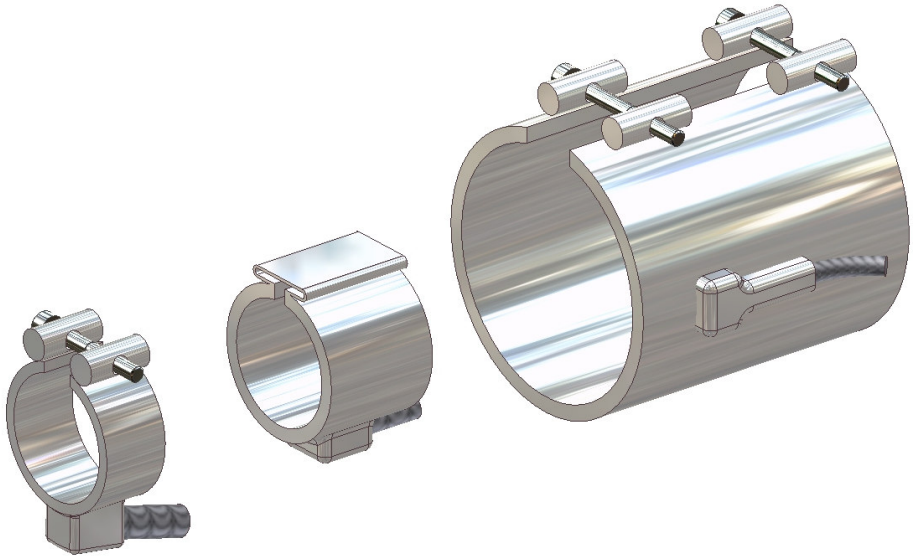
Thermal system - (heater bands and temperature sensors)



Thermal electric technology:

- Mica-, ceramic– or mineral compound heater bands
- Temperature sensors

Index of contents

Chapter **Page**

Thermal system 2
Thermal system comparison 2
Temperature sensors; construction / recommendation 3

Thermal System

The thermal system plays a considerable role in the optimal function of shut-off nozzles. Heating systems contain a heating unit, temperature sensors and the associated controllers.

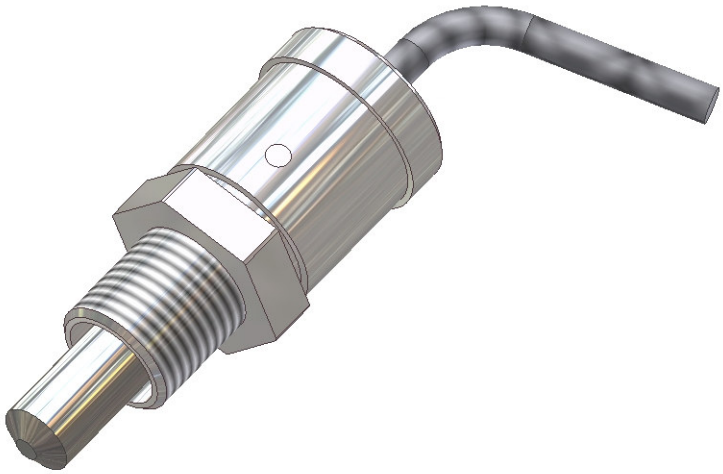
The heater band should be durable and have sufficient power reserves. The temperature sensors must exhibit a fast response mode and a long service life. The system is determined by it's weakest factor. If a wrong heating system is implemented, this could perform unreliably and impair or detract from the performance of the nozzle substantially.

Thermal system comparison

	High performance heater band Type DGM	Mica heater band Type DGS	Mica heater band
Power density	10 W/cm2	3.5 W/cm2	3.5 W/cm2
Max. temperature	600°C	350°C	280°C
Cable	3m wire netting, thermal insulation	1.5m wire netting, thermal insulation	1m wire netting
Cable outlet	Terminal block with cable protection	Terminal block with cable protection	Direct without protection
Calibration / installation	Tangential latches for optimal tension / screws	Tangential latches for optimal tension / screws	Folded sheet metal / screws
Construction	Plastic impervious, magnesium oxide isolation	Plastic impervious, mica isolation	Plastic impervious, mica isolation
Advantage	• high quality insulation materials • high performance sealing • optimal heat transfer • minimal deadweight heating • excellent controllability • mechanically stable construction • plastic impervious • high efficiency • minimal energy consumption • rust free steel cover • long service life	• good cost/performance ratio • good heat transfer • good controllability • mechanically stable construction • plastic impervious • rust free steel cover • long service life	• economical
Disadvantage	• initial cost • moisture sensitive • starting circuit required or slow heating for dehumidifying	• under performance for technical plastics	• bad heat transfer due to insufficient clamping and irregular contact to the body • insufficient response due to low power • sensitive cable outlets • usually not plastic impervious resulting in short circuiting

Summary:
For the processing of technical plastics, a high quality heater band is absolutely recommended. The good thermal performance and compact, mechanically stable construction allow for easier handling and increase process security in application. Machine downtimes due to insufficient heat transfer and defective thermal systems are considerably reduced.

Temperature sensor



What is to be considered when selecting temperature sensors:

- maximum continuous operation temperature
- minimum required service life
- type of measuring system
- sensor construction
- position and fixing of sensor at the measuring point
- use of suitable connection cable
- selection of the optimal measuring and controlling unit

Construction:

Cheap sensors are available on the market. Such economical sensors have however a large deadweight and the measuring point is more than likely only soldered. The random form of the tip rests insufficiently on the object to be measured and the deadweight distorts the temperature measurement.
Placing at the exact measuring point is difficult with these sensors due to inaccurate attachment mechanics.

The temperature sensors used by us are high-quality construction units with a life span of several years. The individual components are optimally co-coordinated and durably designed. Fast response times and reproducible measuring data are important factors in the thermal system chain.

Recommendation:

High quality temperature sensors are absolutely recommended with the processing of technical plastic parts.
The melt temperature can only be measured correctly by fast response times and exact, reproducible measuring data of the temperature sensor. The measuring data have a direct influence on the controlling of the heater band.
If a single factor in the thermal system performs insufficiently, this can have a direct effect on the process security of the injection process.