

Protection and safety for industry,  
facilities and household

**Overheating protection**  
**for electric motors**  
**and heaters**

**ELECTRIC MOTORS AND HEATERS**

**Electric drives must not overheat inadmissibly, just as electric heaters must not overheat. Temperature sensors and bimetal switches from Microtherm Sentronic protect virtually any heating element from overheating in any operating state. The space-saving integrated components provide safety not only for operators of motor-driven machines and devices- and consumers but also the equipment which use these heated assemblies.**

With its standard products for thermal protection, Microtherm Sentronic has a strong presence in electric motors and electric heaters. Various types of sensor or protection elements – PTC, PT1000 or bimetal switches – are used on drives and heaters, in some cases with multiple redundancy for higher safety scenarios. Bimetallic switches are manufactured purely mechanically with consistent tolerance chains of  $\pm 1/100$  mm and serve in drives and on heated assemblies as direct or indirect device protection, in which they interrupt the current flow in a temperature-dependent manner in the event of overheating.

Wear, bearing damage or improper use can lead to a locked-rotor situation in motors, causing a temperature spike to its maximum temperature. To prevent this unacceptable heating during protected operation, temperature limiters, often in the form of bimetal switches, shut off the current to permit the windings to cool down again. For this reason, circuit breakers are often incorporated directly into the windings of electric motors between the main and auxiliary windings.

Application areas for overheating protection in motors and drives include:

- Infrastructure and chemical plants, pumps for transporting liquid media such as water, oil and chemicals, pumps and compressors for gases, and generators for power generation in thermal power plants, wind and hydroelectric power plants
- Industrial machinery, automation hardware and scientific equipment
- HVAC building equipment, fans for ventilation, cooling or air-conditioning, elevators, blinds or shutters
- Medical technology, medication pumps or actuators for hospital beds
- Mobility, actuators for convertible tops or brake ventilation systems.

Electric heaters must also be protected against overheating if, for example, excess temperatures occur as a result of damage to the heating coils or unstable ambient conditions are encountered. For this reason, many consumer goods, household appliances, and numerous industrial equipment, incorporate protective temperature limiters.

Applications for protective temperature limiters in and on heating systems include:

- Household appliances coffee machines, kettles, hot plates, irons, hair dryers, water beds, ventilation hoods, dishwashers, washing machines and electric stoves
- Electric braking systems and load resistors
- Lighting technology – transformers or dimmers
- Building air conditioning, heating coils for air heating (HVAC)
- IT infrastructure, server cabinets and farms
- E-mobility, charging plugs for battery-electric vehicles
- Medical technology: centrifuges and incubators
- Renewable energy, inverter technology in photovoltaic systems and cooling of solar cells or wind turbines.

Similar to the watchmaking industry, Microtherm Sentronic has decades of experience in the processing of flexible strip metals into the smallest and most precise functional switching components. The core competence is the mechanically challenging manufacture of bimetallic microswitches and the integration of diverse electrical functions in reliable and economically produced assemblies. With comprehensive application-, process- and system expertise and decades of experience in the production of assemblies, our products are chosen by OEMs and suppliers in a wide range of industries.

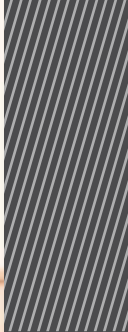
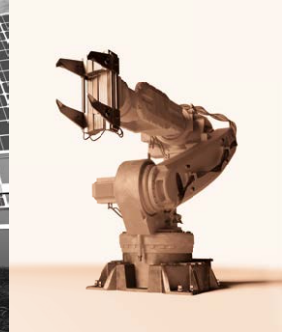
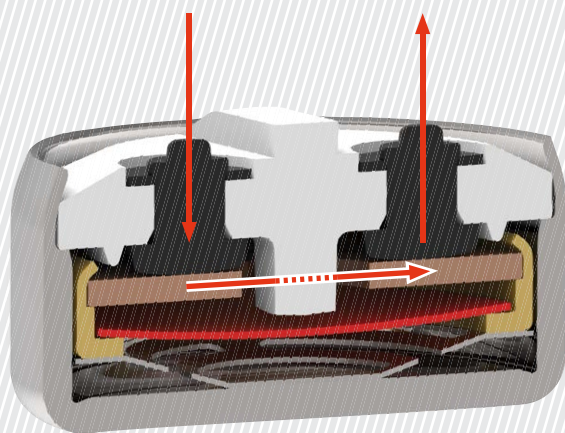


figure 1



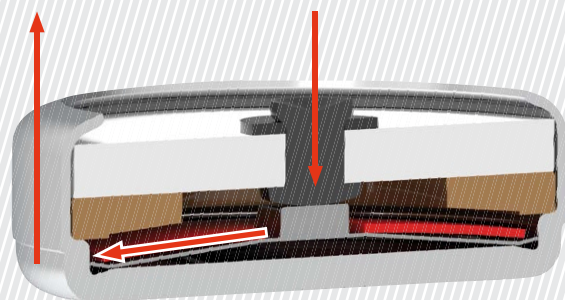
Thermal protection limiter with non-current-sensitive  
Bimetal disc – thus not current sensitive

The operating principle and design of bimetallic switches are consistent across applications with minor variations but are suitable for a wide variety of application-specific test procedures and validation measures. Microtherm switches are miniature, designed with a reliable contour for mounting in tight spaces and are pressure stable. In addition, the Microtherm protectors are sealed so that they can be vacuum impregnated with various varnishes and glues. They are supplied bare, potted or shrink-wrapped and can be installed in universal and specialized drives by embedding them in winding harnesses, and can be integrated into all types of electrical equipment by means of clips or clamps for fastening.

With their non-current-carrying thermo-bimetal snap-action disc technology, the "B-series" and the "F-series" react to the temperature input of the applications to be protected (e.g. electric motor). That is, these switches respond primarily to temperature, and **not** directly to the rated current, or fault current. The T-Series is a different design with a two contact system **and is current sensitive**. For current flow through the "B-Series" and "F-Series", see figures 1 and 2.

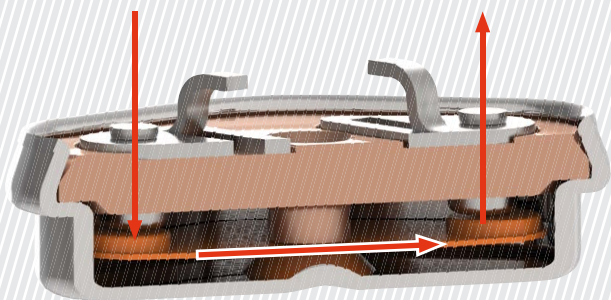
With a current flowing thermo-bimetal snap disc, the "T-Series" does not react exclusively to the temperature input of the applications to be protected (e.g. electric motor) but also to their current flow. That means, these switches react to temperature **as well as** the rated current, or fault current. Current flow through the "T-Series" see figure 3.

figure 2



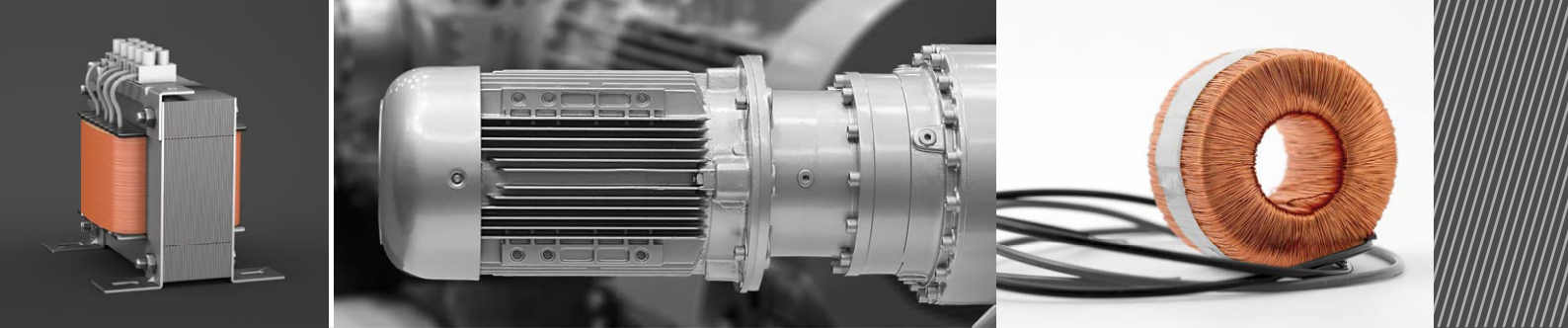
Thermal protection limiter with non-current-sensitive  
Bimetal disc – thus not current sensitive

figure 3

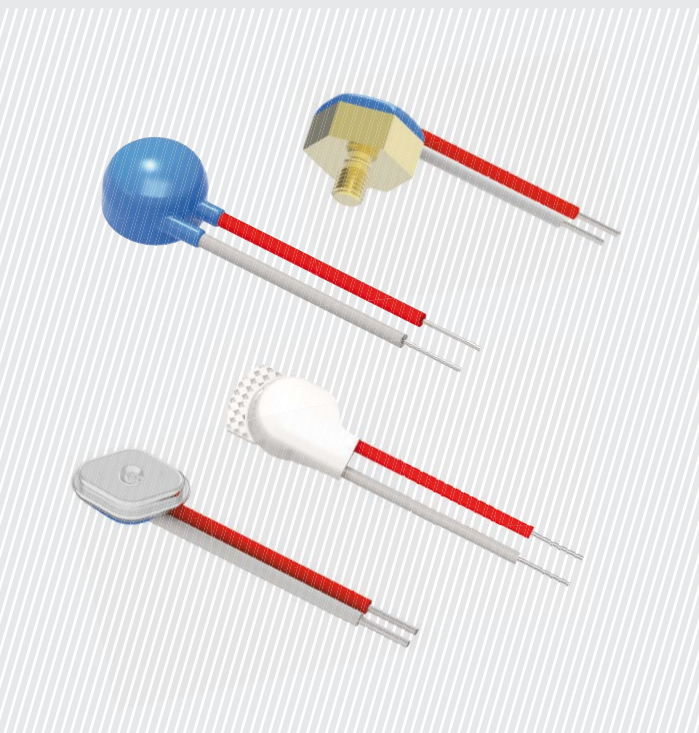


Thermal protection limiter with current-sensitive  
bimetal disc – thus current sensitive





## TEMPERATURE SWITCHES



Product examples – further designs on request

## TEMPERATURE SENSORS



Product examples – further designs on request

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