

Data sheet

Pressure switch and Thermostat

CAS



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

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

Approvals

CE-marked in accordance with LVD 2006/95/EC

EN 60947-1, EN-60947-4-1, EN 60947-5-1

Ship approvals

American Bureau of Shipping,
ABS (excl. CAS 139)
Lloyds Register of Shipping, LR (excl. CAS 1080)
Germanischer Lloyd, GL
Bureau Veritas, BV

Det Norske Veritas, DNV
Registro Italiano Navale, RINA
Maritime Register of Shipping, RMRS
Nippon Kaiji Kyokai, NKK

THERMOSTAT

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

Ordering

2-step thermostat, type CAS 1080

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]	[mm]		
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

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

Preferred version

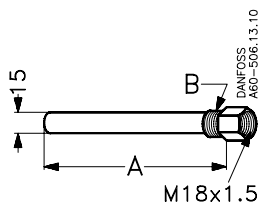
Enclosure

IP67 acc. to EN 60529.
The thermostat housing is enamelled pressure die cast aluminium (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

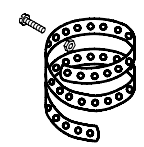
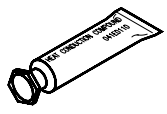


Sensor pockets for thermostats

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.

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	041E0114

Installation

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 $\varnothing 13 \text{ mm} \times 47.5 \text{ mm}$.

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 fig. 10.

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

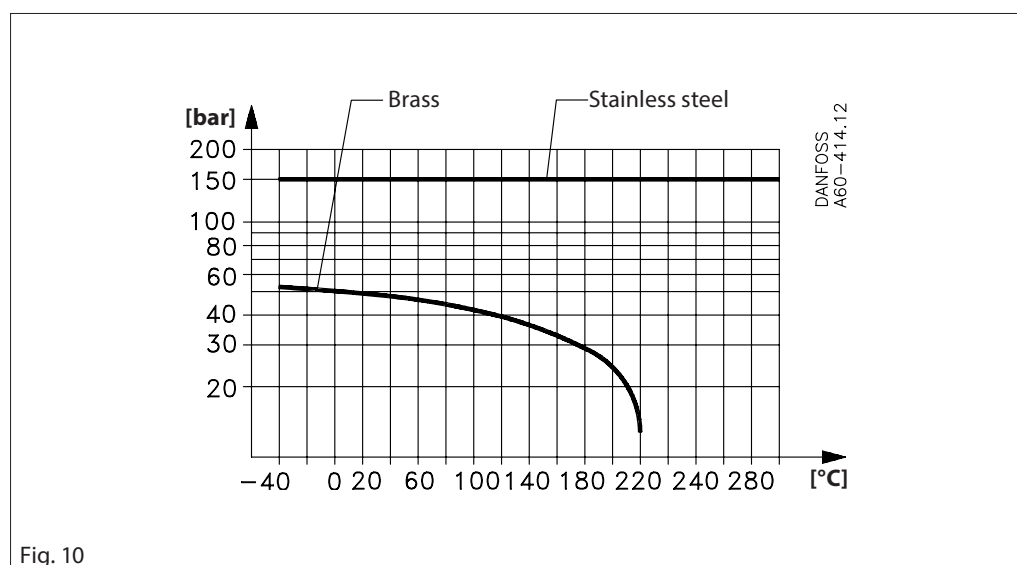


Fig. 10

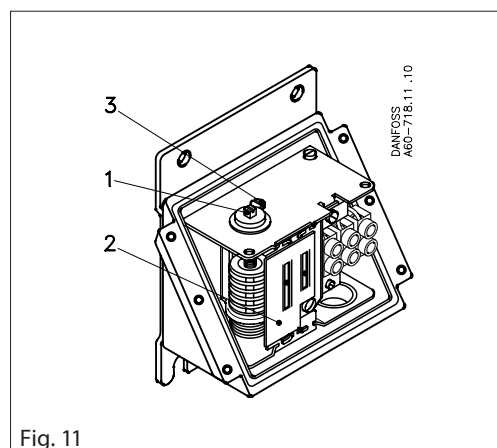


Fig. 11

- 1. Range spindle
- 2. Range scale
- 3. Locking screw

Setting

When the thermostat cover is removed, and the locking screw (3) fig. 2 is loosened, the range can be set with the spindle (1) while at the same time the scale (2) is being read (fig.11).

Installation
(continued)

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:

$$\text{Scale correction} = Z \times a$$

Z can be found from fig. 12, while "a" is the correction factor from the table below. (See example, page 14).

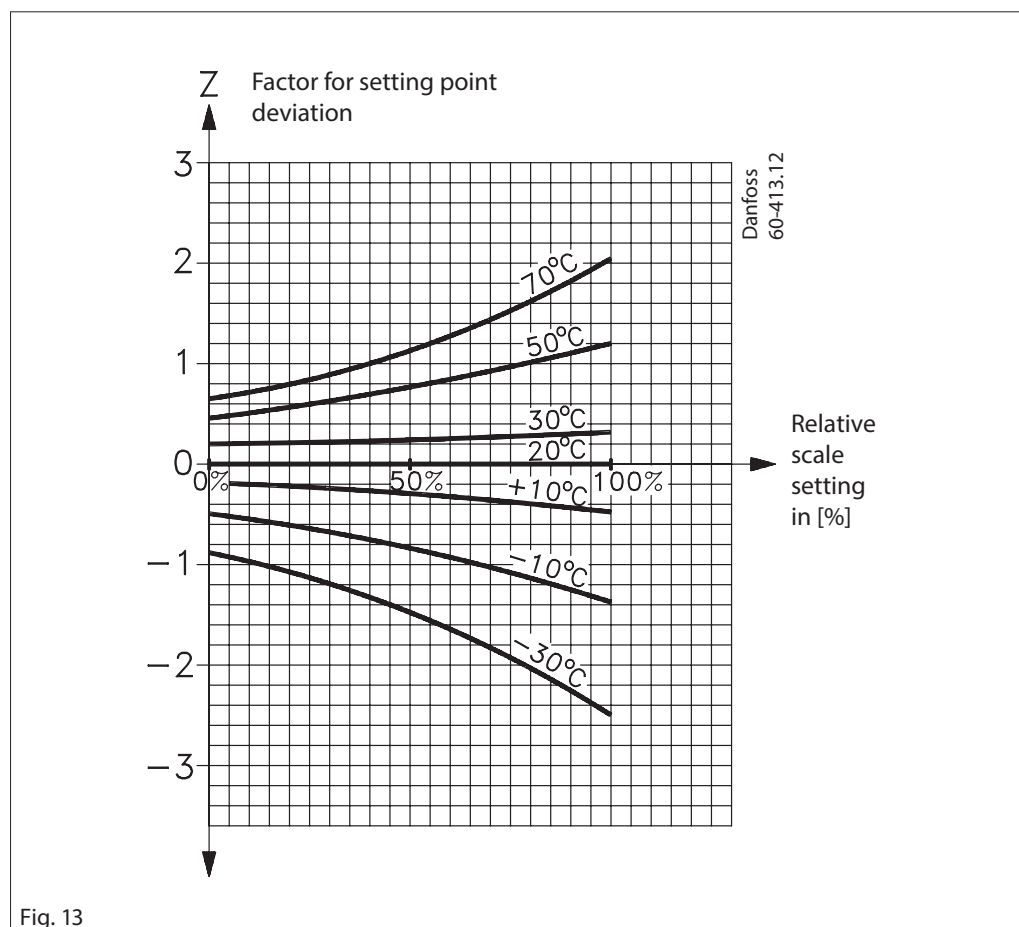


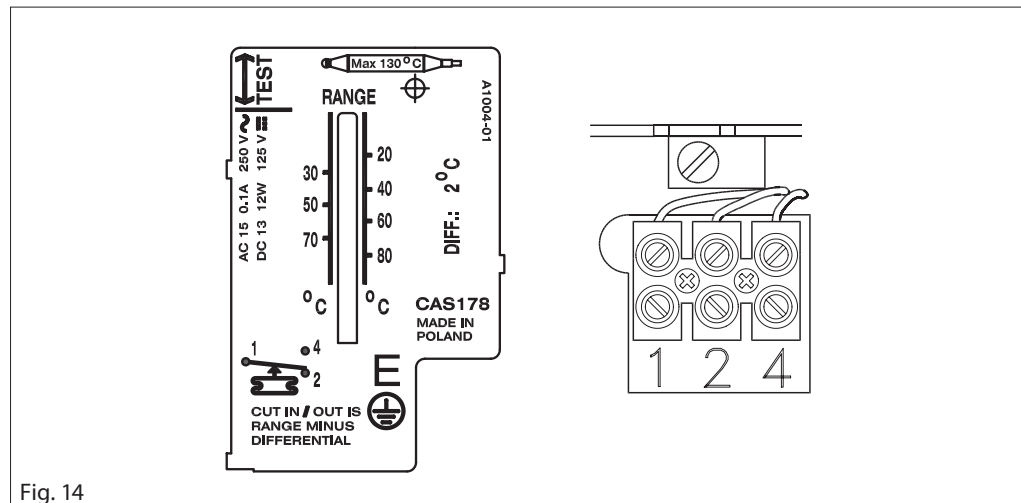
Fig. 13

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

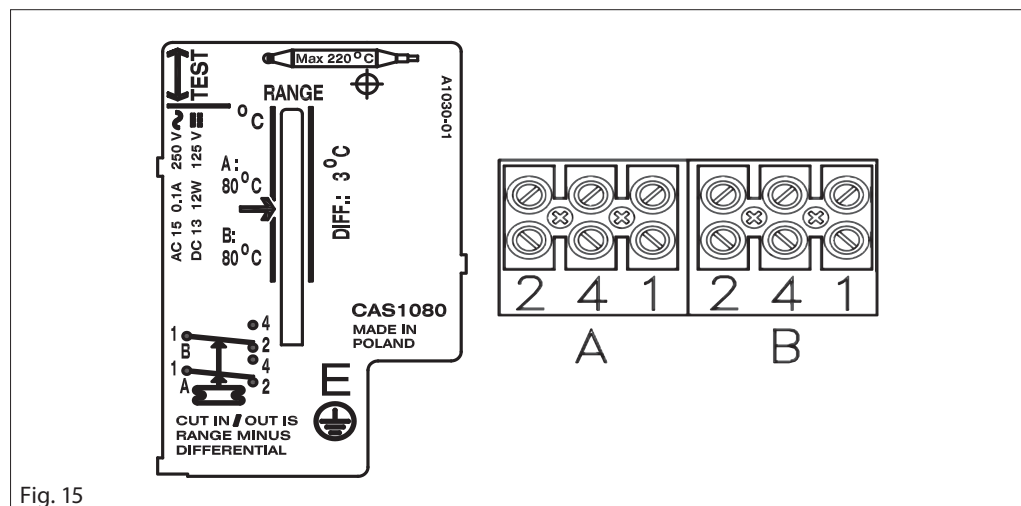
Installation
(continued)

Electrical connection

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



2-step CAS thermostat, type CAS 1080



Function

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:

- 1) Medium flow velocity
- 2) Temperature change rate of the medium
- 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 fig. 16.

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

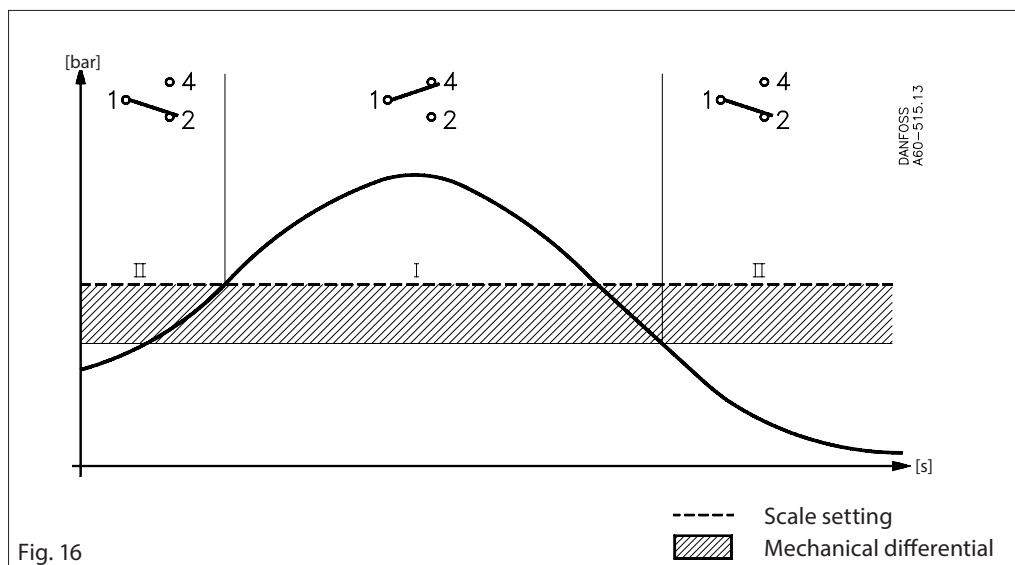


Fig. 16

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:

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

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

Factor for scale deviation Z fig. 12, $Z \approx 0.7$
 Correction factor "a=2.4", see table page 12.
 Scale correction = $Z \times a = 0.7 \times 2.4 = 1.7 \text{ °C}$
 CAS must be set at $95 + 1.7 = 96.7 \text{ °C}$

Function
(continued)

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 fig. 17.

The contacts marked A correspond to step 1.

The contacts marked B correspond to step 2.

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

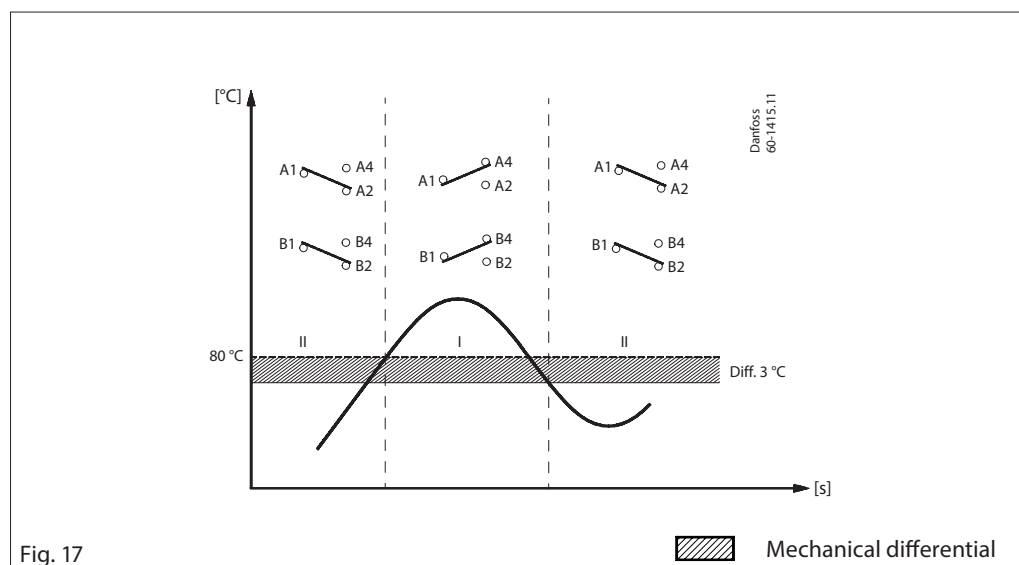
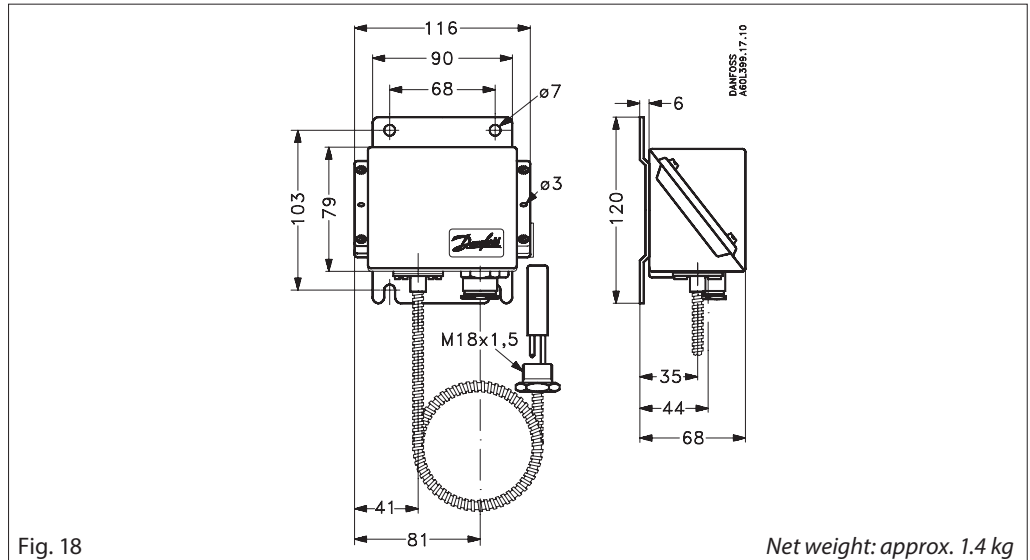


Fig. 17

**Dimensions [mm]
and weights [kg]**

CAS with remote sensor and 2 m armoured capillary tube



2-step thermostat, type CAS 1080

