MN4213 LNG/LPG

KONGSBERG

Calibrated Temperature Sensor

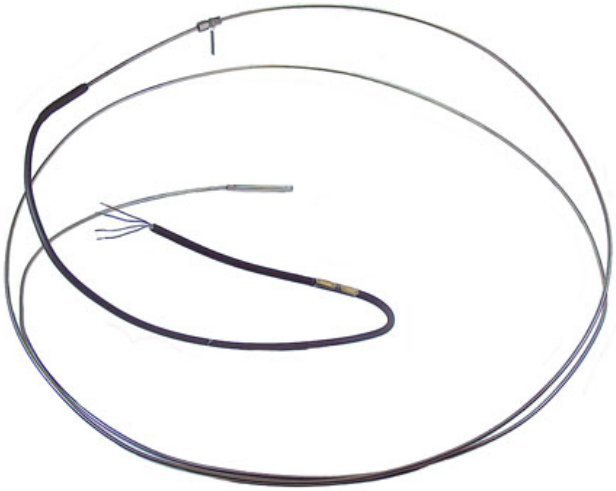
Application and general description

KONGSBERG temperature sensor MN4213 is specially designed for accurate temperature measurements in tanks containing liquefied gas. It is manufactured to meet the requirements set in the governing international standards for Custody Transfer Systems on gas carriers;

ISO 8310: Refrigerated light hydrocarbon fluids – Measurement of temperature in tanks containing liquefied gases – Resistance thermometers and thermocouples

ISO 10976: Refrigerated light hydrocarbon fluids – Measurement of cargo on board LNG carriers

Each sensor is delivered with a unique serial number and a Calibration Certificate.



MN4213 Temperature sensor

Sensor design

A 4-wire Pt100 element is sealed in a tube filled with isolating powder, and extended by a mineral insulated cable made of AISI 316 stainless steel in required length. At the upper end of the mantle cable, a compression fitting is fixed to ensure gas-tight penetration through tank top (see figure 1). In addition the sensor has an extension flexible CU-cable.

Element and Accuracy

Temperature measurement is a crucial parameter for correct calculation of volume of liquid gas in gas carriers. High quality sensors with reliable accuracy are an important factor when monitoring cryogenic cargoes.

The MN4213 uses a high quality Pt100 Class B 1/10 DIN element with a tolerance **of ±0.03 °C at 0 °C**.

Calibration of sensors

To obtain the optimal accuracy in the cryogenic temperature range, each sensor is calibrated so that the characteristic and precision around 0 °C instead applies in the range around **LNG** -155 °C and **LPG** -25 °C.

The calibration process of KONGSBERG Calibrated Temperature Sensors goes through several steps;
Firstly, all elements are aged and stabilised by varying the temperature from -196 °C to room temperature several times. Then each sensor is carefully measured and recorded several times at different temperatures **LNG** (-196 °C, -70 °C, 0 °C and +70 °C), **LPG** (-70 °C 0 °C and +70 °C), and finally a Calibration Certificate for each sensor is printed.
The calibration certificate indicates the resistance value **LNG** -165 °C to -145 °C and **LPG** -50 °C to 0 °C.

Drawings

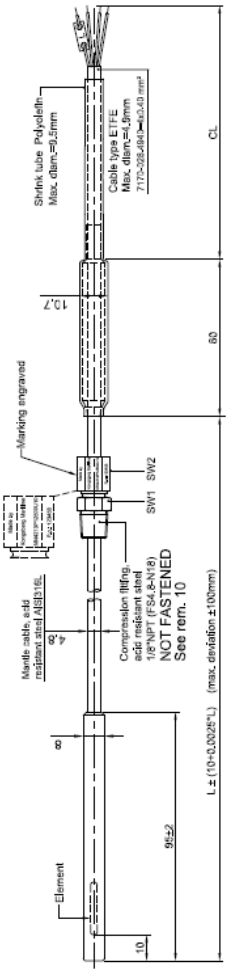


Fig. 1: The MN4213 Design

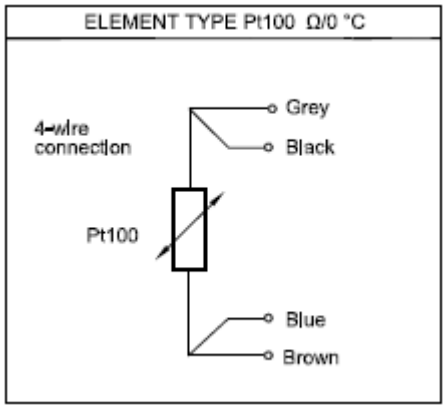


Fig. 2: The MN4213 Temperature sensor, connections

ORDERING EXAMPLE: MN4213 P 12500 U 10

Mechanical design
4-wire connection (1/10 DIN)
Length in mm
Pt100 element type
CL = 10 decimeter

Letter No. 1	Explanation	Calibrated range
P	4-wire connection	-165 °C to +50 °C
W	4-wire connection	-100 °C to +50 °C

Letter No. 2	Element
U	Pt100 Class B 1/10 DIN

Technical specifications

Type	MN4213X - - - XX. See Ordering example
Length	To be specified. Minimum 150 mm, maximum 50 000 mm
Tolerance, length	±10 mm + 0.0025 * L (Max. deviation ±100 mm)
Material in sensor	AISI 316 acid resistant steel
Element	Pt100 Class B 1/10, according to IEC 60751/(ITS90)
Calibration (LNG)	According to ISO/DIS 10976
Calibration uncertainty (**LNG**)	-165 °C to -145 °C ±0.1 °C
	-145 °C to -80 °C ±0.15 °C
	-80 °C to +50 °C ±0.3 °C
Calibration uncertainty (**LPG**)	-50 °C to +50 °C ±0.15 °C
Insulation resistance	>100 MΩ at 500 V
Connection	4-wire flexible cable
Protection grade	IP68 (20 bar)
Coupling	1/8" NPT threads
Weight	Approximately 0.1 kg/m

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