Data sheet

Pressure switch

CS

For air compressors and water boosters

Description

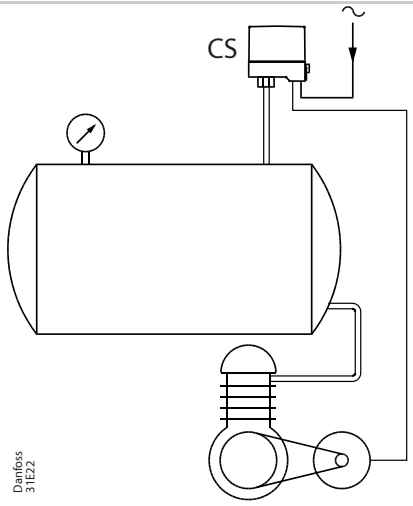
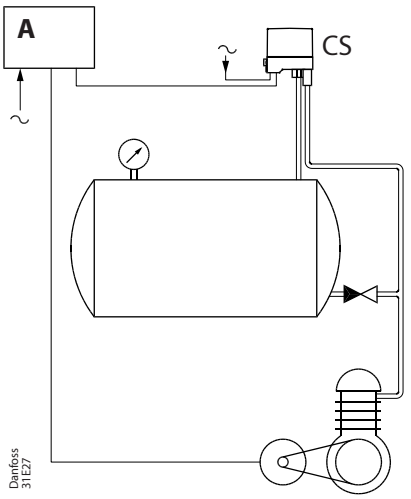
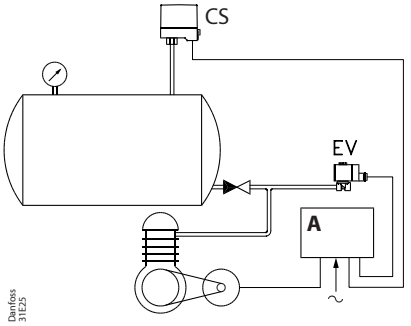
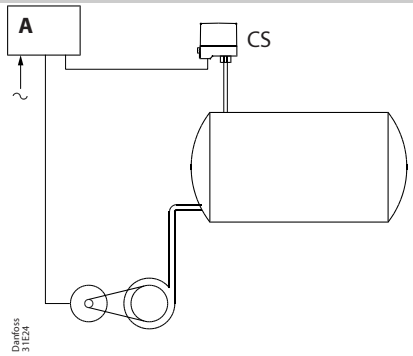
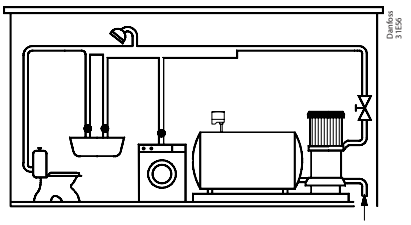
CS pressure switches have a built-in pressure operated, three-pole switch. The contact position of which depends on the pressure in the connector and the range setting and adjustable differential. The pressure switches are fitted with a manual switch that will lock the contact system in the open position independently of the pressure in the system. Pressure switches with relief valve are used in compressed air systems where pressure relief on the compressor piston before start is required. The CS is suited for automatic start and stop of air compressors and water boosters

Features & benefits

- Pressure ranges 2 – 20 bar
- Pressure connection G ½ or G ¼
- Contact system 3-pole (TPST) as standard available also as an accessory
- Adjustable differential
- Relief valve as accessory
- Manual switch to lock the contact system
- Enclosure IP43 or IP55
- Special versions with pressure connection made of polyacetal suitable in drinking water applications

Applications

Table: Application examples

Example 1 Control of an air compressor with a CS pressure switch.	**Example 2** Control of a compressor with a CS pressure switch fitted with a pressure relief valve. Note the check valve between pressure relief line and reservoir.	**Example 3** Control of an air compressor with a CS. An EV210B 3B solenoid valve is recommended where there is need for especially fast pressure relief.
		
Example 4 Control of a centrifugal pump with a CS, via an automatic star-delta switch, motor starter, or similar.	**Example 5** Pressure boosting system for domestic circuits. A type CS switch is used to start/stop the pump.	
		

A	Motor starter or automatic start-delta switch

Ordering

Product code numbers

Table: Standard pressure switch type CS

Stop pressure p_e [bar]	Min. differential Δp [bar]	Max. differential Δp [bar]	Max. test pressure p_e [bar]	Grade of enclosure	Pressure connection	Type	Code no.
2 – 6	0.72 – 1.0	1.0 – 2.0	10	IP43	G ¼	1-pole	031E020266
2 – 6	0.72 – 1.0	1.0 – 2.0	10	IP43	G ¼	3-pole	031E020066
2 – 6	0.72 – 1.0	1.0 – 2.0	10	IP55	G ¼	3-pole	031E020566
2 – 6	0.72 – 1.0	1.0 – 2.0	10	IP43	G ½	3-pole	031E021066
2 – 6	0.72 – 1.0	1.0 – 2.0	10	IP55	G ½	3-pole	**031E021566**[(1)]
4 – 12	1 – 1.5	2.0 – 4.0	20	IP43	G ¼	3-pole	031E022066
4 – 12	1 – 1.5	2.0 – 4.0	20	IP55	G ¼	3-pole	**031E022566**[(1)]
4 – 12	1 – 1.5	2.0 – 4.0	20	IP43	G ½	3-pole	031E023066
4 – 12	1 – 1.5	2.0 – 4.0	20	IP55	G ½	3-pole	**031E023566**[(1)]
7 – 20	2 – 3.5	3.5 – 7.0	32	IP43	G ¼	3-pole	031E024066
7 – 20	2 – 3.5	3.5 – 7.0	32	IP55	G ¼	3-pole	031E024566
7 – 20	2 – 3.5	3.5 – 7.0	32	IP43	G ½	3-pole	031E025066
7 – 20	2 – 3.5	3.5 – 7.0	32	IP55	G ½	3-pole	**031E025566**[(1)]

(1) Preferred versions

Table: Special versions with Polyacetal pressure connection - suitable for drinking water

Stop pressure p_e [bar]	Min. differential Δp [bar]	Max. differential Δp [bar]	Max. test pressure p_e [bar]	Grade of enclosure	Pressure connection	Type	Code no.
2 – 6	0.72 – 1.0	1.0 – 2.0	10	IP43	G ½	3-pole	031E101066
4 – 12	1 – 1.5	2.0 – 4.0	20	IP43	G ½	3-pole	031E101266
7 – 20	2 – 3.5	3.5 – 7.0	32	IP43	G ½	3-pole	031E101466

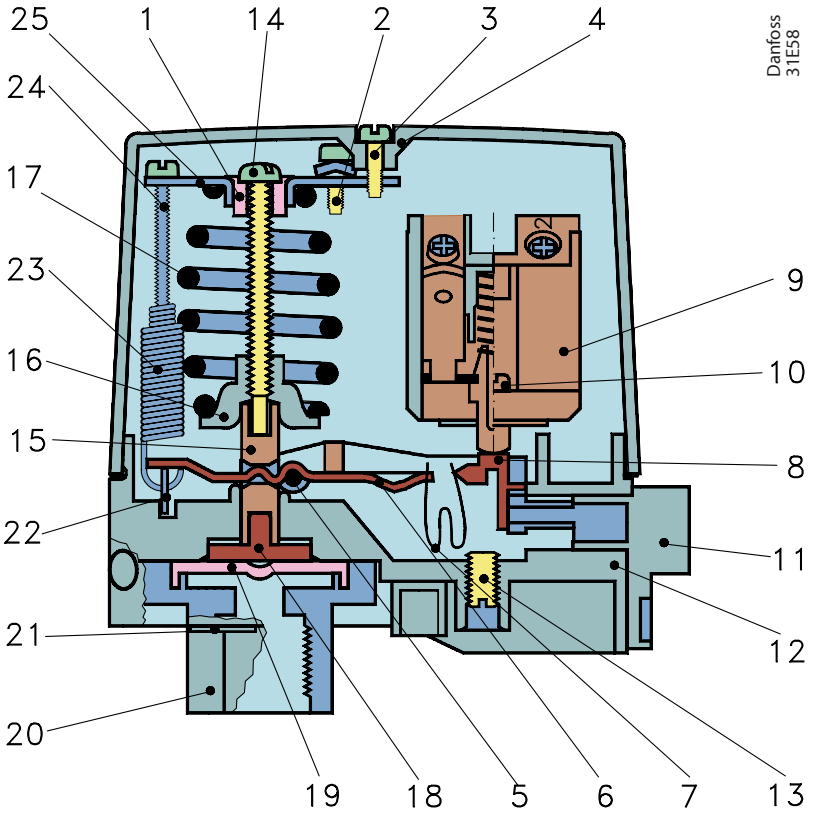
Accessories code numbers

Table: Accessories and spare parts

Description	Code no.
Three pole contact system (TPST)	031E029166
Pressure relief valve, incl. fixing screw (for 6 mm pipe/hose)	031E029866
Pressure relief valve, incl. fixing screw (for ¼ in. pipe/hose)	031E029766
Two Pg 16 screwed cable entries with gaskets (cable diam. 6.5 – 15 mm)	031E029366
Nipple with 7/16–20 UNF and M10 x 1 int.	031E029666

Functions

Figure: Design and function



1	Slide ring
2	Earth screw
3	Cover screw
4	Cover
5	Spindle
6	Toggle arm
7	Snap spring
8	Snap arm
9	Switch housing assy

10	Self-tapping screw
11	Manual switch
12	Base
13	Grubscrew
14	Stop pressure screw
15	Pressure pad
16	Spring retainer
17	Compression spring
18	Pressure shoe

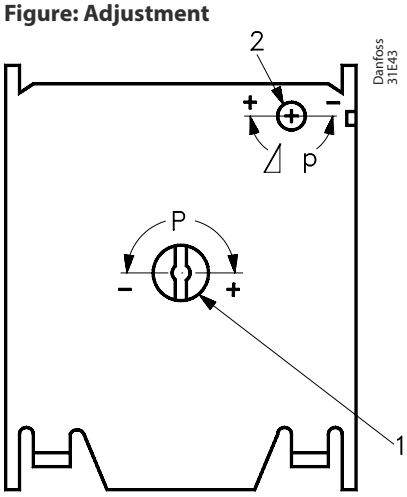
19	Diaphragm
20	Flange, G ¼ or G ½
21	Cap
22	Differential arm
23	Tension spring
24	Differential pressure screw
25	Bracket

The pressure switch is built up of the following main elements: connector, diaphragm, snap system, main spring, differential spring and a 3-pole or one-pole contact system. The stop pressure must be set on the main spring and the difference between start and stop pressures on the differential spring.

Pressure from the controlled system is led, via the connector, to the diaphragm. The diaphragm converts this pressure to a mechanical movement which is transferred by the snap system to the contact system. In this way, the contact system starts or stops a compressor/pump.

Settings

Figure: Adjustment



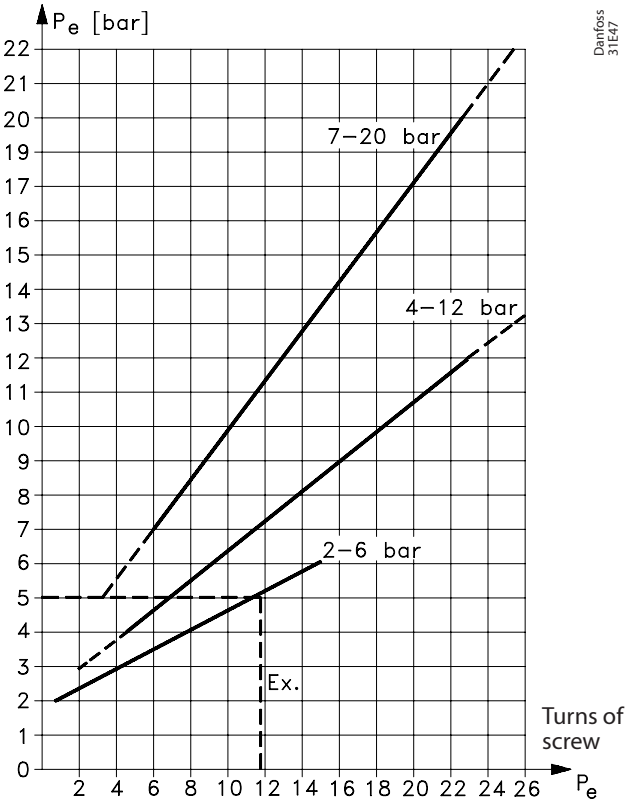
1	Stop pressure screw
2	Differential screw

All standard versions of CS pressure switches are preset and supplied with springs under minimum compression.

1. Turn the stop pressure screw (1) the given number of times towards + (high stop pressure), see Figure: Stop pressure graph.
2. Turn the differential screw (2) the given number of times towards + (max. differential), see Differential pressure nomograms.
3. Start the plant and let it run until the required stop pressure is reached.
4. Turn the stop pressure screw (1) towards minus (lower stop pressure) until the plant stops.
5. Reduce the pressure to the required start pressure.
6. Turn the differential screw (2) towards minus (smaller differential) until the plant starts.
7. Check that the plant stops and starts at the required pressures.

Note: If the differential is set at a value greater than the stop pressure the plant cannot start. If this is the case, set the differential at a smaller value (towards minus).

Figure: Stop pressure graph



Example:

A compressor is to be regulated by a CS pressure switch. The start pressure is 3.5 bar, and the stop pressure 5 bar. The choice should be a CS with a range of 2 – 6 bar

1. Turn the stop pressure screw (1) about 12 times. See Figure: Adjustment.
2. Turn the differential screw (2) about 4.5 times. See Figure: CS 2 – 6 [bar]. Take a straight line from 5 bar stop pressure on the nomogram to the differential, 1.5 bar and read off the number of turns, i.e. 4.5.

Take a straight line from 5 bar stop pressure on the nomogram to the differential, 1.5 bar and read off the number of turns, i.e. 4.5.

Differential pressure nomograms

Figure: CS 2–6 [bar]

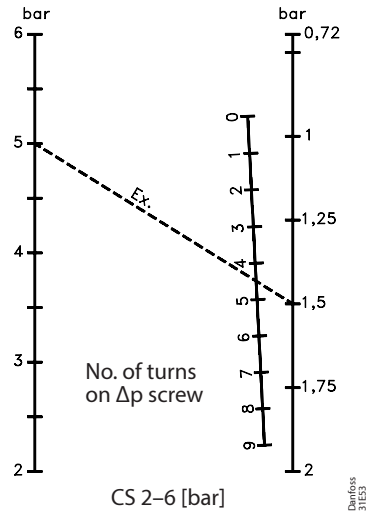


Figure: CS 4–12 [bar]

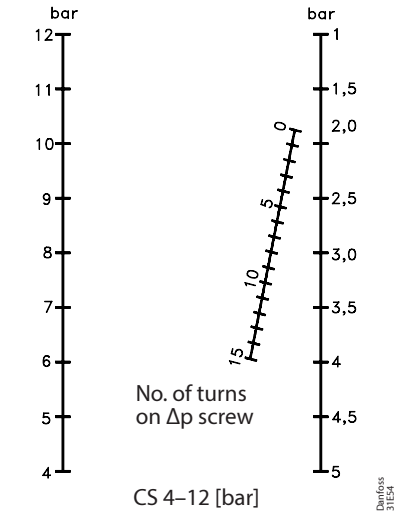
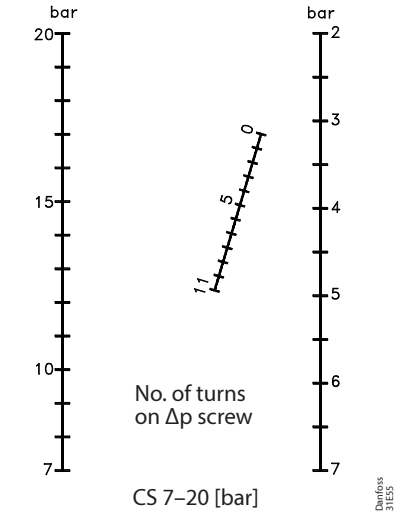


Figure: CS 7–20 [bar]



Product details

General data

Table: Specifications

Ambient temperature	-20 – 70 °C	
Temperature of medium	Water	0 – 70 °C
	Air	-20 – 70 °C
Vibration–proof	0 – 1000 Hz at 4g	
Resonance frequency, see Figure	Direction A–B	341 Hz
	Direction C–D	332 Hz
	Direction E–F	488 Hz
Diaphragm material	Hytrel	
Pressure connector	Special	Polyacetal, G ½
	Others	Silumin, G ¼ or G ½
Pressure relief valve (capacity)	2000 cm^3 from 10 – 1 bar in 18.8 sec.	
Grade of enclosure to IEC 529	IP43 or IP55	

Figure: Resonance frequency

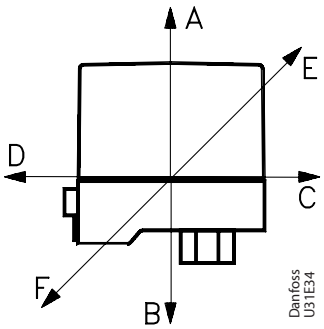


Table: Contact load

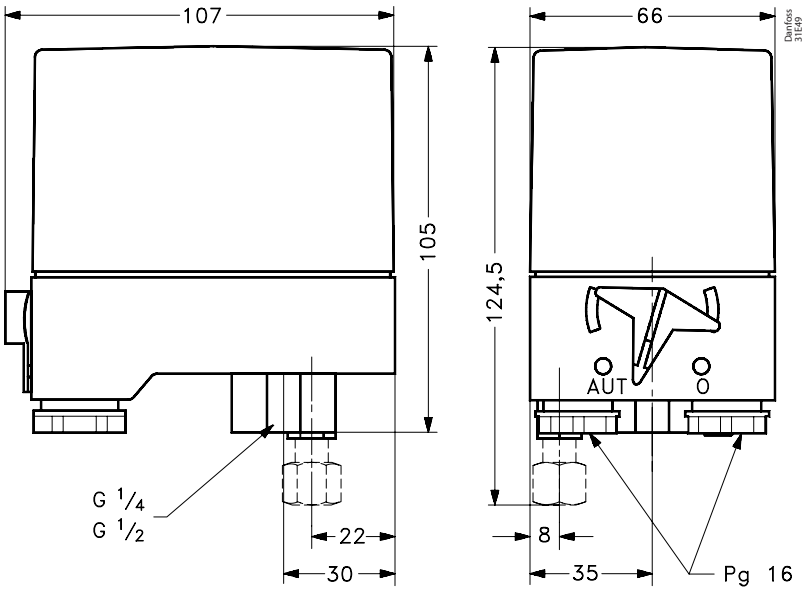
Contact load	I_e	U_e
AC–3	12 A	220 – 415 V
AC–3	9 A	600 V
DC–13/14	2 A	220 V (3 contacts in series)

Table: Properties according to EN 60947

Wire dimension	solid / stranded	0.7 – 2.5 mm^2
	flexible, with / without ferrules	0.75 – 2.5 mm^2
	flexible, with ferrules	0.5 – 1.5 mm^2
Tightening torque	max. 1.2 Nm	
Rated impulse voltage	4 kV	
Pollution degree	3	
Short circuit protection, fuse	25 A	
Insulation	600 V	
IP–index	IP43 or IP55	

Dimensions

Figure: Dimensions [mm]



Weight approx. 0.5 kg

Connections

Mains connection

Figure: 3–pole AC load

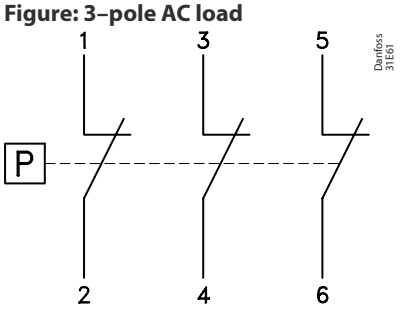


Figure: 1–pole AC load

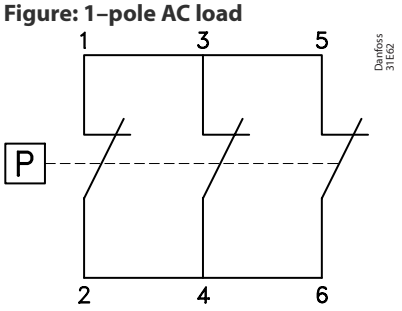


Figure: 1–pole DC load

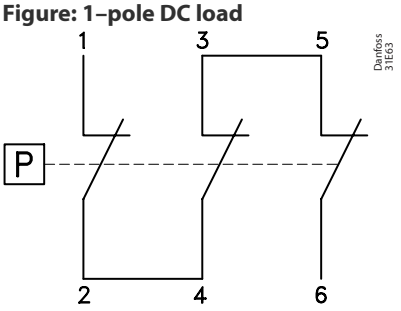


Table: Contact load

	I_e	U_e
AC–3	12 A	220 V – 415 V
	9 A	600 V
DC–13/14	2 A	220 V (3 contacts in series)

Installation

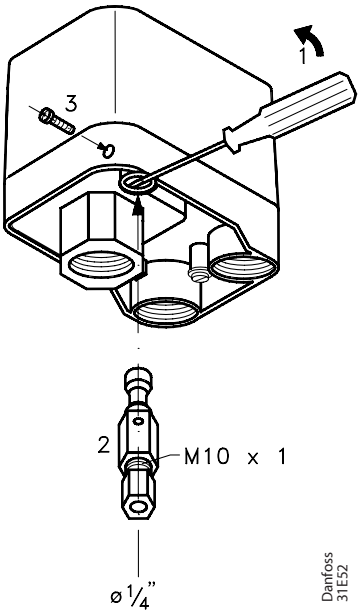
Recommended orientation

The pressure switches will operate regardless of their orientation. However, to meet the enclosure requirements of IP43 and IP55, they must be mounted vertically with the connection downwards. The CS pressure switches are self-supporting (on the connection).

Fitting a pressure relief valve:

1. Remove the blanking plug
2. Fit the pressure relief valve
3. Fit the plastoform screw

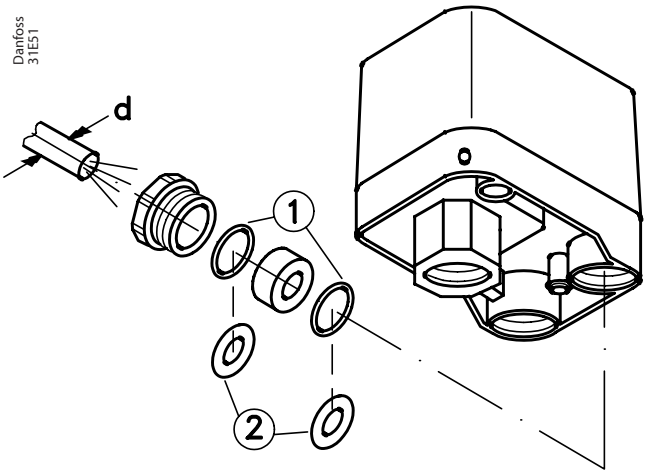
Figure: Installation



Fitting screwed cable entries

The accessory bag contains two sets of metal gaskets each with different internal diameters. These will give a sufficient cord relief if used correctly with the cable diameter concerned.

Figure: Installation

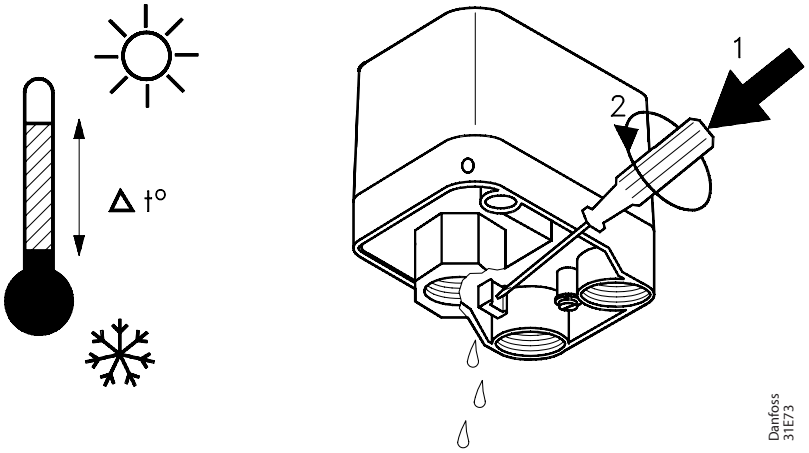


d > 8.5 mm – 1
d ≤ 8.5 mm – 2
031E0293

Drain hole

If because of large temperature variations there is a risk of condensate forming in the pressure switch, a screwdriver can be used to make a drain hole in the enclosure.

Figure: Drain hole



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Export Control Declaration	Pressure switches & Thermostats	Danfoss	
UA Declaration	Danfoss UA 2024-07-25 cooling sensors	Danfoss	LVD
Pressure Safety Certificate	LLC CDC EURO-TYSK UA.TR.089.1015.05-22	LLC CDC EURO TYSK - Ukraine	Pressure
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