

RIGID STEM MODEL AND CAPILLARY TUBE MODEL DIAL THERMOMETER

NITROGEN MEASURING SYSTEM

Patents granted respectively pending all over the world.

General information :

An inventive approach to the physical properties of gas, and a longterm research program related to the construction of a nitrogen filled thermometer that eliminates the disadvantages of the dial thermometers filled with mercury or other toxic, harmful, aggressive or reactive liquids. This design also overcomes the disadvantages of vapour pressure thermometers as well as the disadvantages of the hardly used classic type of gas thermometers.

The finished product is a modern and universal applicable instrument of Dutch manufacture. The measuring element, which already proved, it's ability since 1975, is patented by the manufacturer in all industrial countries.

The modern design and the robust construction makes the SECUTHERM thermometer pre-eminently suitable for heavy industrial circumstances.

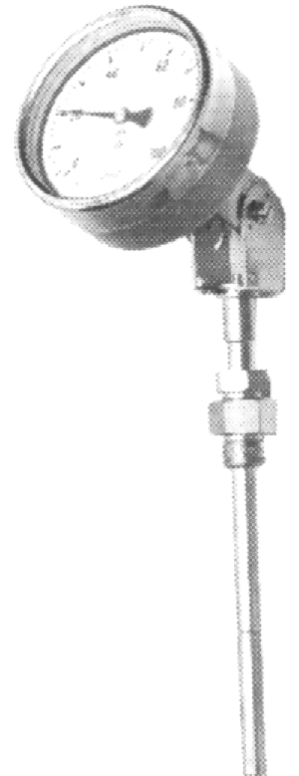
The results of an evaluation executed by the institute TNO-IWECO according to rules as placed in BS4509 part 3 and MIL-STD-735A (ships) are embedded in a qualification-report. (Evaluation Repport E2340 T79).

The thermometers of steel can be supplied in cases Ø80, 100, 160, 250 mm and in profile execution. The thermometers of stainless steel can be supplied in cases Ø63, 80, 100 and 160 mm. The different temperature ranges are limited to a minimum temperature of -245°C and a maximum of +700°C.

For extra-ordinary heavy industrial circumstances liquid filled cases are possible.

The capillary-tube with thermometers of steel is copper, with stainless steel thermometers it is stainless steel. Dependant on the application, capillary-coverings are possible. At choice : steel, aluminium-pvc or stainless steel flexible covering.

The maximum length of the capillary-tube is 100 meter. The influence of the temperature with very long capillary lengths is small and besides on the length of the capillary, it depends on the volume of the bulb and of course also on the difference between the ambient temperature and the calibration temperature of +20°C. Signaling of the measured values is possible with the help of contact devices or a transmitter. The mV outlet-signal of the transmitter can be reserved into a 0-20 mA signal.



Measuring principle :

The operation of the SECUTHERM thermometer is based on the behaviour of gasses under the influence of temperature changes.

With this thermometer the medium sensitive to temperature has been put in a closed manometrical system by which the greatest possible part of the medium is contained in the reservoir (the bulb) which is brought in contact with the liquid or the body of which the temperature is to be measured.

By raising the temperature the pressure in the closed manometrical system rises by the expansion of the medium which results in stretching or unrolling of the manometrical spiral.

This movement is transmitted in a pointer movement through which, the help of a graduated dial by means of the position of the pointer, the temperature can be read.

At this moment the working of most mechanical industrial dial thermometers is still based on this principle.

Bulb and bourdontube can be connected by a capillary which can be some centimeters long, but also ten or more meters, even up to 100 meters. The measuring system is filled under pressure with nitrogen.

Nitrogen as filling system has the advantage that is cheap to obtain and it is safe in use.

It has also small heat capacity, whilst the patented way of application will achieve a linear scale.

The small heat capacity of the bulb results in a fast pointerreaction (in 3 sec. up to 50% of the value in water of 100°C with a thermometerrange of 0-100°C).

With nitrogen as reactive medium ranges are possible from -180°C up to +700°C, with helium as reactive medium ranges downwards to -245°C are possible.

An overload of 30% of the range will not damage the bourdontube.

In a special execution an overload of 100% is possible, however the maximum permitted temperature remains +700°C.

The reliability of the thermometer is guaranteed by the robust construction and by application of eminent materials in combination with knowledge and craftsmanship in this specialized field.

A systematic test of the thermometer belongs to the manufacture program.

For compensation of the ambient temperature the thermometer is provided with a bi-metal.

The pointer movement is equipped with an adjustmentscrew which can be operated from the outside of the thermometer.

Through selective dimensions of bulb and capillary it is possible to use capillary-lengths up to 100 meter.

The ambient influence with large capillary-lengths is small and depends, besides on the length of the capillary, on the volume of the volume of the bulb, and also on the difference between the ambient temperature and the calibration temperature of +20°C.

For existing installations or for special purposes, executions with small bulbs are possible.

For the user it is important that the filling is not reactive, poisonous or corrosive.

Built-in method :

The thermometer has to be mounted at an approachable place.

For making the heat conduction as great as possible it is desired to mount the bulb where the floating medium is in motion most.

Preferably after a stopcock or in curve of a pipeline with the bulb against the streamdirection.

Also the specific heat conductions will influence the measurement.

As starting point for a minimum bulblength the next values will be applied :

<i>WATER</i>	:	<i>63 mm</i>
<i>OIL</i>	:	<i>100 mm</i>
<i>AIR / GASSES</i>	:	<i>160 mm</i>

The sensitive part of the bulb has to be totally surrounded by the medium.

To prevent heat outlet through conduction, the nipple / nut connexion of the thermometer is isolated with a gasket.

BUILT-IN METHOD

SECUTHERM thermometers Rigid Stem model steel execution:

Case :

Ø80, 100, 160 and 250 mm, steel black painted.

Bezel :

With Ø100 and 160 mm cases bajoneting black painted, dust- and aprayproof, neopreen sealingring. With Ø80 and 250 mm cases bezel black painted and aprayproof.

Window :

Glass, gauge 4 mm.

Dial :

Aluminium, white enamelled with black characters.
Scale division linear over 270°C in °C (according to DIN)

Pointer :

Aluminium, black painted.

Measuring system :

Refined steel spring, heat-treated and rust preventing, provided with bi-metal for compensation of the ambient temperature, 30% overload is allowed.

Indicating correction :

By adjusting the adjustmentscrew operating on the side of the thermometer.

Indicating accuracy :

Better than + / - 1% of the overall scale.

Bulb :

Stainless steel, standard Ø 9, 10 and 12 mm. Suitable for direct immersion in the medium. (diameter Ø 6; 8; 9,5 and others possible)

Loading capacity :

Bulb and pocket can be exposed to high pressures. Please contact us when you use very high pressures, specially in combination with high temperatures.

Connections :

Brass, brass chrome plated and stainless steel. See also page 4, 11 and 12.

Thermowells :

Steel and stainless steel, multipart welded. See also pages 4 and 11.

Standard ranges :	Subdivisions :	Standard ranges :	Subdivisions :
-200 / +40°C	5°C	0-120°C	2°C
-120 / +40°C	2°C	0-160°C	2°C
-100 / +50°C	2°C	0-200°C	5°C
- 80 / +40°C	2°C	0-250°C	5°C
- 60 / +40°C	2°C	0-300°C	5°C
- 40 / +40°C	1°C	0-400°C	10°C
- 30 / +30°C	1°C	0-500°C	10°C
- 30 / +50°C	1°C	0-600°C	10°C
0 -60°C	1°C	0-700°C	10°C
0 -100°C	2°C		

Deviating executions :

See page 10.

Contact thermometers :

See page 16 and following.

SECUTHERM thermometers Rigid Stem model stainless steel execution:

Case :

Ø 63, 80, 100 and 160 mm, stainless steel AISI 304.

Bezel :

Bajonetting stainless steel AISI 304 polished. Dust- and waterproof, neopreen sealingring.

Window :

Glass, gauge 4 mm.

Dial :

Aluminium, white enamelled with black characters.
Scale division linear over 270°C in °C (according to DIN)

Pointer :

Aluminium, black painted.

Measuring system :

Refined steel spring, heat-treated and rust preventing, provided with bi-metal for compensation of the ambient temperature, 30% overload is allowed.

Indicating correction :

By adjusting the adjustmentscrew operating on the side of the thermometer.

Indicating accuracy :

Better than 1% of the overall scale.

Bulb :

Stainless steel, standard Ø 9, 10 and 12 mm. Suitable for direct immersion in the medium. (diameter Ø 6; 8; 9,5 and others possible)

Loading capacity :

Bulb and pocket can be exposed to high pressures. Please contact us when you use very high pressures, specially in combination with high temperatures.

Connections :

Stainless steel. See also page 4, 11 and 12.

Thermowells :

Stainless steel, multipart welded. See also pages 4 and 11.

Standard ranges :	Subdivions :	Standard ranges :	Subdivisions :
-200 / +40°C	5°C	0-120°C	2°C
-120 / +40°C	2°C	0-160°C	2°C
-100 / +50°C	2°C	0-200°C	5°C
- 80 / +40°C	2°C	0-250°C	5°C
- 60 / +40°C	2°C	0-300°C	5°C
- 40 / +40°C	1°C	0-400°C	10°C
- 30 / +30°C	1°C	0-500°C	10°C
- 30 / +50°C	1°C	0-600°C	10°C
0 -60°C	1°C	0-700°C	10°C
0 -100°C	2°C		

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