» Electrically heated hoses with system «

- Heat with system
  - Flexible heat in two senses.

- Multifunctional control technology
  - Integral temperature control and temperature limitation: Twofold in-process reliability.

- Three component variants
  - Wide range of applications. Product range.
templine heated hoses

From concept to development.

If a medium-carrying link must be movable and easily extended or replaced, hoses and not rigid pipes are the practical choice for that link. Moreover, to prevent heat loss in the carried medium, a combination of hose and electric heating is the ideal solution.

This combination is offered by the novel templine heated hose system from Masterflex AG. This innovative design additionally leads to a significant reduction in energy consumption!

Development of the Masterflex AG templine product series was the outcome of the Company’s long expertise in the field of innovative High-Tech Hose Systems and of ongoing dialogue with customers.

The heart of this new development is a medium hose combined with an economically efficient heating system and a completely new design.

By virtue of their design, templine heated hoses have specific advantages for the user compared with conventional heated hose systems. The latter, electrically heated by means of conventional heating elements derived from the “trace heating” model are always only a compromise. Such heating systems cannot always match operators’ individual requirements. Awareness of this inspired Masterflex AG to develop an alternative approach and ultimately a new heated-hose system.

Areas of application

The number of individual applications in process engineering is immense. Electrically heated hose systems are found for example in:

- chemical and petrochemical plants for grease and oil liquefaction, for conveying chemicals in movable plant units, in plants handling bulk materials (decondensation) and liquids and much else
- in the motor industry in analysis systems for monitoring exhaust gases
- in mechanical engineering, e.g. for heating hydraulic fluid and in book-binding machines
- in adhesive technology, e.g. in labelling machines and machines for laminating wood and plastic
- in automation, e.g. in production robots in the motor industry (painting, bonding of bodywork parts etc.)
- in the food and allied industries, e.g. for conveying fats, liquid sugar, cocoa butter
- in special applications, e.g. equipping of vehicles during exhaust-gas clean-up

templine is a product series of Masterflex AG, Gelsenkirchen.
templine heated hoses

Heat with system.

Wherever media must be kept flowable by temperature maintenance and a flexible link between inlet and outlet is required, electrically heated hoses are the ideal solution.

Templine heated hoses are flexible in two senses:

- high mechanical flexibility due to the concentric layout of the heating system
- four heating cables = four circuits = four different heating capacities

Templine functional principle

The medium-carrying hose inside is covered by a temperature-resistant braiding. The four heating cables are woven into and fixed inside. They produce on the hose surface a uniform heat which can be precisely monitored at all times. The heating conductors consist of various metal alloys with different resistances. Designed as highly flexible fine-wired conductors, they follow almost every movement.

Different combinations of the heating cables allow to influence on the heating capacity of the hose.

Templine products are designed in accordance with the current DIN/EN standards and guidelines.

Manufacture of the products is an integral part of ISO 9001-TQM.

Electrical interconnection of these heating cables determines the heating capacity of the templine heated hose.

It can vary between 50% and 200% (see templine functional principle)

Product structure of the templine heated hose

Templine heated hose

Combination of heating cables:
**templine heated hoses**

Heat with system.

**Conventionally heated hose systems**

These transfer the heat to the medium-carrying hose via at least two plastic-insulated heating cables or a heating tape. The illustration below shows the design in operation as an example. In addition to parallel routing of the heating tape, helical installation of an industrial heating cable with a resistance heating conductor is also possible. In the case of small diameters however, the contact area for heat transfer reduces essentially as the hose radius decreases.

**The templine heated hose system**

With a configuration of four heating conductors spiralled around the surface of the medium-carrying hose and almost complete coverage is obtained. The thermograph below shows the optimal heat spread on the templine heated hose. The heat spreads evenly over the surface to be heated alongside the heating conductors. Annular and homogeneous heating of the medium with only limited temperature differences is thereby assured.

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**The result**

- heat transfer only over a small contact area
- high heat density on small areas of the hose surface
- uneven heat distribution
- danger of product overheating (“hot spots”)
- energy losses due to indirect heat input (reflection)
- increased energy consumption
- heating system responds with delay on temperature variations in the medium-carrying hose

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**The result**

- heat supplied evenly to the medium with limited temperature variation
- optimal protection for temperature-sensitive liquids, dusts, gases and granulates
- higher energy efficiency – lower power consumption at equal temperature compared with conventional systems (up to 30%)
- high ageing resistance of heated-hose system: The smooth heat spread prevents abrasive wear and material stresses due to excessive expansion and reduction resulting from large temperature deviations.
templine heated hoses

Heat with system.

<table>
<thead>
<tr>
<th>Technical data</th>
<th>Type I</th>
<th>Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>+80 °C</td>
<td>+200 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 °C to +60 °C</td>
<td>-20 °C to +60 °C</td>
</tr>
<tr>
<td>Medium hose</td>
<td>polyamide (PA)</td>
<td>fluoropolymer (PTFE)</td>
</tr>
<tr>
<td>Heating strands</td>
<td>resistance alloys</td>
<td>resistance alloys</td>
</tr>
<tr>
<td>Yarn braiding</td>
<td>polyester yarn</td>
<td>glass-fibre yarn</td>
</tr>
<tr>
<td>Intermediate insulation</td>
<td>polyurethane (PUR)</td>
<td>silicone (Si)</td>
</tr>
<tr>
<td>Thermal insulation</td>
<td>elastomere foam</td>
<td>silicone foam</td>
</tr>
<tr>
<td>Protective sheath / braiding</td>
<td>polyamide braid (PA)</td>
<td>polyamide braid (PA)</td>
</tr>
<tr>
<td>Inside diameter</td>
<td>4, 6, 8, 10, 12, 14, 16, 20, 25 mm</td>
<td></td>
</tr>
<tr>
<td>Operating voltage</td>
<td>up to 230 V</td>
<td></td>
</tr>
<tr>
<td>Heating capacity</td>
<td>up to 100 Watt per meter</td>
<td></td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>up to 44 bar (dependent on temperature and diameter)*</td>
<td></td>
</tr>
<tr>
<td>Bending radius</td>
<td>10 x outside diameter of hose</td>
<td></td>
</tr>
<tr>
<td>Lengths of heated hose</td>
<td>acc. to application</td>
<td></td>
</tr>
<tr>
<td>Protective class</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP 65 (templine-A, -R, -B)</td>
<td></td>
</tr>
<tr>
<td>Hose fittings</td>
<td>metal fittings DKOR, DJK (DIN 3861, DIN ISO 12151-2, others on request)</td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>mild steel and stainless steel</td>
<td></td>
</tr>
</tbody>
</table>

* versions with higher pressure resistance on request

Comprehensive testing at institutes and university laboratories, such as for example tests of

- bending flexibility
- torsional strength
- ageing resistance
- physical stability

with favourable results attest the templine product line’s exceptional practical suitability and advantages.

Proven reliability from Masterflex AG, Gelsenkirchen.

The templine product line has been certified by the VDE Institute in Offenbach/Main and holds a VDE inspection certificate.

Institut für Elektrische Energietechnik, Cologne University of Applied Sciences
templine control technology

Multifunctional equipment in space-saving design.

Media transported in electrically heated hoses need a continuous temperature surveillance. Especially temperature-sensitive materials require close temperature tolerance control over the hose length.

Templine temperature control systems have been developed by Masterflex AG specifically for the templine heated hose system. Their development has been based on experience gained from talking to customers, on expert in-house knowledge of materials and thermodynamics, and on directives and standards.

Templine control technology combines the requirement for space-saving construction with multifunctional equipment. It can be incorporated directly in the heated hose adaptor housing. This is achieved by means of up-to-date multi-layer PCB technology with programmable controller and limiter modules.

This has made it possible to meet the requirements from users for the controller and limiter to be incorporated in the electrically heated hose itself.

Product structure of the temperature controller

1. adaptor enclosure for templine heated hose
2. assembled temperature controller
3. transparent cover with inspection window
4. flexible supply cable (230 V)

Special advantages

- heating conductor and temperature-sensor leads are routed inside the adaptor enclosure and are thus protected
- only one flexible supply cable between heated-hose system and the power-supply terminal
- protected against dust and water ingress (IP 65)

Product structure of end termination

a. templine sealing enclosure
b. hose fitting
templine control technology

The component range.

templine-R temperature controller

The templine-R complements the heated hose, making it an integrated, ready-for-use system. The electronics monitor the temperature of the medium in conjunction with a sensor on the surface of the medium-carrying hose. They are installed at the factory in the heated hose’s connection housing.

<table>
<thead>
<tr>
<th>Housing size*</th>
<th>150,0 x 67,5 x 76,5 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>160,0 x 71,0 x 96,5 mm</td>
</tr>
<tr>
<td></td>
<td>196,0 x 91,0 x 116,5 mm</td>
</tr>
</tbody>
</table>

templine-B temperature limiter

The temperature controller can be combined with the templine-B temperature limiter inside the adaptor enclosure. The limit value can be individually chosen according to process requirements as with the temperature controller.

<table>
<thead>
<tr>
<th>Housing size*</th>
<th>150,0 x 67,5 x 113,5 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>160,0 x 71,0 x 132,5 mm</td>
</tr>
<tr>
<td></td>
<td>196,0 x 91,0 x 153,5 mm</td>
</tr>
</tbody>
</table>

templine-A connecting piece

The templine-A heated hose system has been designed for the connection between external supply/control and heated hose. The temperature sensor lines are integral components of the flexible supply cable.

<table>
<thead>
<tr>
<th>Housing size*</th>
<th>150,0 x 67,5 x 90,5 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>160,0 x 71,0 x 109,5 mm</td>
</tr>
<tr>
<td></td>
<td>196,0 x 91,0 x 130,5 mm</td>
</tr>
</tbody>
</table>

* Size dependent on the diameter of the heated hose.
templine-R controller concept

The control characteristic of the templine system is PI action. Setting for PD, PID or two-step-controller action is available on request.

The heating system is switched to operation load free to avoid high-frequency interference in the energy supply network. In case of opening adaptor enclosure during service and new settings, the operator is assisted by an LED indicating exceedance or an under-cut of temperature setting range between +5 °C and +250 °C.

templine-B temperature control and limitation

The templine heated hose system can be equipped by a temperature limiter combined with temperature controller. The temperature limit is adjusted according to the application at the factory before delivery.

In combination with the temperature limiter the temperature controller can regulate the heated hose and monitor the medium temperature. Double protection is thus obtained for temperature-sensitive liquids, granulates or gases carried in the hose.

Technical data

- Operating temperature: -20 °C to +50 °C
- Storage temperature: -20 °C to +60 °C
- Nominal voltage: 230 V (+10/-15 %)
- Switched current: max. 6 A
- Switching capacity: 1380 W (with ohmic load)
- Temperatures:
  - templine-R: +5 °C to +250 °C
  - templine-B: +5 °C to +250 °C
- Control characteristic:
  - optional (at factory)
    - PI (basic setting)
    - two-step-controller, PD, PID
- Protective class/rating: I / IP 65
- Spring terminals: 11 x 2,5 mm² 4 x 0,5 mm²
- Signalisation: 3 indicator LEDs
  - sensor break/short circuit/
    extended set temperature
  - operation controller
  - heating operation
- Switching hysteresis:
  - templine-R: 2 K
  - templine-B: 5 K
- Temperature sensor: PT100
- Enclosure dimensions: see page 8
- Enclosure material: polyamide

Product key/Order reference

The product key gives information about the structure of the factory-assembled templine heated hose system.
Masterflex AG

Your Partner for High-Tech Hose Systems.

Masterflex AG, Gelsenkirchen, is the specialist in the world-wide development and production of high-grade hoses and connection systems manufactured from innovative high-tech materials.

Since its formation in 1987 the Company has accumulated a high level of materials and processing expertise.

Masterflex commands the entire process chain: from application of materials through development of its own manufacturing processes on self-provided plants to product production and distribution. At various locations in Europe, the USA and Brazil, Masterflex manufactures and distributes High-Tech Hose Systems for very wide-ranging industrial applications.

Quality, reliability and economic efficiency from a single source.

The demands of our customers and the requirements of the market are critical in the development of new products, which are realised jointly with our customers and our research & development department. Our extensive range offers products which fulfil individual requirements and perform demanding tasks. From conveying extremely abrasive materials to extracting highly aggressive chemicals and hot air at up to +1,100°C.

Nearly all sectors of industry and areas of application benefit from our high-value and durable products.

Locations:

- Germany
- France
- United Kingdom
- Czech Republic
- USA
- Sweden
- Brazil
- Russia

one step ahead
Advice with system

Project checklist / Contact form.

Masterflex templine electrically heated hoses are individually designed which are created following the requirements of actual applications by our experts. This form should be a guideline on the way to a complete database for calculation and design of an ideal templine heated hose product.

Contact details

Business name: 
Street: 
Postal code / location: 
Contact: 

Function: 
Phone: 
Mobile: 
Fax: 
E-mail: 

Description of application

1. Hose inner diameter: 4 mm 6 mm 8 mm 10 mm 12 mm 14 mm 16 mm 20 mm 25 mm other: mm


5. Application: ✔ Frost protection ☐ Temperature maintenance ☐ Temperature increase


9. Medium type: granular/powder ☐ gaseous ☐ liquid ☐ type:

10. Environment: Indoor ☐ Outdoor ☐ Wind (>2m/s) ☐ Moisture


15. Configuration of heated hose: ☐ external supply (templine-A) ☐ with temperature controller (templine-R) ☐ with temperature limiter (templine-B)

16. Hose equipment: 

hose fitting: required material: design: 

Protective jacket: Standard (PA-braid) Other:

17. Mechanical strain: yes ☐ no ☐ description:

18. Installation: ☐ fixed installation (e.g. cable trays) ☐ free installation (e.g. robot) ☐ mobile installation (e.g. road tanker) Others:


20. Certificates require: yes ☐ no ☐ if so, which:

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