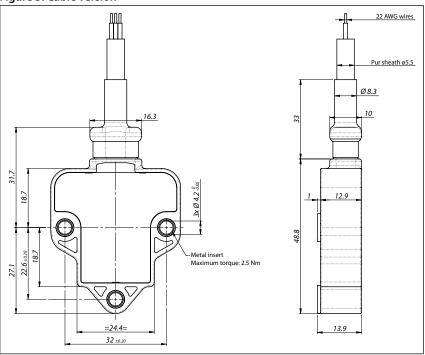
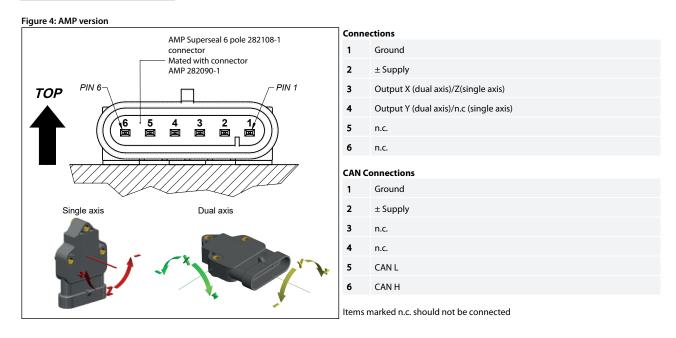


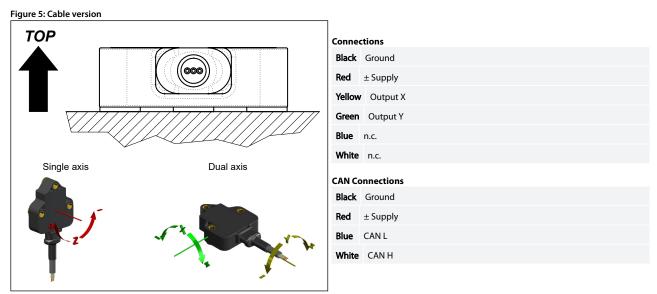
Figure 3: Cable version





Electrical connections





AMP full redundant version

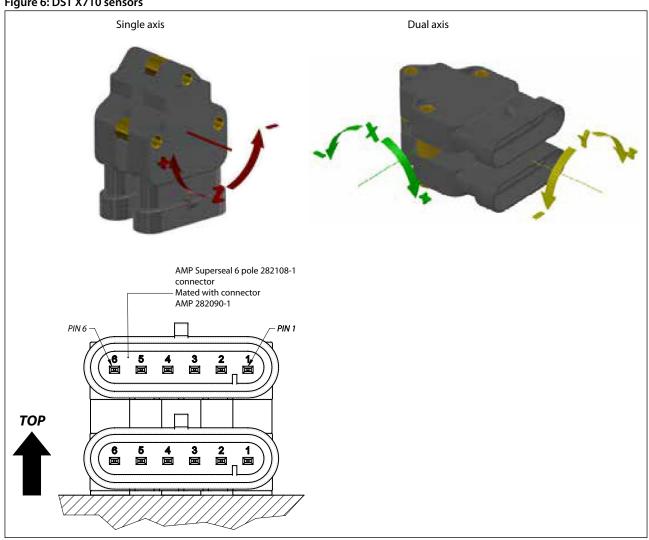
Danfoss DST X710 tilt sensor is designed to be double mounted with specific spacers (BUS027) in order to have a full redundant space-saving version.

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



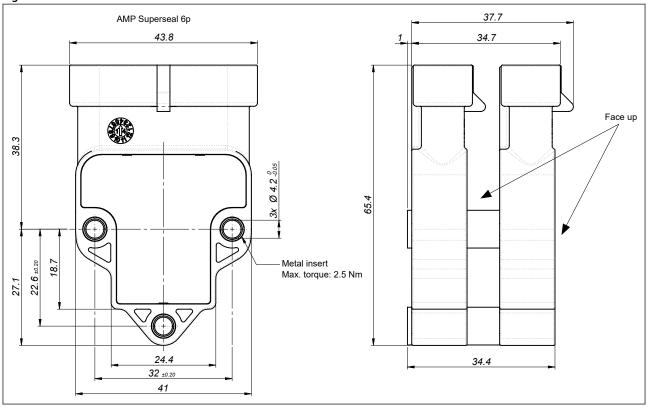
Connections CAN Connections			onnections
1	Ground	1	Ground
2	± Supply	2	± Supply
3	Output Xn.c.	3	n.c.
4	Output Y	4	n.c.
5	n.c.	5	CAN L
6	n.c.	6	CAN H

Items marked n.c. should not be connected



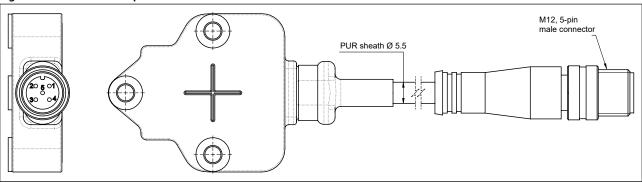
AMP Dimensions

Figure 7: AMP Version



Cable + M12 version

Figure 8: M12 connection pin



Analog	g 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

Туре	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

AMP Superseal 6P connector Cable (specify cable length) F Asis type Data abs (XY varis)	Electrical connections	
Asis type		A
Asis type		F
Dual asis (XY axis) 0 Single axis (Z axis) V Measuring range W 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 xxxx Measuring range (Not available) 000 Supply voltage — V=Yok'd (only for A1 output) L ± 10±36Vd L £ 10±36Vd L £ 10±36Vd A1 £ 2±36 VEC output A1 £ 2±36 VEC output A2 £ 4±20 Extoutput (powered at 11 o. 36 V DC) A3 £ 2±20 Extoutput (powered at 11 o. 36 V DC) A3 £ 2±20 Extoutput (powered at 11 o. 36 V DC) A3 £ 2±20 Extoutput (powered at 11 o. 36 V DC) A3 £ 2±20 Extoutput (powered at 11 o. 36 V DC) A3 £ 2±20 Extoutput (powered at 10 - 36 V DC) A3 £ 2±20 Extoutput (powered at 10 - 36 V DC) A3 £ 2±20 Extoutput (powered at 10 - 36 V DC) A3 £ 2±20 Extoutput (powered at 10 - 36 V DC) A3 £ 2±20 Extoutput (powered at 10 - 36 V DC) <td< td=""><td></td><td></td></td<>		
Measuring range Measuring range (indicate) = 10° ± 15° ± 20° ± 30° ± 40° ± 60° ± 85° (single axis 2 for analogue output valual axis XYI; 360° (± 180°) for single Zaxis only	Axis type	
Measuring range	Dual axis (XY axis)	0
Measuring range (Indicate) ±10" ±15" ±20" ±30" ±45" ±45" ±45" for single Z axis only	Single axis (Z axis)	V
Measuring range (Indicate) ±10" ±15" ±20" ±30" ±36" ±36" ±36" to single Z axis only		
Measuring range (Not available)	Measuring range	
Measuring range (Not available) 000 Supply voltage -5V4c (only for A1 output) L +10+30Vic (see output signal for right supply voltage) H Output type -5V5 cutput (available) A1 (available) 5-4.5 VD Coutput (available) with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A1 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply H = 0.5 - 4.5 V output) A2 (available with supply Le ratiometric output and with supply Le ratiometric outp		XXX
Redundant option not available) 000	(Single axis 2 for analogue output dual axis x1), 300 (±100) for single 2 axis only	
Redundant option not available) 000	Measuring range (Not available)	
### Supply voltage ### SVGC (only for A1 output) ### L ### 10+36VG (see output signal for right supply voltage) ### Coutput type Coutput type		000
+5Vdc (only for A1 output) +10430Vdc (see output signal for right supply voltage) 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) (available with supply L = ratiometric output and with supply H = 0.5 - 4.5 V output) (available with supply L = ratiometric output and with supply H = 0.5 - 4.5 V output) (available with supply L = ratiometric output and with supply H = 0.5 - 4.5 V output) (available with supply L = ratiometric output and with supply H = 0.5 - 4.5 V output) (available with supply L = ratiometric output and with supply H = 0.5 - 4.5 V output) (A2 4-20 mA output (powered at 10 - 36 V DC) (A3 CANopen output (powered at 10 - 36 V DC) (A1 CABLE CABLE CABLE WITHOUT CONNOCATION AMP Superseal) (A2 CABLE (100 mm) + M12, 5-pin male overprinted connector CABLE (100 mm) + M12, 5-pin	,	
### ### ### ### ### ### ### ### ### ##	Supply voltage	
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 0.5 - 4.5 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 0 Linearity curve to be attached 0 Version Standard Accessories No accessories X Magnetic pen (PKIT 312) Y 3 x spacers for redundant version (BUS027) A Cable length 100 mm 01 200 mm 05 1 m 10 2 m 20	+5Vdc (only for A1 output)	L
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) 0.1 0.7 10 V DC output (powered at 11 - 36 V DC) 4 - 20 mA output (powered at 10 - 36 V DC) CANopen output (powered at 10 - 36 V DC) Cable Cable (100 mm) + M12, 5-pin male overprinted connector Certificate No certificate attached Linearity curve to be attached Linearity curve to be attached Version Standard Accessories No accessories No accessories No accessories No accessories No accessories Accessories No accessories No accessories No accessories No accessories No accessories Accessories No accessories Output 100 mm Output 100 mm		н
0.5 - 4.5 V DC output (available with supply L = ratiometric output and with supply H = 0.5 - 4.5 V output) A1 0.7 - 4.5 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 without connector (always "0" in case of DST X710 A MP Superseal) 0 Cable (100 mm) + M12, 5-pin male overprinted connector 1 Certificate Certificate attached 0 Linearity curve to be attached L Version Standard 033 Accessories No accessories X Magnetic pen (PKIT 312) X 3 x spacers for redundant version (BUS027) A Cable length 100 mm 01 200 mm 05 1 m 10 2 m 20	(see output signal for right supply voltage)	
0.5 - 4.5 V DC output (available with supply L = ratiometric output and with supply H = 0.5 - 4.5 V output) A1 0.7 - 4.5 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 without connector (always "0" in case of DST X710 A MP Superseal) 0 Cable (100 mm) + M12, 5-pin male overprinted connector 1 Certificate Certificate attached 0 Linearity curve to be attached L Version Standard 033 Accessories No accessories X Magnetic pen (PKIT 312) X 3 x spacers for redundant version (BUS027) A Cable length 100 mm 01 200 mm 05 1 m 10 2 m 20	Output type	
(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) 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 1 Version Standard 033 Accessories No accessories X Magnetic per (PKIT 312) Y 3 x spacers for redundant version (BUS027) A Cable length 100 mm 01 200 mm 05 1 m 10 2 m 20		
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 X Magnetic pen (PKIT 312) Y 3 x spacers for redundant version (BUS027) A Cable length 100 mm 01 200 mm 05 1 m 10 2 m 20		A1
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 05 1 m 10 2 m 20	0 - 10 V DC output (powered at 11 - 36 V DC	A2
Cable without connector (always "0" in case of DST X710 A MP Superseal) Cable (100 mm) + M12, 5-pin male overprinted connector 1 Certificate No certificate attached Linearity curve to be attached Xersion Standard O33 Accessories No accessories X Magnetic pen (PKIT 312) 3 x spacers for redundant version (BUS027) Cable length 100 mm 01 200 mm 05 1 m 10 2 m	4 - 20 mA output (powered at 10 - 36 V DC)	A3
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 05 1 m 10 2 m 20	CANopen output (powered at 10 - 36 V DC)	C1
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 05 1 m 10 2 m 20		
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 (BU5027) A Cable length 100 mm 01 200 mm 05 1 m 10 2 m 20		0
Certificate 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 05 1 m 10 2 m 20		
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	Cable (100 fillit) + W12, 5-piii filale overprinted connector	1
Linearity curve to be attached L Version 033 Standard 033 Accessories X No accessories X Magnetic pen (PKIT 312) Y 3 x spacers for redundant version (BUS027) A Cable length 01 100 mm 02 500 mm 05 1 m 10 2 m 20	Certificate	
Version Standard 033 Accessories X No accessories X Magnetic pen (PKIT 312) Y 3 x spacers for redundant version (BUS027) A Cable length 01 200 mm 02 500 mm 05 1 m 10 2 m 20	No certificate attached	0
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	Linearity curve to be attached	L
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		
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	Version	
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	Standard	033
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	Assessation	
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		V
3 x spacers for redundant version (BUS027) Cable length 100 mm 01 200 mm 02 500 mm 10 2 m 20		
Cable length 100 mm 01 200 mm 02 500 mm 05 1 m 10 2 m 20		
100 mm 01 200 mm 02 500 mm 05 1 m 10 2 m 20	5 x spaces for redundant version (b03027)	^
200 mm 02 500 mm 05 1 m 10 2 m 20	Cable length	
500 mm 05 1 m 10 2 m 20	100 mm	01
1 m 10 2 m 20	200 mm	02
2 m	500 mm	05
	1 m	10
Other length on request -	2 m	20
	Other length on request	-



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

Α	AMP Superseal 6p
0	Dual Axis (XY axis)
045	±45°
000	NA
Н	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



Online support

Danfoss offers a wide range of support along with our products, including digital product information, software, mobile apps, and expert guidance. See the possibilities below.

The Danfoss Product Store



The Danfoss Product Store is your one-stop shop for everything product related—no matter where you are in the world or what area of the cooling industry you work in. Get quick access to essential information like product specs, code numbers, technical documentation, certifications, accessories,

Start browsing at store.danfoss.com.

Find technical documentation



Find the technical documentation you need to get your project up and running. Get direct access to our official collection of data sheets, certificates and declarations, manuals and guides, 3D models and drawings, case stories, brochures, and much more.

Start searching now at www.danfoss.com/en/service-and-support/documentation.

Danfoss Learning



Danfoss Learning is a free online learning platform. It features courses and materials specifically designed to help engineers, installers, service technicians, and wholesalers better understand the products, applications, industry topics, and trends that will help you do your job better.

Create your Danfoss Learning account for free at www.danfoss.com/en/service-and-support/learning.

Get local information and support



Local Danfoss websites are the main sources for help and information about our company and products. Find product availability, get the latest regional news, or connect with a nearby expert—all in your own language.

Find your local Danfoss website here: www.danfoss.com/en/choose-region.

Spare Parts



Get access to the Danfoss spare parts and service kit catalog right from your smartphone. The app contains a wide range of components for air conditioning and refrigeration applications, such as valves, strainers, pressure switches, and sensors.

Download the Spare Parts app for free at www.danfoss.com/en/service-and-support/downloads.

Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.