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www.masterwatt.nt-rt.ru | | mwa@nt-rt.ru

Технические характеристики на литые алюминиевые нагреватели (непрямые электрические теплообменники) КОМПАНИИ **MASTERWATT**

Cast aluminium heaters



Seal gas heater

Masterwatt's new Seal Gas INDIRECT electric heat exchanger, is ready-made solution for dry gas seal application.

The range of cast aluminium line heaters provide an effective heating solution for constant flow liquids or gases, eliminating the requirement for a costly pressure vessel. Particularly in high pressure applications, or when exotic process materials are required, the flameproof cast heater range can provide significant commercial advantage.

FEATURES

- Certified to ATEX Equipment Directive, IECex, CSA, INMETRO, ATEX, EAC TR-CU standards.
- Certified under EN 60079-0, EN 60079-1, EN 60079-7, EN 60079-31
- Maximum design pressure and temperature of 500 barg at up 350°
- Suitable for corrosive/aggressive gas
- Process control and over-temperature protection sensors: RTD Pt100 / TC "K" or "J" / thermostast.
- Coil materials: Carbon steel / stainless steel AISI316 / INCOLOY 625 / DUPLEX
- Enclosure IP66÷68

- Ex-d/Ex-e Certified enclosure
- “U” STAMPED (if required)
- MACE MR 0175 (if required)

MAIN APPLICATIONS

- Seal Gas heating for compressors
- Off-Shore packages (installations with limited space)
- The package is also well suited for all onshore applications, in order to meet a wide range of flow rates and temperatures.

BENEFITS

INDIRECT Technology means there is no concern about your SEAL gas stream could go into contact with the heating elements, especially when elements reach end-of-life conditions and are typically more susceptible to corrosion.

Heating Plates

This family of heaters has been designed to stabilise the internal pressure of technical gas bottles.

Heat transfer is by direct contact between the heater upper surface and the bottle bottom.

The heat is transferred from the bottle to the gas, thus keeping the internal pressure constant also in the cases where the external temperature is low.

In addition, the use of this type of heater allows to optimise gas consumption and to empty completely the bottles, limiting to the minimum the gas residuals remaining inside the bottle. These gases, without the support of the heater, would remain unused due to insufficient internal pressure.

FEATURES

- Certified to ATEX Equipment Directive, IECex, ATEX, EAC TR-CU standards.
- Certified under EN 60079-0, EN 60079-1, EN 60079-7, EN 60079-31
- Maximum operating temperature 99°

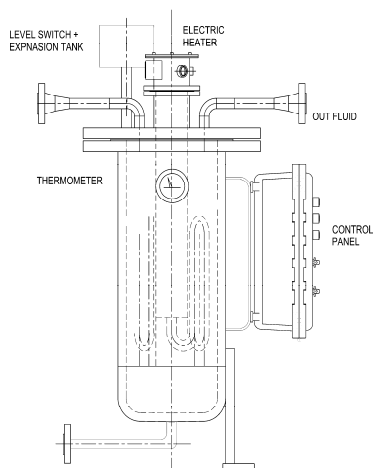
THE INDIRECT ELECTRICAL HEAT EXCHANGERS

Electrical Heat Exchangers are particularly interesting because they are very compact and also highly performing in terms of temperature control accuracy.

In some cases however they can be penalised by the temperatures reached on the heating elements sheath, temperatures that are sometimes quite high but which represent the main factor of the abovementioned compactness and effectiveness. These are the cases in which the process fluid is corrosive and becomes even more aggressive at high temperature. In these cases, in fact, the surface of the heating elements is potentially subject to such a strong corrosion attack that even the most resistant materials can be damaged.

In these cases an indirect heating system is adopted in which the process fluid passes through a coil that is immersed into a liquid (water, glycol or oil depending on the working temperatures). Inside the liquid, in turn, a heater is immersed which keeps it at a temperature suitable to obtain the desired process fluid heating. Figure 4 shows the functioning scheme of this system.

Figure 4: functioning scheme of an electrical indirect heat exchanger



This system is clearly more complex than a traditional electrical heat exchanger since it requires the adoption of specific safety systems (level control, expansion tank, safety valve). Also from a thermo-dynamic point of view this solution is less efficient since it requires larger heat exchanger surfaces. On the other hand however this can be the only viable technical solution.



THE ALUMINIUM CAST HEAT EXCHANGERS

A particular example of indirect heating system is the aluminium cast heat exchanger.

In this product the coil is not sank into a liquid (which is kept at the desired temperature by an electrical heater) but it is incorporated in an aluminium casting which also includes the heating elements. The result is a monolithic construction (see Figure 5) which proves to be very safe (potential failures of the heater do not contaminate the process fluid nor generate dangerous leakages) and compact.

Figure 5: aluminium cast heat exchanger



These products present much less severe safety and control issues since no more sensors or expansion tanks are required to control the liquid level nor a safety valve shall be installed to prevent overpressures caused by an overheating of the secondary fluid.

On the other hand, it is evident that such a system does allow any type of maintenance since only the temperature sensors can be exchanged but not the electric heater. In addition it has a thermal inertia which is even higher than the traditional indirect heat exchangers and this penalises significantly the thermal control accuracy, especially if the plant is operated variable at flow rates. It is therefore suitable mainly for processes with constant operational parameters like, e.g., the heating of natural gas bled from a compressor to seal the bearings of the compressor itself (Seal Gas Heater). Thanks to its compactness this product is also suitable for installations on skids and wherever the allowable clearances are reduced.

Main Characteristics:

- ☑ compliant to all Ex standards (ATEX, IECEx, EAC, CSA, cCSAus, INMETRO, CCOE/PESO, China EX)
- ☑ IP66+IP68 terminal box in Ex-d or Ex-e construction
- ☑ control and safety functions based on PT100 (also possible with thermocouples or thermostats)
- ☑ Power supply divided into more stages suitable for a simple on/off control (control by thyristor possible too)
- ☑ Both horizontal or vertical execution possible
- ☑ Coil material: AISI316, Duplex, Inconel 625 (NACE compliance upon requested)
- ☑ Design pressure up to 500 barg
- ☑ Design temperature up to 350 °C
- ☑ ASME U-Stamp certification available on demand

HEATING PLATES

This family of heaters has been designed to stabilise the internal pressure of technical gas bottles. Heat transfer is by direct contact between the heater upper surface and the bottle bottom.

The heat is transferred from the bottle to the gas, thus keeping the internal pressure constant also in the cases where the external temperature is low.

In addition, the use of this type of heater allows to optimise gas consumption and to empty completely the bottles, limiting to the minimum the gas residuals remaining inside the bottle. These gases, without the support of the heater, would remain unused due to insufficient internal pressure.



TECHNICAL DATA

- ↗ Armoured electric heater annealed inside an aluminium-cast plate
- ↗ Plate lower side thermally insulated
- ↗ Aluminium-cast electric terminal box with IP65/IP68 protection degree
- ↗ Installation: horizontal, on flat surfaces
- ↗ Maximum allowable weight: 100 Kg



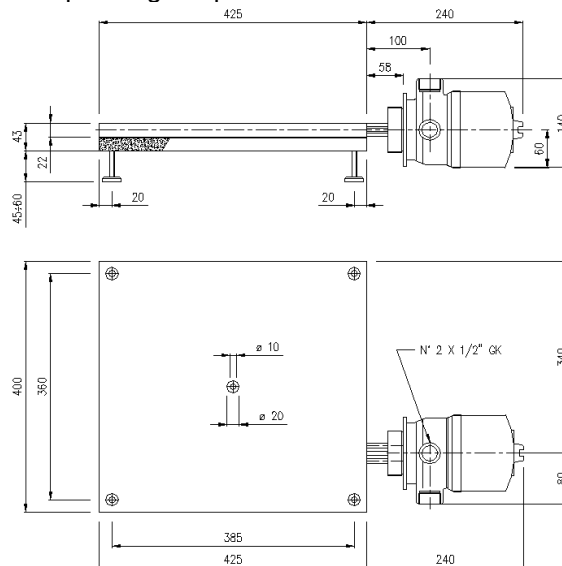
These heater are certified in accordance with IEC/EN 60079-0, IEC/EN 60079-1, and IEC/EN 60079-31 specifications. They are also available with EAC, CCOE/PESO & China EX certification.

The marking is:

II 2G Ex dB IIC T4 -/Gb IP65/IP68

II 2D Ex tb IIC T135°C -/Db

- ↗ Cable design temperature < 126 °C
- ↗ Certificate validity: / Zone 1 or 2
- ↗ Ambient temperature: max. - 60 °C + 70 °C
- ↗ Operating temperature: max 99 °C



EXPLOSION-PROOF BAND HEATERS

Products that are analogous to the heating plates are the explosion-proof band heaters. They also are realised sinking one or more armoured heaters inside an aluminium or bronze casting but, thanks to the peculiar manufacturing technique, they are constructed with a cylindrical (or semi-cylindrical) shape. This makes them suitable for the heating of cylindrically-shaped bodies like, e.g., the plasticisation cylinders of the extruders which operate in classified areas. The pictures below show some examples of these products.



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