Data sheet



Pressure switch

CAS

Description

The CAS series consists of a series of pressure controlled switches and temperature controlled switches. In this series, special attention has been given to meeting demands for a high level of enclosure, robust and compact construction and resistance to shock and vibration.
The series is suitable for use in alarm and regulation systems in factories, diesel plants, compressors, power stations and on board ships.

Features & benefits

- A high level of enclosure
- Fixed differential
- Robust and compact construction
- Resistance to shock and vibration
- Available with all major marine approvals

Ordering

Product code numbers

Pressure switch

Table: Standard pressure switches

Type	Setting range p_e	Mechanical differential	Permissible operating pressure	Max. test pressure	Min. burst pressure	Pressure connection	Code no.
	[bar]	[bar]	[bar]	[bar]	[bar]		
CAS 133	0 – 3.5	0.1	10	10	40	G ¼	060-315066
CAS 136	0 – 10	0.2	22	22	40	G ¼	060-315166
CAS 137	6 – 18	0.3	27	27	72	G ¼	060-315266
CAS 139	10 – 35	0.6	53	53	100	G ¼	060-315366

Table: Pressure switches for high pressure and strongly pulsating media

Type	Setting range p_e	Mechanical differential	Permissible operating pressure	Max. test pressure	Min. burst pressure	Pressure connection	Code no.
	[bar]	[bar]	[bar]	[bar]	[bar]		
CAS 143	1 – 10	0.2 – 0.6	120	180	240	G ¼	060-316066
CAS 145	4 – 40	0.8 – 2.4	120	180	240	G ¼	060-316166
CAS 147	6 – 60	1 – 3	120	180	240	G ¼	060-316266

Table: Differential pressure switch

Type	Setting range p_e	Mechanical differential	Permissible operating pressure	Max. test pressure	Min. burst pressure	Pressure connection	Code no.
	[bar]	[bar]	[bar]	[bar]	[bar]		
CAS 155	0.2 – 2.5	0.1	0 – 8	22	42	2 × G ¼	060-313066

Thermostat

Table: Thermostat, type CAS 178 – CAS 181

Type	Setting range	Mechanical differential adjustable / fixed	Max. sensor temperature	Suitable sensor length (see also "Accessories")				Capillary tube length	Code no.
	[°C]	[°C]	[°C]	[mm]				[m]	
CAS 178	20 – 80	2.0	130	65	75	110	160	2	060L315166
CAS 180	70 – 120	2.0	220	65	75	110	160	2	060L315366
CAS 181	60 – 150	2.0	250	65	75	110	160	2	060L315566

Table: 2-step thermostat, type CAS 1080

Type	Factory setting		Mechanical differential	Max. temperature	Insert sensor length	Code no.
	[°C]	[°C]	[°C]	[°C]	[mm]	
	Step 1	Step 2				
CAS 1080	80	80	2.0	220	200	060L502066

Enclosure

IP67 acc. to EN 60529. The thermostat housing is enameled pressure die cast aluminum (GD-AISI 12). The cover is fastened by four screws which are anchored to prevent loss. The enclosure can be sealed with fuse wire.

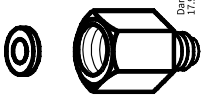
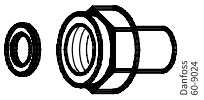
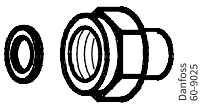
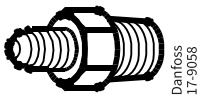
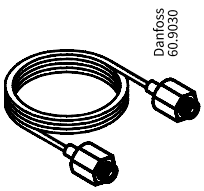
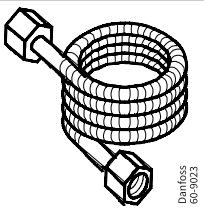
Identification

The type designation and code no. of the unit is stamped in the side of the housing.

Accessories code numbers

Pressure switch

Table: Accessories

Type	Part	Description	Qty.	Code no.
	Connector with nipple	Pipe thread ISO 228-1, G ⅜ connector, nipple and AL washer (10 mm ext. 8 mm int. diam) for soldering onto steel or copper tubing, steel span of jaws 22	5	017-436866
	Connector with nipple	G ⅜ connector, nipple and washer (10 mm ext. / 6.5 mm int. diam.) for welding, steel span of jaws 22	1	017-422966
	Reducer	Pipe thread ISO 228-1, G ⅜ × 7/16 – 20 UNF reducer, washer, brass span of jaws 22	5	017-420566
	Adaptor	Pipe thread ISO 228-1, G ⅜ × 1/8 – 27 NPT with copper washer brass span of jaws 22	1	060-333466
	Adaptor	Pipe thread ISO 228-1, G ⅜ A × ¼ – 18 NPT with copper washer brass span of jaws 22	1	060-333566
	Adaptor	Pipe thread ISO 228-1, G ⅜ A × ¼ – 18 NPT with copper washer brass span of jaws 22	1	060-333666
	Adaptor	7/16 - 20UNF × R ⅜ (ISO 7-1) brass, span of jaws 19	1	060-324066
	Nipple	G ¼ A × G ⅜ A		060-333266
		G ¼ A × ext. M10 x 1 with washer		060-333866
	Damping coil	Pipe thread ISO 228-1, damping coil with G ⅜ connector and 1.5 m copper capillary tube. Standard washers are supplied.	1	060-104766
	Armoured damping coil	Pipe thread ISO 228-1, damping coil with G ⅜ connector and 1 m copper capillary tube. Standard washers are supplied.	1	060-333366

Thermostat

Table: Sensor pockets for thermostats

Brass sensor pocket			Steel 18/8 sensor pocket		
A [mm]	**Thread B**	**Code no.**	**A [mm]**	**Thread B**	**Code no.**
65	½ NPT	060L326566	–	–	–
75	½ NPT	060L326466	75	G ½ A	060L326766
75	G ½ A	060L326266	–	–	–
75	G ¾ A	060L326666	–	–	–
75	G ½ A (ISO 228/1)	060L328166	–	–	–
110	½ NPT	060L328066	110	G ½ A	060L326866
110	G ½ A	060L327166	110	½ NPT	060L327066
110	G ½ A (ISO 228/1)	060L340666	–	–	–
110	G ¾ A (ISO 228/1)	060L340366	–	–	–
160	G ½ A	060L326366	160	G ½ A	060L326966
200	G ½ A	060L320666	–	–	–
200	G ½ A (ISO 228/1)	060L340866	–	–	–
200	G ¾ A (ISO 228/1)	060L340266	–	–	–
250	G ½ A	060L325466	–	–	–
330	G ½ A	060L325566	–	–	–

NOTE: All sensor pockets are supplied without gland nut, gaskets and washes

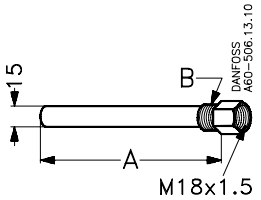
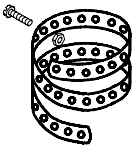
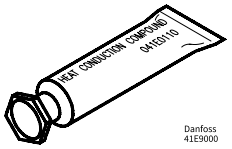


Table: Other Accessories

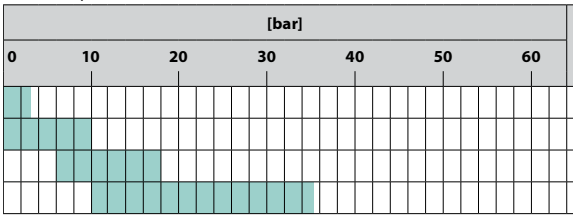
Other Accessories		Description	Qty./unit	Code no.
Clamping band		For CAS temperature controls with remote sensor (L = 392 mm).	10	017-420466
Heat conductive compound (tube with 4.5 cm^3)		For CAS with sensor fitted in a sensor pocket. For filling sensor pocket to improve heat transfer between pocket and sensor. Application range for compound: -20 – 150 °C, momentarily up to 220 °C.	1	041E0115

Overview

Product portfolio

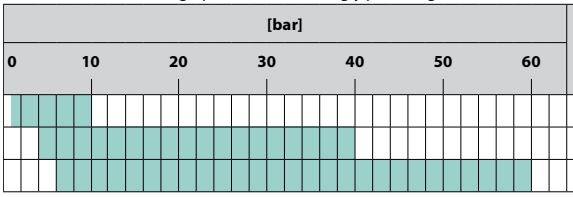
Figure: Overview

Standard pressure switches



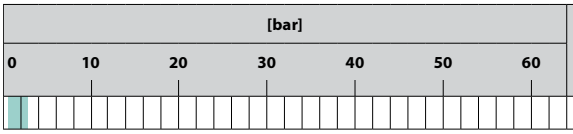
Range P_e [bar]	Type
0 – 3.5	**CAS 133**
0 – 10	**CAS 136**
6 – 18	**CAS 137**
10 – 35	**CAS 139**

Pressure switches for high pressure and strongly pulsating media



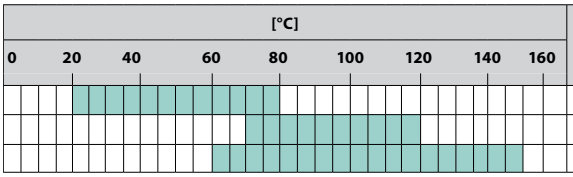
Range P_e [bar]	Type
1 – 10	**CAS 143**
4 – 40	**CAS 145**
6 – 60	**CAS 147**

Differential pressure switches



Range P_e [bar]	Type
0.2 – 2.5	**CAS 155**

Thermostats



Range [°C]	Type
20 – 80	**CAS 178**
70 – 120	**CAS 180**
60 – 150	**CAS 181**

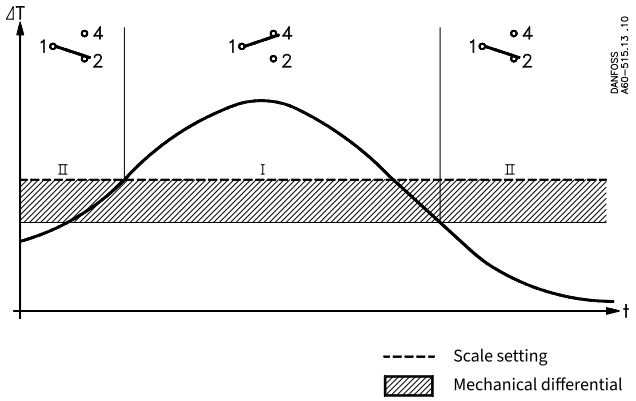
Functions

Pressure switch

a. CAS 155

Contacts 1-4 make and contacts 1-2 break when the differential pressure rises above the set range value. The contacts changeover to their initial position when the differential pressure again falls to the range value minus the differential (*see Figure: CAS 155*).

Figure: CAS 155

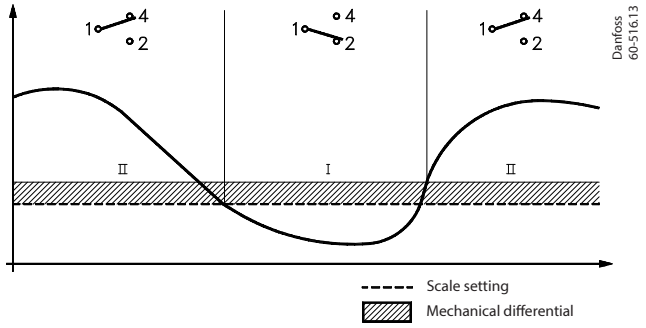


I	Alarm for rising pressure given at the set range value
II	Alarm for falling pressure given at the set range value minus the differential

b. All other CAS pressure switches

Contacts 1-2 make and contacts 1-4 break when the pressure falls under the set range value. The contacts changeover to their initial position when the pressure again rises to the set range value plus the differential (*see Figure: All other CAS pressure switch*).

Figure: All other CAS pressure switch



I	Alarm for falling pressure given at the set range value
II	Alarm for rising pressure given at the set range value plus the differential

Example 1:

An alarm must be given when the lubrication oil pressure in a motor fall below 0.8 bar. Select CAS 133 (range 0 – 3.5 bar). The minimum permissible lubricating oils pressure of 0.8 bar must be set using the range spindle. The differential is fixed at 0.1 bar, i.e. the alarm will not cut out before the pressure rises to 0.9 bar. The switch break function is normally used for alarm purposes, i.e. the alarm must be connected to terminals 1 and 4.

Example 2:

When the differential pressure exceeds 1.3 bar a filter must be cleaned. The maximum static pressure (LP) for the CAS 155 of 8 bar must not be exceeded. The pressure control range spindle must be set at 1.3 bar. The alarm must be connected to terminals 1 and 2 (alarm for broken circuit).

Thermostat

Differentials

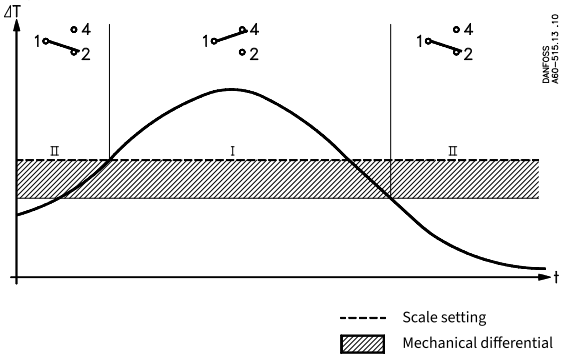
The mechanical differential is the differential determined by the design of the thermostat. The thermal differential (operating differential) is the differential the system operates on.
The thermal differential is always greater than the mechanical differential and depends on three factors:

- Medium flow velocity
- Temperature change rate of the medium
- Heat transmission to the sensor

Thermostat function

Contacts 1-4 make while contacts 1-2 break when the temperature rises above the scale setting.
The contacts changeover to their initial position when the temperature falls to the scale setting minus the differential (*see Figure: Thermostat*).

Figure: Thermostat



I	Alarm for rising temperature given at range setting value.
II	Alarm for falling temperature given at range setting value minus the differential.

Example 1

Diesel engine with cooling water temperature of 85 °C (normal). An alarm must be triggered if the cooling water temperature exceeds 95 °C. Choose a CAS thermostat 180 (range 70 – 120 °C). Main spindle setting: 95 °C. The required alarm function is obtained by connecting to thermostat terminals 1-4.

Example 2

Find the necessary scale correction for a CAS 180. Set 95 °C at 50 °C ambient temperature. The relative scale setting Z can be calculated from the following formula:

$$\frac{\text{Setting value - min.scale value}}{\text{max.scale value - min.scale value}} \times 100 = \ [\%]$$

$$\text{Relative scale setting:} \frac{95 - 70 \times 100}{120 - 70} = 50\%$$

Factor for scale deviation Z (*see Figure: Scale correction*), Z ≈ 0.7
Correction factor "a=2.4", *see Table: Range*
Scale correction = Z × a = 0.7 × 2.4 = 1.7 °C
CAS must be set at 95 + 1.7 = 96.7 °C

2-step thermostat type CAS 1080

CAS 1080 thermostats have fixed factory settings. The thermostats with factory setting at 80 °C of step 1 and step 2 is used for special application, where double warning – like crank case fire – is requested. The contacts automatically reset when the temperature decreases in accordance with the differential.

Differentials

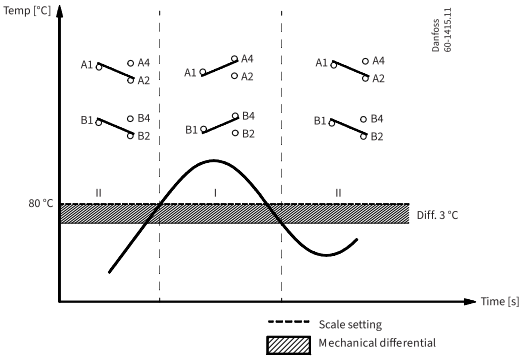
The mechanical differential is the differential determined by the design of the thermostat. The thermal differential (operating differential) is the differential the contact system operates on. The thermal differential is always greater than the mechanical differential and depends on three factors:

1. Medium flow velocity
2. Temperature change rate of the medium and
3. Heat transmission to the sensor

Thermostat function

Contacts 1-4 make while contacts 1-2 break when the temperature rises above the scale setting.
The contacts changeover to their initial position when the temperature falls to the scale setting minus the differential (*see Figure: Thermostat function*).
The contacts marked A correspond to step 1.
The contacts marked B correspond to step 2.

Figure: Thermostat function



I	Alarm for rising temperature given at range setting value.
II	Alarm for falling temperature given at range setting value minus the differential.

Product details

Design

Table: Materials in contact with the medium

Type	Materials	
CAS 133, CAS 136, CAS 137, CAS 139	Bellows	Stainless steel, material no. 1.4306 (DIN 17440)
	Pressure connection	Brass material no. 2.0401 (DIN 17660)
CAS 143, CAS 145, CAS 147, CAS 155	Pressure connection	Nickel plated brass CuZn 40 Ob3 ISO R 426 (DIN 17569)
	Diaphragm	Nitrile-butadien rubber

Performance and environmental conditions

Pressure switch

Table: Technical data

Switch	Microswitch with single pole changeover (SPDT)	
Contact load	Alternating current	AC-14 / AC-15: 0.1 A, 220 V
	Direct current	DC-13: 12 W, 125 V
Ambient temperature	CAS 133 – 139	-40 – 70 °C
	CAS 143 – 155	-25 – 70 °C
Temperature of medium [1]	CAS 133 – 139	-40 – 100 °C
	CAS 143 – 155	-25 – 100 °C
Vibration resistance	Vibration-stable in the range 2 – 30 Hz amplitude 1.1 mm and 30 – 100 Hz, 4 g	
Cable entry	Cable diameters from 5 – 14 mm	

[1] For water and seawater, max. 80 °C

Thermostat

Table: Technical data

Type		CAS 178, CAS 180, CAS 181	CAS 1080
Switch		Microswitch with single pole changeover (SPDT)	Microswitch with single pole changeover (2 x SPDT)
Contact load	Alternating current	AC-14 / AC-15: 0.1 A, 220 V	
	Direct current	DC-13: 12 W, 125 V	
Ambient temperature		-25 – 70 °C	
Vibration resistance		Vibration-stable in the range 2 – 30 Hz, amplitude 1.1 mm and 30 – 100 Hz, 4 g.	
Cable entry		Pg 13.5 for cable diameters from 5 – 14 mm	2 x g 13.5 for cable diameters from 5 – 14 mm

Terminology

Range setting
The pressure range within which the unit will give a signal (contact changeover).

Differential
The difference between make pressure and break pressure.

Permissible operating pressure
The highest permanent or recurring pressure the unit can be loaded with.

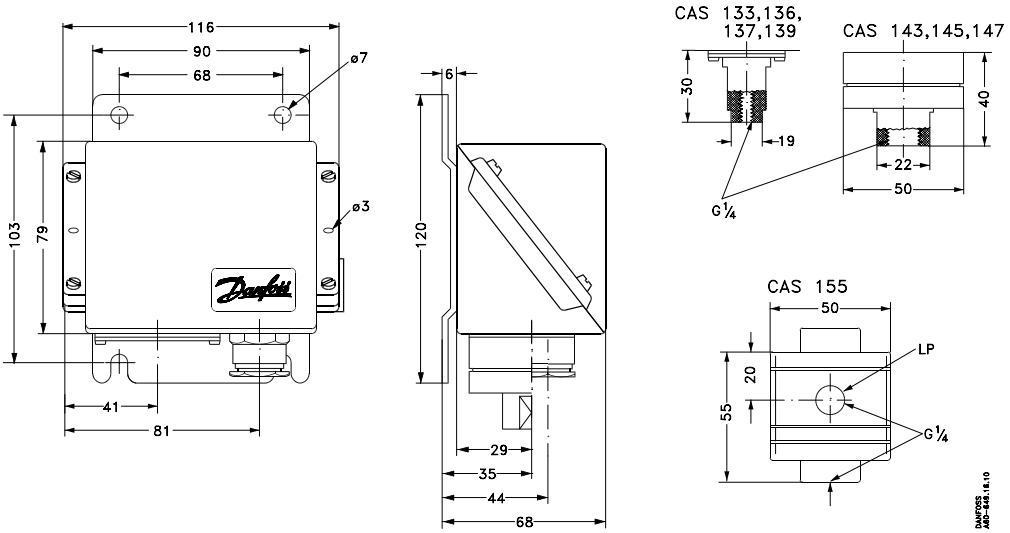
Max. test pressure
The highest pressure the unit may be subjected to when, for example, testing the system for leakage. Therefore, this pressure must not occur as a recurring system pressure.

Min. burst pressure
The pressure which the pressure-sensitive element will withstand without leaking.

Dimensions

Pressure switch

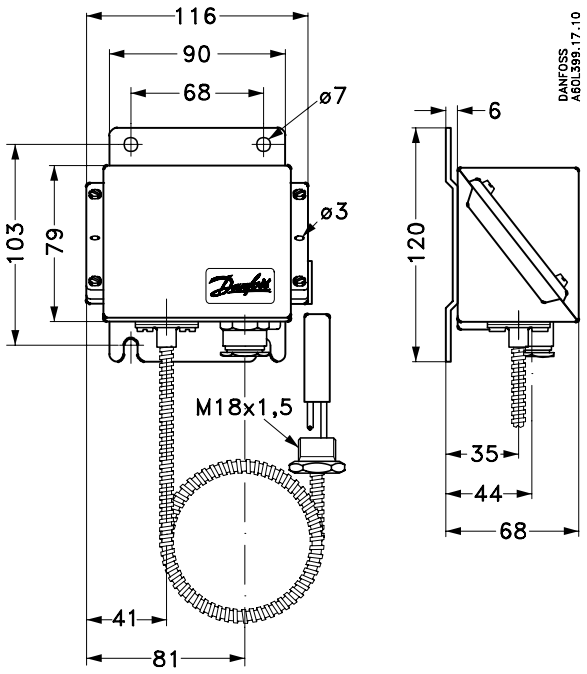
Figure: Dimensions [mm] and weights [kg]



Net weight: CAS 133-139 approx. 1.0 kg
CAS 143-147 approx. 1.3 kg
CAS 155 approx. 1.5 kg

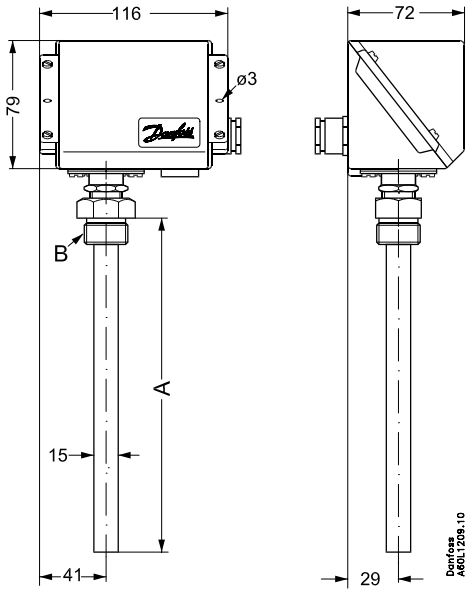
Thermostat

Figure: CAS with remote sensor and 2 m armoured capillary tube



Net weight: approx. 1.4 kg

Figure: 2-step thermostat, type CAS 1080



A: 200 or 80 mm
B: G ¾ A
Net weight: approx. 1.4 kg

Installation

Pressure switch

Figure: Steam plant

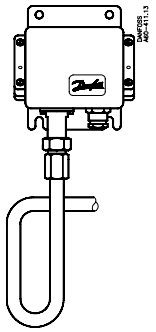


Figure: Electrical connection

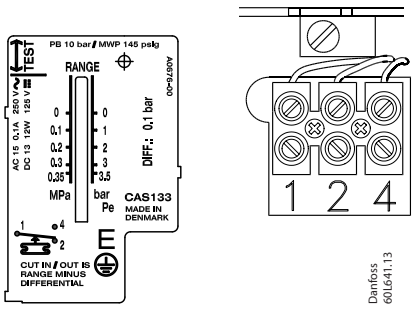
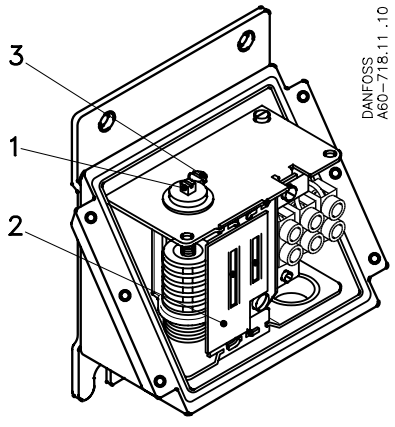


Figure: Setting



1	Range spindle
2	Range scale
3	Locking screw

Installation
CAS pressure switches are fitted with a 3 mm steel mounting plate. The units should not be allowed to hang from the pressure connection.

Pressure connection
When fitting or removing pressure lines, the spanner flats on the pressure connection should be used to apply counter-torque.

Steam plant
To protect the pressure element from excessive heat, the insertion of a water-filled loop is recommended. The loop can, for example, be made of 10 mm copper tube as shown in *Figure: Steam plant*.

Water systems
Water in the pressure element is not harmful, but in case of frost a water-filled pressure element may burst. To prevent this happening, the pressure control can be allowed to operate on an air cushion.

Media Resistance
See Table: Materials in contact with the medium. If seawater is involved, types CAS 143, CAS 145, CAS 147, CAS 155 are recommended.

Pulsations
If the pressure medium is superimposed with severe pulsations, which occur in automatic sprinkler systems (fire protection), fuel systems for diesel motors (priming lines), and hydraulic systems (e.g. propeller systems), etc., types of case CAS 143, CAS 145, CAS 147 are recommended. The maximum permissible pulsation level for these types is 120 bar.

Setting
When the pressure switches cover is removed, and the locking screw (3) is lossened, the range can be set with the spindle (1) while at the same time the scale (2) is being read (*see Figure: Setting*).

Electrical connection
CAS pressure switches are fitted with a screwed cable entry that is suitable for cable diameters from 5 – 13 mm. Contact function is shown in *see Figure: Electrical connection*.

Thermostat

Location of unit
CAS thermostats are designed to withstand the shocks that occur, for example, in ships on compressors and in large machine installations. CAS thermostats are fitted with a base of 3 mm steel plate for fixing to bulkheads, etc.

Resistance to media
Material specifications for sensor pockets.

Sensor pocket brass
The tube is made of Ms 72 to DIN 17660, the threaded portion of So Ms 58 Pb to DIN 17661.

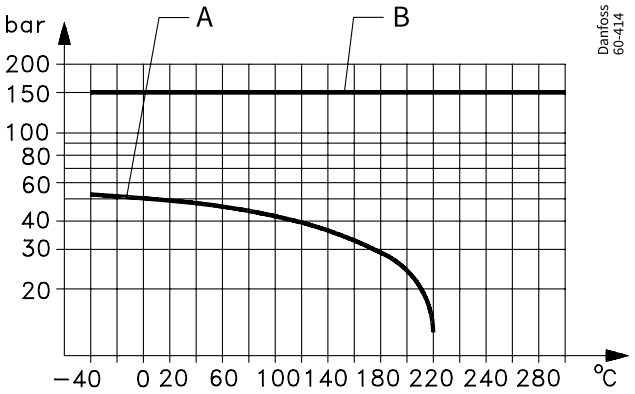
Sensor pocket, stainless steel 18/8
Material designation 1.4305 to DIN 17440.

Sensor position
As far as possible the sensor should be positioned so that its longitudinal axis is at right angles to the direction flow. The active part of the sensor is ø13 mm × 47.5 mm.

The medium
The fastest reaction is obtained from a medium having high specific heat and high thermal conductivity. It is therefore advantageous to use a medium that fulfils these conditions (provided there is a choice). The flow velocity of the medium is also of significance. (The optimum flow velocity for liquids is about 0.3 m/s). For permissible media pressure, *see Figure: Permissible media pressure on the sensor pocket as a function of temperature*.

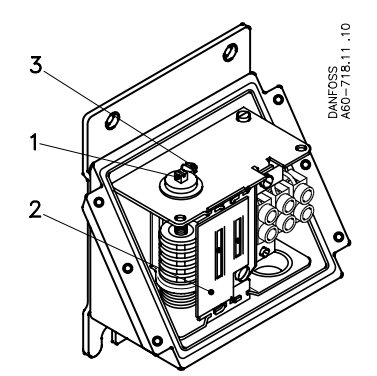
Setting
When the thermostat cover is removed, and the locking screw (3) is loosened, the range can be set with the spindle (1) while at the same time the scale (2) is being read (*see Figure: Setting*).

Figure: Permissible media pressure on the sensor pocket as a function of temperature



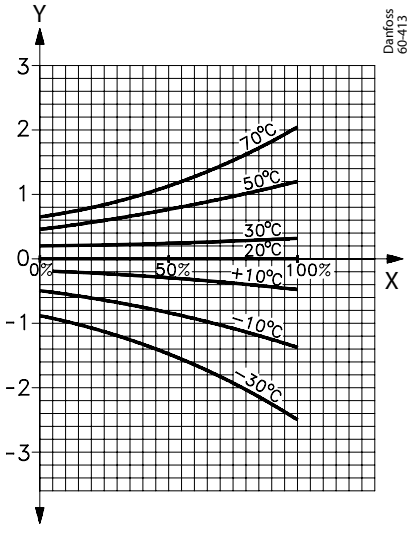
A	Brass
B	Stainless Steel

Figure: Setting



1	Range spindle
2	Range scale
3	Locking screw

Figure: Scale correction



Scale correction

The sensor on CAS thermostats contains an adsorption charge. Therefore, function is not affected whether the sensor is placed warmer or colder than the remaining part of the thermostatic element (bellows and capillary tube). However, such a charge is to some extent sensitive to changes in the temperature of bellows and capillary tube. Under normal conditions this is of no importance, but if the thermostat is to be used in extreme ambient temperatures there will be a scale deviation. The deviation can be compensated for as follows: Scale correction = Z × a.

Z can be found from *see Figure: Scale correction*, while "a" is the correction factor from the table below.

Table: Range

Type	Regulation range [°C]	Correction factor for "a" thermostats
CAS 178	20 – 80	2.5
CAS 180	70 – 120	2.4
CAS 181	60 – 150	3.7

CAS thermostats are fitted with a Pg 13.5 screwed cable entry suitable for cables from 5 – 14 mm.

Figure: Electrical connection

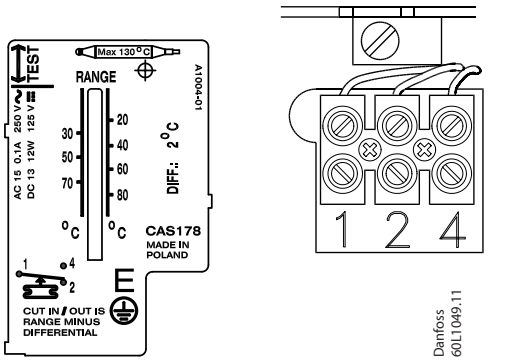
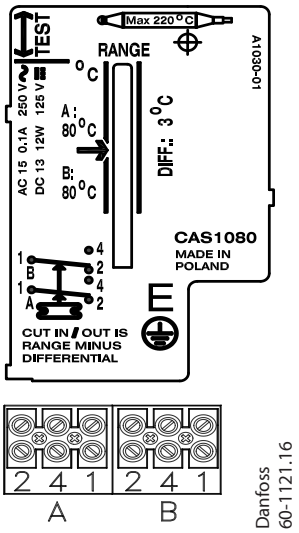


Figure: 2-step CAS thermostat, type CAS 1080



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.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Certification body	Approval topic
CCC Declaration	Danfoss CCC 2024010305641308	CCC - China Compulsory Certification	CCC
Marine Certificate	ClassNK certificate TA25225M	ClassNK - The Japanese Marine Association	Marine
Marine Certificate	DNV GL TAA00001VX Rev. 1	DNV GL	
Marine Certificate	RINA ELE0577221XP	RINA - Registro Italiano Navale	Marine
EU Declaration	Danfoss EU 060-9680.AC	Danfoss	LVD
Manufacturer's Declaration	Danfoss MD 060-9639.AB	Danfoss	China RoHS
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Export Control Declaration	Pressure switches & Thermostats	Danfoss	
UA Declaration	Danfoss UA 2024-07-25 cooling sensors	Danfoss	EMC, LVD
UA Declaration	Danfoss UA 2023-01-10 Regulators PL01 PL04	Danfoss	PED, Pressure
Pressure Safety Certificate	LLC CDC EURO-TYSK UA.TR.089.1015.05-22	LLC CDC EURO TYSK - Ukraine	Pressure
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Marine Certificate	BV 04957-H0 BV	BV - Bureau Veritas	
Marine Certificate	DNV GL TAA00001W1 Rev. 1	DNV GL	
Marine Certificate	ClassNK certificate TA25224M	ClassNK - The Japanese Marine Association	Marine
Marine Certificate	BV 04956-I0 BV	BV - Bureau Veritas	
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