

Inline heaters



Inline heaters are a special variant of the electrical flow-type heaters. They are designed for efficiently heating liquid or gaseous flowing fluids. The absolutely pocket-free design of the inline heaters is a special feature of them. There are no obstructions for the fluid. Thus, a deposit of retained particles is not possible. The heated surface can be designed such that nevertheless a turbulent flow is ensured. The design is based on the general conditions such as the type and properties of the respective fluid, pressure and temperature as well as the desired operating points in the process.

Inline-type air heaters directly heat fluids. To this effect, electrical energy in the heating elements is converted to thermal energy. The thermal energy is then transferred from the heating elements to the fluid. Here, it is important that the design be matched to the general conditions, for each fluid has its specific properties.

Anwendungsbereiche:

 Speichern 	 Heizen 	 Tauschen 
 Industrie 	 Life Science 	 Anlagenbau 
 Flüssigkeitserwärmung 	 Gaserwärmung 	 Werkzeugbeheizung 

Fluids

For example, these fluids are heated in electrical inline heaters:

I. Water

- Drinking water, max. surface load depending on the water hardness 4 – 6 W/cm²
- Circulating and/or heating water, max. surface load approx. 10 W/cm²
- Softened water, observe the maximally admissible chloride content, max. surface load approx. 10 W/cm²
- Ultra-pure water, e.g. purified water (PW), highly purified water (HPW) or WFI

II. Gases

- Air, sterilized air as well

Materials

The fluid to be heated and the application temperature mainly define the materials and the surface qualities which can be used for the unheated and/or heated surfaces. Otherwise, corrosion may quickly result in a failure of the flow-type heater, for example.

Materials of the wetted components:

- Corrosion-resistant stainless steel
- Heat-resistant stainless steel
- Alloys on nickel basis , e.g. Incolloy, Hastelloy
- Titanium, special materials

Control equipment

Inline heaters are usually selected by an external switchgear cabinet. The electrical heating power can be divided into one or several heating stages. This division can individually be adjusted to match the control equipment.

I. Controllers

- Electronic ON-OFF control or PID control. (-> ON-OFF control switches off the heater if the temperature is exceeded, and switches it on again when the temperature falls below its lowest value. Thus, the temperature will always oscillate around the setpoint. The algorithm of the PID controller will optimally compensate the control fluctuations.)
- Load switching by contactors or wear-free semiconductors (thyristors). (-> contactors are wearing parts and must be replaced after approx. 100,000 make/break operations; thyristors switch quickly and without any wear but generate more heat losses than contactors.)

II. Sensors

- Thermal protectors and limiters (as a safety design as well).
- Temperature sensors for the fluid and heating element temperature.
- Overheating protection

Insulation

Inline heaters are normally delivered with an insulation. The following insulation designs are available:

I. Insulation material

- Mineral wool with a stainless steel jacket
- Gas-tight insulation

Fluid connections

We are prepared to agree with you on the type and position of the fluid connections. The following connections are available:

I. Fluid connections

- Standard flanges (DIN, ASME, SAE etc.)
- Female or male thread connections
- Clamp flanges (DIN32676)
- Sterile flanges (DIN11864)
- Dairy-type pipe connections

Design models

The following designs are available for the electrical equipment and control of the flow-type heater:

I. Design models

- Indoor or outdoor installation
- Hazardous area (zone 1 or 2, 21 or 22)
- Non-hazardous area
- Type of protection IP54 or better
- Switchgear cabinet for wall or floor mounting
- Steel sheet connection housing, powder-coated or stainless steel
- Electronic or electromechanical control
- Communication with higher-level control system by floating contacts, standardized signal or bus