HEATED LINES FOR THE ENVIRONMENTAL MEASUREMENT AND FOR ENGINE AND DYNAMOMETER TEST BENCHES
CATALOGUE 2009-04
Codes for the basic hose and fittings  

<table>
<thead>
<tr>
<th>Type</th>
<th>Serial code</th>
<th>Special number</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAH</td>
<td></td>
<td></td>
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<tr>
<td>WAP</td>
<td></td>
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<tr>
<td>WEX</td>
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<tr>
<td>WAKG</td>
<td></td>
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</tr>
<tr>
<td>WAKS</td>
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<tr>
<td>WAKW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Codes for the maximum operating temperature or power

<table>
<thead>
<tr>
<th>Maximum operating temperature $T_{\text{max}}$ in °C</th>
<th>Power in W/m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heated lines with heating cable</td>
<td>WAL</td>
</tr>
<tr>
<td>Heated lines with heating tape</td>
<td>WAH</td>
</tr>
</tbody>
</table>

- WAL: 10 = 10 W/m
- WAH: 15 = 15 W/m
- WAH: 26 = 26 W/m
- WAP: 40 = 40 W/m
- WAH: 25 = 25 W/m
- WAH: 45 = 45 W/m
- WAH: 60 = 60 W/m

Codes for heated lines

- PTFE-hose
- Exchangeable PTFE hose in hose
- Exchangeable PTFE hose + tube ends
- Exchangeable PTFE hose + tube ends
- Stainless steel tube
- Exchangeable PTFE hose
- Exchangeable PTFE hose + tube ends
- Exchangeable PTFE hose + exchange. tube ends
- Exchangeable PTFE hose + ferrule fittings

Important!  NEW article codes since 01.01.2008

Note:

All the descriptions and illustrations of the products in this catalogue are non-binding and correspond to our current state of knowledge. Winkler reserves the right to modify the products described here at any time and without prior notice if considered necessary for the purpose of further development or constructional reasons.
Winkler technology

With more than 25 years of experience, Winkler stands for reliable products and intelligent innovations in industrial heat engineering. We offer the broadest range of flexible heating systems, control & monitoring equipment and accessory products for exacting analytical measurement.

Heated lines from Winkler are used in analytical systems for monitoring air pollutants in power stations and waste incineration plants as well as for process analysis in industry. They serve to transport gas samples without falsification from the sampling point to the gas treatment system and analyser. Thanks to their high degree of durability, they can be in use for many years, often round the clock and under tough conditions. The whole bandwidth of heating solutions from Winkler is also demonstrated at engine test beds for the calibration and optimization of combustion engines in the context of further development as well as at chassis dynamometers for statutory emission testing and vehicle certification.

The accuracy and reproducibility with which sensors and instruments in analytical systems are able to function crucially depends on the sampling gas treatment and the correct heating along the measuring gas route in accordance with the applicable standards and regulations. As the legal regulations become stricter and measurement technology improves even further, the requirements in this sector will increase correspondingly. Therefore, the heating within an analytical system represents a major element of every facility, and this is where Winkler, as a specialist, can always offer the perfect solution.

Rely on our experience and you will be convinced of our products and services!

Winkler quality

The technical experience and high level of quality assurance are reflected in all Winkler products so that our customers can rely on tested and proven products for their applications.

Our heating systems are characterized by an even distribution of heating power and a generously dimensioned heating conductor arrangement. This enables relatively direct and careful heat transfer to the fluid or object to be heated.

We only use high-quality, tried and tested materials and components, and there is no compromise in this respect when it comes to the selection of and cooperation with our suppliers. Our customers are therefore offered excellent and trustworthy products with a long service life, even under heavy load conditions.

Winkler products are 100% routine tested. There are two documented tests already during production, and during the third and final test the analytical measurement lines are again subjected to strict quality inspection. This triple testing procedure ensures a high degree of safety and reliability. And in the long run, these high quality and safety standards are beneficial.

Our quality management system is certified to ISO 9001:2000. Winkler is a certified manufacturer in accordance with Directive 94/9/EC, Appendix VII (ATEX).

Winkler service

Your direct contact to Winkler:
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Fax +49-6221-3646-40

For all inquiries and orders:
E-Mail: sales@winkler-heidelberg.de

Service is an important part of our cooperation with our customers. Winkler not only supplies reliably functioning products, but also complete solutions from one single source. We see ourselves as service providers to and development partners of our customers. Together with you – and with flexibility and creativity – we will find a solution, even for very complex applications.

As a system supplier to manufacturers of high-standard analytical devices and systems we are familiar with the requirements in practice and the application conditions. Often it is certain details that will make the product ideally suited to a particular task.

Make use of our know-how to stay ahead!

In addition to the options already listed, all the products in this catalogue can be individually adapted to your specific projects. In other words, we can offer you a solution that is exactly tailored to the requirements of your application. This approach is technically more elegant, and in the long run it will normally also prove to be more economic.

Don’t hesitate and get in touch with our specialists – they’ll be happy to advise you!
Heated lines types WAL + WAH

Applications
Heated lines for the transport of gas samples in the temperature range up to 120°C. Ideal for fix installation - especially outdoors - with normal mechanical strain.
Can be cut to any length on site and terminated with termination kit.

Structure
- PTFE-hose, unheated overlapping 500 mm on both ends (see picture).
- Heating with selflimiting heating tape with protective braiding and polyolefin/fluoropolymer-covering. Available also with ATEX-connections.
- Flexible insulation structure with multilayer thermal fleece.
- Outer cover with sturdy corrugated hose made of black polyamide (PA 12) and silicon caps.
- Without sensor, no controller necessary.
- Ready to connect with core cable ends.

Heated lines type WAP

Applications
Heated lines for the transport of gas samples in the temperature range up to 120°C. Ideal for fix installation - especially outdoors - with normal mechanical strain.
Can be cut to any length on site every 60 cm (to insure continuous heating) and terminated with termination kit.

Structure
- PTFE-hose, unheated overlapping 500 mm on both ends (see picture).
- Heating with parallel heating tape with protective braiding.
- Flexible insulation structure with multilayer thermal fleece.
- Outer cover with sturdy corrugated hose made of black polyamide (PA 12) and silicon caps.
- Built-in temperature sensor for the operation with a controller.
- Ready to connect with core cable ends.
Technical data types WAL, WAH + WAP

Dimensions and bend radiuses (Tolerances of length ±2%, tolerances of diameter ±5%)

<table>
<thead>
<tr>
<th>ND</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>4 mm</td>
<td>6 mm</td>
<td>8 mm</td>
<td>10 mm</td>
<td>12 mm</td>
</tr>
<tr>
<td>DK</td>
<td>48 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM</td>
<td></td>
<td>42.5 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LI</td>
<td>500 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LK</td>
<td>105 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD</td>
<td>62 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LE</td>
<td>35 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. bend radius</td>
<td>200 mm</td>
<td></td>
<td></td>
<td></td>
<td>300 mm</td>
</tr>
</tbody>
</table>

Technical data for 230 VAC (Tolerances of power ±10%, $T_0$ : ambient temperatures)

| Type | WALW210.. | WALW215.. | WALW226.. | WAHW225.. | WAHW245.. | WAHW260.. | WAPW240..
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power at $T_0 = +10^\circ C$</td>
<td>10 W/m</td>
<td>15 W/m</td>
<td>26 W/m</td>
<td>25 W/m</td>
<td>45 W/m</td>
<td>60 W/m</td>
<td>40 W/m</td>
</tr>
<tr>
<td>Temperature maintained at $T_0 = +20^\circ C$</td>
<td>35 - 40°C</td>
<td>35 - 45°C</td>
<td>40 - 50°C</td>
<td>70 - 80°C</td>
<td>90 - 100°C</td>
<td>110 - 120°C</td>
<td>120°C</td>
</tr>
<tr>
<td>Temperature maintained at $T_0 = -20^\circ C$</td>
<td>15 - 25°C</td>
<td>20 - 30°C</td>
<td>30 - 40°C</td>
<td>50 - 60°C</td>
<td>80 - 90°C</td>
<td>100 - 110°C</td>
<td>110 - 120°C</td>
</tr>
<tr>
<td>Temperature class (for Ex-Versions)</td>
<td>T6</td>
<td>T3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. oper. temperature at Power ON</td>
<td>65°C</td>
<td>120°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. oper. temperature at Power OFF</td>
<td>85°C</td>
<td>190°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admissible ambient temperatures</td>
<td>-20°C / +40°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. lengths manufactured</td>
<td>78 m</td>
<td>78 m</td>
<td>78 m</td>
<td>100 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. length of circuit $T_0 = -20^\circ C$ (16A fuse)</td>
<td>145 m</td>
<td>95 m</td>
<td>59 m</td>
<td>102 m</td>
<td>61 m</td>
<td>45 m</td>
<td>100 m</td>
</tr>
<tr>
<td>Max. length of circuit $T_0 = -20^\circ C$ (20A fuse)</td>
<td>183 m</td>
<td>125 m</td>
<td>77 m</td>
<td>128 m</td>
<td>77 m</td>
<td>55 m</td>
<td>100 m</td>
</tr>
</tbody>
</table>
ATEX heated lines and heated hoses type **WEX**

**Applications**
Heated lines and hoses for the transport of fluids in the temperature range up to **200 °C** for applications in potentially explosive atmospheres classified zone 1 and 2 areas. Not suitable for zone 0 areas.

**Structure**
- PTFE basic hose with stainless steel braiding and fittings made of stainless steel 1.4305 (other fittings and materials upon request). Available nominal diameters: 4, 6, 8, 10 and 13 mm. Total length: depending on nominal diameter up to max. 48 m.
- Heating with PTFE-insulated heating wire with protective braiding.
- Flexible insulating structure with multilayer thermal fleece.
- Outer cover with antistatic corrugated hose made of black polyamide (PA12) and antistatic silicon caps.
- Two built in temperature sensors type ATEX Pt 100 for control and limitation of the temperature. Sensor position: 300 mm from the electrical connection side (other sensor positions upon request).
- Operation solely with controller and limiter.
- Power cable: 1.5 m (other cable lengths upon request) PTFE insulated wires in antistatic corrugated hose made of black polyamide (PA12).
- Ready to connect with core cable ends.

**Benefits**
- Complete system, ready to connect, tested and certified according to ATEX.
- **EC-type examination certificate Nr. EXS 07 10 29587 004**
  The EC-type examination certificate certifies the conformity with relevant regulations, according to Annex III of council directive N° 94/9/EC for equipment and protective systems intended for the use in potentially explosive atmospheres (ATEX).
- Very flexible → easy installation.

**Marking**
- **CE 0123** II 2G Ex e ma IIC T3
- Conformity symbol with notified body’s identification number (0123 = TÜV Süd)
- Explosion safety symbol for electric equipment
- **II**
- Explosion safety symbol for class II
- **2G**
- Equipment category
- **Ex**
- Symbol mark for the use of standard series DIN EN 60079-0 gases/fumes
- **e**
- Ignition protection type improved safety according to DIN EN 60079-7
- **ma**
- Ignition protection type encapsulation according to DIN EN 60079-18
- **IIC**
- Explosion group IIC hydrogen
- **T3**
- Class of surface temperatures up to 200 °C

**Temperature control and limitation**

The respective operating and limiting temperatures of the ATEX heated lines and hoses must always be monitored with the appropriate equipment. Regulations prescribe temperature controllers and limiters (or combinations of both) with intrinsically safe sensor inputs according to ATEX.

**Applications**

**Components for the control outside explosive areas:**
- 2 Controllers
  - WRH00141-230XW000
  - WRZ00226-230XX025
- 1 Solid state relay (P>500 W)
  - WRZ0222A-230XX020
- 1 Contactor (P>1.800 W)
  - WRZ0MK82-230XX024
- 2 Power supply 24V
  - WRZ0MK32-024XT000
- 2 Measurement transducer

**Connection boxes for the connection of cables within explosive areas:**
- Connection box **EE** (Power) WEZ00188
- Connection box **Ex** (Sensors) WEZ00189

**Connection boxes for control outside explosive areas:**
- Connection box EEx (Power) WEZ00188
- Connection box Exi (Sensors) WEZ00189
Technical data

- **Operating temperature**: max. 200 °C
- **Ambient temperature**: –20 °C up to +40 °C
- **Operating voltage**: 230 VAC (50 Hz)
- **Rated power**: 30 W – 4.800 W
- **Power tolerances**: ± 10 %
- **Protection class**: I
- **Min. bend radius**: 300 mm

Dimensions and rated power (Tolerances: lengths ±2%, diameters ±5%)

<table>
<thead>
<tr>
<th>ND</th>
<th>da</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td></td>
<td>6 mm</td>
<td>8 mm</td>
<td>10 mm</td>
<td>12 mm</td>
<td>15 mm</td>
</tr>
<tr>
<td>DK</td>
<td></td>
<td>64 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM</td>
<td></td>
<td>54 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LA</td>
<td></td>
<td>25 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LK</td>
<td></td>
<td>110 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD</td>
<td></td>
<td>80 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LE</td>
<td></td>
<td>35 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated power</td>
<td></td>
<td>100 W/m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total max. length</td>
<td></td>
<td>48 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated max. pressure*</td>
<td></td>
<td>200 bar</td>
<td>180 bar</td>
<td>160 bar</td>
<td>120 bar</td>
<td>100 bar</td>
</tr>
</tbody>
</table>

Certificates

EC-Type Examination Certificate

EC-Certificate

- **Operating temperature**: max. 200 °C
- **Ambient temperature**: –20 °C up to +40 °C
- **Operating voltage**: 230 VAC (50 Hz)
- **Rated power**: 30 W – 4.800 W
- **Power tolerances**: ± 10 %
- **Protection class**: I
- **Min. bend radius**: 300 mm

* at 200 °C
Heated lines types WAKG + WAKS

Applications
Heated lines for the transport of gas samples in the temperature range up to 250°C. Well suited for fix installation and mobile use indoors with normal mechanical strain. Versions for high temperatures up to 400°C.

Structure
- PTFE basic hose with stainless steel braiding and tube ends made of stainless steel 1.4305.
- Heating with PTFE (T_{max} < 250°C) or glass silk (T_{max} > 250°C) insulated heating cable with protective braiding.
- Soft and extremely flexible insulation structure with glass silk braiding (T_{max} > 250°C) and silicon foam.
- Standard-insulation structure approx. 40 mm (up to ND 16) and approx. 60 mm (from ND 20). Options underneath.
- Outer cover with protective braiding in different versions (WAKG) or silicon skin (WAKS) and silicon caps.
- Built-in temperature sensor for the operation with a controller.
- Ready to connect with plug.

Options of protective braidings for the outer cover of type WAKG

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G0</td>
<td>Black polyamide braiding. Use for standard applications. Available up to ND 32</td>
</tr>
<tr>
<td>G1</td>
<td>Red polyamide braiding (up to ND 16)</td>
</tr>
<tr>
<td>G2</td>
<td>Orange polyamide braiding (up to ND 16)</td>
</tr>
<tr>
<td>G3</td>
<td>Blue polyamide braiding (up to ND 16)</td>
</tr>
<tr>
<td>G4</td>
<td>Grey polyamide braiding (up to ND 16)</td>
</tr>
</tbody>
</table>

Options of insulation structures for types WAKG and WAKS

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IG40</td>
<td>Insulation structure approx. 40 mm. IG40 standard up to ND 16 is40 available up to ND 10</td>
</tr>
<tr>
<td>IS40</td>
<td>Insulation structure approx. 60 mm. Use for instance in climate chambers. Available up to ND 16 (G0, GB and G9)</td>
</tr>
<tr>
<td>IG60</td>
<td>Insulation structure approx. 30 mm. Ideal for cabinets + mobile use. Available for ND 4 and ND 6 (S1)</td>
</tr>
</tbody>
</table>

Operation with controller

* with stainless steel tube or corrugated hose
Technical data types \textit{WAKG} and \textit{WAKS}

**Dimensions and bend radiiuses** (Tolerances of length ±2%, tolerances of diameter ±5%)

<table>
<thead>
<tr>
<th>ND</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>13 (12*)</th>
<th>16 (15*)</th>
<th>20</th>
<th>25</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td>4 mm</td>
<td>6 mm</td>
<td>8 mm</td>
<td>10 mm</td>
<td>12 mm</td>
<td>15 mm</td>
<td>18 mm</td>
<td>22 mm</td>
<td>28 mm</td>
<td>35 mm</td>
</tr>
<tr>
<td>DK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>52 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>DM</td>
<td></td>
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<td>42 mm</td>
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</tr>
<tr>
<td>LA</td>
<td>25 mm</td>
<td>26 mm</td>
<td>28 mm</td>
<td>32 mm</td>
<td>32 mm</td>
<td>34 mm</td>
<td>41 mm</td>
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<tr>
<td>LK</td>
<td>110 mm</td>
<td>105 mm</td>
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<td>100 mm</td>
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<td>64 mm</td>
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<td>35 mm</td>
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</tr>
</tbody>
</table>

**Min. bend radius**

- 160 mm
- 250 mm
- 450 mm
- 500 mm
- 600 mm

*For heated lines with corrugated stainless steel hose

**Maximum operating temperatures and power** (Tolerances of power ±10%, ambient temperatures –20°C up to +40°C)

<table>
<thead>
<tr>
<th>( T_{\text{Max}} )</th>
<th>ND</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>13 (12*)</th>
<th>16 (15*)</th>
<th>20</th>
<th>25</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>100°C fix</td>
<td></td>
<td></td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>180 W/m</td>
<td>240 W/m</td>
<td>300 W/m</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>180 W/m</td>
<td>240 W/m</td>
<td>300 W/m</td>
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<td></td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>180 W/m</td>
<td>240 W/m</td>
<td>300 W/m</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>240 W/m</td>
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</tr>
<tr>
<td>200°C fix</td>
<td></td>
<td></td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>180 W/m</td>
<td>240 W/m</td>
<td>300 W/m</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>180 W/m</td>
<td>240 W/m</td>
<td>300 W/m</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>240 W/m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300°C fix</td>
<td></td>
<td></td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>180 W/m</td>
<td>240 W/m</td>
<td>300 W/m</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>180 W/m</td>
<td>240 W/m</td>
<td>300 W/m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>240 W/m</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400°C fix</td>
<td></td>
<td></td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>180 W/m</td>
<td>240 W/m</td>
<td>300 W/m</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>180 W/m</td>
<td>240 W/m</td>
<td>300 W/m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>125 W/m</td>
<td>150 W/m</td>
<td>240 W/m</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Maximum lengths for operating voltages of 230 VAC and 115 VAC with one heating circuit** (Tolerance of lengths ±2%)

<table>
<thead>
<tr>
<th>( T_{\text{Max}} )</th>
<th>ND</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>13 (12*)</th>
<th>16 (15*)</th>
<th>20</th>
<th>25</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>100°C 230 V</td>
<td>52 m</td>
<td>41 m</td>
<td>34 m</td>
<td>28 m</td>
<td>21 m</td>
<td>17 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>230 V 115 V</td>
<td>25 m</td>
<td>20 m</td>
<td>17 m</td>
<td>14 m</td>
<td>10 m</td>
<td>8 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200°C 230 V</td>
<td>52 m</td>
<td>41 m</td>
<td>34 m</td>
<td>28 m</td>
<td>21 m</td>
<td>17 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>230 V 115 V</td>
<td>25 m</td>
<td>20 m</td>
<td>17 m</td>
<td>14 m</td>
<td>10 m</td>
<td>8 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>250°C 230 V</td>
<td>41 m</td>
<td>34 m</td>
<td>21 m</td>
<td>17 m</td>
<td>12 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>230 V 115 V</td>
<td>20 m</td>
<td>17 m</td>
<td>10 m</td>
<td>8 m</td>
<td>6 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300°C 230 V</td>
<td>34 m</td>
<td>28 m</td>
<td>23 m</td>
<td>20 m</td>
<td>17 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>230 V 115 V</td>
<td>17 m</td>
<td>14 m</td>
<td>11 m</td>
<td>10 m</td>
<td>8 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400°C 230 V</td>
<td>26 m</td>
<td>23 m</td>
<td>20 m</td>
<td>17 m</td>
<td>13 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>230 V 115 V</td>
<td>13 m</td>
<td>11 m</td>
<td>10 m</td>
<td>8 m</td>
<td>6 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Heated lines type **WAKW**

**Applications**
Heated lines for the transport of gas samples in the temperature range up to **200°C**. Very well suited for fix installation - even outdoors - and the mobile use with higher mechanical strain.

**Structure**
- PTFE basic hose with stainless steel braiding and tube ends made of stainless steel 1.4305.
- Heating with PTFE insulated heating cable with protective braiding.
- Flexible insulating structure with multilayer thermal fleece.
- Standard insulation structure approx. 40 mm (up to ND 13) and approx. 50 mm (ND 16). Options underneath.
- Outer cover with sturdy protective hoses in different versions and silicon caps.
- Built-in temperature sensor ►Page 16 for the operation with a controller.
- Ready to connect with plug.

---

**Options of protective hoses for the outer cover of type WAKW**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2</td>
<td>Black polyamide (PA) corrugated hose</td>
<td>W8</td>
<td>Galvanised steel spiral hose. Trittfest</td>
<td>W7</td>
<td>Spiralschlauch PUR black</td>
</tr>
<tr>
<td></td>
<td>Use for standard applications. Available up to ND 16</td>
<td></td>
<td>Use for höhere Belastungen Available up to ND 13</td>
<td></td>
<td>Use for Sonderanwendungen upon request Available up to ND 25</td>
</tr>
<tr>
<td>W3</td>
<td>Black TPE corrugated hose. Mobile use. Not for permanent outdoor use. Available up to ND 13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Options of insulation structures for type WAKW**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Code</th>
<th>Code</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>IW40</td>
<td>Insulation structure approx. 40 mm. Use for standard applications. Available up to ND 16.</td>
<td>IW50</td>
<td>Insulation structure approx. 50 mm. Use for instance in climate chambers. Available up to ND 16.</td>
<td>IW30</td>
</tr>
<tr>
<td>IW50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IW30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Technical data type WAKW

Dimensions and bend radiuses (Tolerances of length ±2%, tolerances of diameter ±5%)

<table>
<thead>
<tr>
<th>ND</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>13</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td>4 mm</td>
<td>6 mm</td>
<td>8 mm</td>
<td>10 mm</td>
<td>12 mm</td>
<td>15 mm</td>
<td>18 mm</td>
</tr>
<tr>
<td>DK</td>
<td></td>
<td></td>
<td></td>
<td>48 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM</td>
<td></td>
<td></td>
<td></td>
<td>42,5 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LA</td>
<td></td>
<td></td>
<td></td>
<td>25 mm</td>
<td>26 mm</td>
<td>28 mm</td>
<td>32 mm</td>
</tr>
<tr>
<td>LK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>105 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>62 mm</td>
<td></td>
</tr>
<tr>
<td>LE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25 mm</td>
</tr>
<tr>
<td>Min. bend radius</td>
<td>200 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>300 mm</td>
</tr>
</tbody>
</table>

Maximum operating temperatures and power (Tolerances of power ±10%, ambient temperatures –20°C up to +40°C)

<table>
<thead>
<tr>
<th>$T_{Max}$</th>
<th>ND</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>13</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>100°C</td>
<td>fix</td>
<td>–</td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>exchangeable</td>
<td>100 W/m</td>
<td></td>
<td>125 W/m</td>
<td>150 W/m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200°C</td>
<td>fix</td>
<td>–</td>
<td></td>
<td>100 W/m</td>
<td>125 W/m</td>
<td>150 W/m</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>exchangeable</td>
<td>100 W/m</td>
<td></td>
<td>125 W/m</td>
<td>150 W/m</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Maximum lengths for operating voltages of 230 VAC and 115 VAC with one heating circuit (Tolerance of lengths ±2%)

<table>
<thead>
<tr>
<th>$T_{Max}$</th>
<th>ND</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>13</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>100°C</td>
<td>230 V</td>
<td>52 m</td>
<td></td>
<td></td>
<td>41 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>115 V</td>
<td>25 m</td>
<td></td>
<td></td>
<td>20 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200°C</td>
<td>230 V</td>
<td>52 m</td>
<td></td>
<td></td>
<td>41 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>115 V</td>
<td>25 m</td>
<td></td>
<td></td>
<td>20 m</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Heated lines with filter type WAF

**Applications**
Heated lines for the transport of gas samples charged with particles in the temperature range up to 200°C. Ideal for mobile use with higher mechanical strain.

**Structure**
- PTFE basic hose ND 4 or 6 mm with stainless steel braiding and tube ends made of stainless steel 1.4305. Filter housing in stainless steel with removable filter element.
- Quick replacement and optimum cleanability of the filter element.
- Heating with PTFE insulated heating cable with protective braiding.
- Flexible insulating structure with multilayer thermal fleece and sturdy protective hoses in different versions or with flexible silicon foam and protective braiding in different versions. Options underneath.
- Built-in temperature sensor ►Page 16 for the operation with a controller.
- Ready to connect with plug.

**Options for the outer cover of type WAF** (Other options ►Page 8+10)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2</td>
<td>Black polyamide (PA) corrugated hose. Use for standard applications.</td>
</tr>
<tr>
<td>G0</td>
<td>Black polyamide braiding. Use for standard applications.</td>
</tr>
</tbody>
</table>

**Technical data type WAF** (Tolerances of length ±2%, tolerances of diameter ±5%)

<table>
<thead>
<tr>
<th>ND</th>
<th>DA</th>
<th>DF</th>
<th>DM</th>
<th>LF</th>
<th>LA</th>
<th>LK</th>
<th>LD</th>
<th>LE</th>
<th>Min. bend radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>6 mm</td>
<td>65 mm</td>
<td>43 mm</td>
<td>132 mm</td>
<td>25 mm</td>
<td>105 mm</td>
<td>62 mm</td>
<td>35 mm</td>
<td>200 mm</td>
</tr>
<tr>
<td>6</td>
<td>8 mm</td>
<td>65 mm</td>
<td>43 mm</td>
<td>132 mm</td>
<td>25 mm</td>
<td>105 mm</td>
<td>62 mm</td>
<td>35 mm</td>
<td>200 mm</td>
</tr>
</tbody>
</table>
Heated lines type WAM

**Applications**
Heated lines for the channelling of exhaust gases and for gas sampling directly at the exhaust pipe in the temperature range up to 250°C. Available in nominal diameters from 40 mm to 150 mm ►Page 14

**Structure**
- Stainless steel corrugated hose with stainless steel protective braiding and stainless steel tube ends.
- Heating with PTFE insulated heating cable with protective braiding.
- Flexible insulation structure with multilayer thermal fleece (T_{max} = 200°C) or glass silk braiding (T_{max} > 250°C) and silicon foam.
- Outer cover with rugged stainless steel protective braiding and silicon or PVC caps.
- Built-in temperature sensor ►Page 16 for the operation with a controller.
- Ready to connect with plug.

**Technical data type WAM** (Tolerances of length ±2%, tolerances of diameter ±5%)

<table>
<thead>
<tr>
<th>ND</th>
<th>DA</th>
<th>DK</th>
<th>DM</th>
<th>LA</th>
<th>LK</th>
<th>Min. bend radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>80 mm</td>
<td>120 mm</td>
<td>110 mm</td>
<td>80 mm</td>
<td>180 mm</td>
<td>800 mm</td>
</tr>
</tbody>
</table>
Standard basic hoses and fittings

Available basic hoses and fittings for heated lines of the types listed. Depending on design, basic hoses with PTFE hose can be employed for fluid temperatures up to 250°C. Heated lines with stainless steel pipes and corrugated stainless steel hoses are designed for fluid temperatures up to 400°C, depending on the type of insulation.

Higher temperatures and special solutions upon enquiry.

### Types of heated lines

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>T_max (°C)</th>
<th>WAL/H</th>
<th>WEX</th>
<th>WAKG</th>
<th>WAKS</th>
<th>WAKW</th>
<th>WAF</th>
<th>WAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PTFE hose (overlapping 500 mm on both ends)</td>
<td>250</td>
<td>ND 2</td>
<td>ND 4</td>
<td>ND 6</td>
<td>ND 8</td>
<td>ND 10</td>
<td>Auf</td>
<td>Anfrage</td>
</tr>
<tr>
<td>1</td>
<td>Exchangeable PTFE hose in hose (overlapping 500 mm on both ends)</td>
<td>250</td>
<td>ND 2</td>
<td>ND 4</td>
<td>ND 6</td>
<td>ND 8</td>
<td>ND 10</td>
<td>Auf</td>
<td>Anfrage</td>
</tr>
<tr>
<td>2</td>
<td>PTFE basic hose + stainless steel tube ends</td>
<td>250</td>
<td>ND 4</td>
<td>ND 6</td>
<td>ND 8</td>
<td>ND 10</td>
<td>ND 13</td>
<td>ND 16</td>
<td>ND 20</td>
</tr>
<tr>
<td>3</td>
<td>PTFE carrier hose with exchangeable PTFE hose (overlapping 500 mm on both ends) + stainless steel tube ends</td>
<td>250</td>
<td>ND 4</td>
<td>ND 6</td>
<td>ND 8</td>
<td>ND 10</td>
<td>ND 13</td>
<td>ND 16</td>
<td>ND 20</td>
</tr>
<tr>
<td>4</td>
<td>Stainless steel tube (overlapping 50 mm on both ends)</td>
<td>250</td>
<td>ND 4</td>
<td>ND 6</td>
<td>ND 8</td>
<td>ND 10</td>
<td>ND 13</td>
<td>ND 16</td>
<td>ND 20</td>
</tr>
<tr>
<td>5</td>
<td>PTFE carrier hose with exchangeable PTFE hose (overlapping 500 mm on both ends)</td>
<td>600</td>
<td>ND 2</td>
<td>ND 4</td>
<td>ND 6</td>
<td>ND 8</td>
<td>ND 10</td>
<td>ND 12</td>
<td>ND 15</td>
</tr>
<tr>
<td>6</td>
<td>Corrugated stainless steel hose + stainless steel studs</td>
<td>250</td>
<td>ND 2</td>
<td>ND 4</td>
<td>ND 6</td>
<td>ND 8</td>
<td>ND 10</td>
<td>ND 12</td>
<td>ND 15</td>
</tr>
<tr>
<td>7</td>
<td>PTFE carrier hose with exchangeable PTFE hose + exchangeable stainless steel tube ends</td>
<td>250</td>
<td>ND 2</td>
<td>ND 4</td>
<td>ND 6</td>
<td>ND 8</td>
<td>ND 10</td>
<td>ND 12</td>
<td>ND 15</td>
</tr>
<tr>
<td>8</td>
<td>PTFE carrier hose with exchangeable PTFE hose + stainless steel ferrule fittings</td>
<td>250</td>
<td>ND 2</td>
<td>ND 4</td>
<td>ND 6</td>
<td>ND 8</td>
<td>ND 10</td>
<td>ND 12</td>
<td>ND 15</td>
</tr>
<tr>
<td>9</td>
<td>PTFE carrier hose with exchangeable PTFE hose + stainless steel ferrule fittings</td>
<td>250</td>
<td>ND 2</td>
<td>ND 4</td>
<td>ND 6</td>
<td>ND 8</td>
<td>ND 10</td>
<td>ND 12</td>
<td>ND 15</td>
</tr>
</tbody>
</table>

Example: type 3 → WAKG0203-230XP006-1500STND
Important! The nominal diameter (ND) of a heated line always refers to the inner diameter (ID) in mm of the inner hose or the inner tube.

Nominal diameters ND

<table>
<thead>
<tr>
<th>Nominal diameter (mm)</th>
<th>ND Code</th>
<th>Inner diameter ID</th>
<th>Outer diameter AD</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>004</td>
<td>4 mm</td>
<td>6 mm</td>
</tr>
<tr>
<td>6</td>
<td>006</td>
<td>6 mm</td>
<td>8 mm</td>
</tr>
<tr>
<td>8</td>
<td>008</td>
<td>8 mm</td>
<td>10 mm</td>
</tr>
<tr>
<td>10</td>
<td>010</td>
<td>10 mm</td>
<td>12 mm</td>
</tr>
<tr>
<td>13</td>
<td>013</td>
<td>13 mm</td>
<td>15 mm</td>
</tr>
<tr>
<td>16</td>
<td>016</td>
<td>16 mm</td>
<td>18 mm</td>
</tr>
</tbody>
</table>

Important! The nominal diameter is not to be confused with the dimensions of the fitting.

Innenschläuche + Innenrohre

- **PTFE-hose**
  - Standard in all basic hoses of types 0, 1, 3, 4, 6, 8 and 9.
  - Resistant to all chemical agents, acids and bases of any concentration. Exception: alkaline metals and fluorine compounds.
  - For replacement:
    - ND 4: Art.-Nr. WAZ02742-004TX006
    - ND 6: Art.-Nr. WAZ02743-006TX008
    - ND 8: Art.-Nr. WAZ02744-008TX010
    - ND 10: Art.-Nr. WAZ02745-010TX012

- **Stainless steel tube 1.4404**
  - Standard in heated lines of type 5
  - Available in ND 4 and 6 mm
  - Other nominal diameters upon request
  - For replacement:
    - ND 4: Art.-Nr. WAZ02753-004VV006
    - ND 6: Art.-Nr. WAZ02754-006VV008

- **Option antistatic PTFE hose**
  - For all basic hose with exchangeable hoses of types 0, 1, 4, 6, 8 and 9.
  - Available in ND 4 - ND 13

- **Option PFA-hose**
  - For all basic hose with exchangeable hoses of types 0, 1, 4, 6, 8 and 9.
  - Available in ND 4

Lengths of heated lines L

<table>
<thead>
<tr>
<th>Lengths of heated lines L</th>
</tr>
</thead>
<tbody>
<tr>
<td>We supply heated lines to the exact length required, ranging from 0.30 m to 78 m. As from certain lengths, several heating circuits or three-phase arrangements will be necessary, depending on voltage, temperature and power.</td>
</tr>
<tr>
<td><strong>Tolerances</strong> : ± 2 %</td>
</tr>
<tr>
<td>Pressure or thermal load variations during operation can result in changes in length of up to ± 2 %.</td>
</tr>
</tbody>
</table>
Operating voltages

Standard: 230 VAC-50 Hz

Options: 12 VAC, 24 VAC, 48 VAC, 115 VAC, 200VAC, 400 VAC, 480VAC
12 VDC, 24 VDC, 48 VDC

Others upon request

Temperature sensors

Standard types of sensors:
- Temperature sensor Pt 100 (2 wire) Code XP
- Thermocouple type K (NiCr-Ni) Code XK
- Thermocouple type J (Fe-CuNi) Code XJ

Options for types of sensors:
- Temperature sensor Pt 100 (3 wire) Code XT
- Temperature sensor Pt 100 (4 wire) Code XQ
- Bi-metal temperature controller Code XB
- Temperature fuse Code XS

Options for multiple sensors and sensor combinations:
- 2 x Pt 100 (2 wire) Code ZP
- 3 x Pt 100 (2 wire) Code DP
- 2 x thermocouple type K Code ZK
- . . . etc.
- Sensor combination e.g. Pt100 + thermocouple type K Code PK
- . . . etc.

Standard sensor position:
The sensor position is always measured from the electrical connection side.
LS = 300 mm for heated lines with heating cable.
LS = 1.000 mm for heated lines with parallel heating tape.

Optional sensor positions:
Please indicate your desired sensor position LS in your order.
The correct position of the sensor is particularly important in cases of (partial) installation in switch cabinets, through walls or outdoors.
Please ask our specialists for advice.

WAKG0203-230XP006-1500STND Example: Pt 100 →

Standard: One heating circuit = one heating zone

Options: Several heating circuits → several heating zones.
3-phase layout possible.

Example: 230 V →

Connecting cables and plugs

Standard:
- Power- and sensor cable together.
- Cable exit sideways according to type 1.
- Length of connecting cable: 1,5 m
- 7-pin round plug (< 10 A), 5-pin round plug (< 20 A)
  Cable ends with ferrules (types WAL, WAH, WAP, WEX)

Options:
- Power and sensor cable routed separately.
- Cable exits according to types 2, 3, 4 or 5
- Other lengths of connecting cable possible from 0,1 m.
- Without plug (cable ends with ferrules)
- Other plugs: You may specify other kinds of plugs required apart from the standard. If the correct type is not known, please send us a sample and the desired pin assignment.

Example: WAKG0203-230XP006-1500STND

Pin assignment (7-pin round plug):
1 : Power (L)
2 : Power (N)
3 : free
4 : free
5 : Sensor (+)
6 : Sensor (–)
PE : Earth

Pin assignment (5-pin round plug):
1 : Power (L)
2 : Power (N)
3 : Sensor (+)
4 : Sensor (–)
PE : Earth

Important!
Exposure to wind, as in the case of outdoor installations, can cool down the heated line quite considerably. Under these conditions, the heated line should be laid with appropriate protection, provided with stronger insulation (see options) and/or more power (W/m), while the temperature sensors have to be strategically placed. If the analytical measurement line runs through areas with different ambient temperatures, the internal hose temperature will vary accordingly. This can be prevented by incorporating different heating zones with separate control.
Controllers

The quality of control and monitoring equipment is decisive for maintaining the exact fluid temperature, protecting the service life of the heated line, and ensuring trouble-free operation of your plant.

Winkler controllers are robust, reliable and designed for continuous duty in industrial environments. Thanks to the clear and user-friendly control panels of our devices, even complex control processes can be carried out quickly and accurately. We offer a comprehensive range of high-quality control monitoring equipment optimally adapted to our heated lines. Special controllers can be built upon request.

All devices also available for use with 115 V upon request.

Art.-Nr. WRH00141-230XW000
- Compact controller with microprocessor for DIN-Rail installation.
- Switching capacity: 230 V, 8 A, 500 W
- Universal sensor entry for Pt 100 and thermocouples.
- 4-digit LED Display 0...999 °C. 4 LED for status indication.
- Quick and easy configuration through foil keyboard.
- Selectable regulation algorithm with self-tuning.

Art.-Nr. WRW00110-230XP000 for operation with Pt 100 sensor
Art.-Nr. WRW00110-230XK000 for operation with thermocouple type K
Art.-Nr. WRW00110-230XJ000 for operation with thermocouple type J
- Controller with microprocessor ready to use for wall installation.
- Switching capacity: 230 V, 10 A, 2.300 W
- Device with plug ready to use. Connection of the heater through 7-pin round socket.
- 4-digit LED Display 0...999 °C. 2 LED for status indication.
- Quick and easy configuration through foil keyboard.

Art.-Nr. WRW00120-230XW000 for use with Pt 100 sensor and thermocouples type K / J (selectable)
- Controller with microprocessor for wall installation.
- Switching capacity: 230 V, 10 A, 2.300 W
- Connection of heater through screw type terminals.
- 4-digit LED Display 0...999 °C. 2 LED for status indication.
- Quick and easy configuration through foil keyboard.

Art.-Nr. WRW00113-230XP000 for use with 2 Pt 100 sensors
Art.-Nr. WRW00113-230XK000 for use with 2 thermocouples type K
Art.-Nr. WRW00113-230XJ000 for use with 2 thermocouples type J
- Controller and limiter combination with microprocessor ready to use for wall installation.
- Switching capacity: 230 V, 10 A, 2.300 W
- Device with plug ready to use. Connection of the heater through 7-pin round socket.
- 4-digit LED Display 0...999 °C. 2 LED for status indication.
- Quick and easy configuration through foil keyboard.
Accessories and spare parts: Exchangeable fittings in stainless steel 1.4305 for basic hoses type 8

**Art.-Nr. WZZS0904-2507P10A**
Plug 6+PE with cap
250 V, 10 A, IP 65, screw connections, -40 °C / +100°C

**Art.-Nr. WZZS0908-2507P10A**
Coupling 6+PE with cap
250 V, 10 A, IP 65, screw connections, -40 °C / +100°C

**Art.-Nr. WZZS0906-2507P10A**
Flange socket 6+PE with cap and screws
250 V, 10 A, IP 65, screw connections, -40 °C / +100°C

**Art.-Nr. WZZS0939-4005P20A**
Plug 4+PE with cap
400 V, 20 A, IP 65, screw connections, -40 °C / +100°C

**Art.-Nr. WZZS0971-4005P20A**
Coupling 4+PE with cap
400 V, 20 A, IP 65, screw connections, -40 °C / +100°C

**Art.-Nr. WZZS0940-4005P20A**
Flange socket 4+PE with cap and screws
400 V, 20 A, IP 65, screw connections, -40 °C / +100°C

**Art.-Nr. WZZS0942-4004P16A**
Plug 3+PE with cap
400 V, 16 A, IP 65, screw connections, -40 °C / +100°C

**Art.-Nr. WZZS0943-4004P16A**
Coupling 3+PE with cap
400 V, 16 A, IP 65, screw connections, -40 °C / +100°C

**Art.-Nr. WZZS0993-4004P16A**
Flange socket 3+PE with cap and screws
400 V, 16 A, IP 65, screw connections, -40 °C / +100°C

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### Accessories and spare parts: Exchangeable fittings in stainless steel 1.4305 for basic hoses type 8

<table>
<thead>
<tr>
<th>Hose adapter</th>
<th>Thread M 12 x 1,5 mm - SW 17</th>
<th>Thread M 14 x 1,5 mm - SW 19</th>
<th>Thread M 18 x 1,5 mm - SW 22</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ND 4 mm</strong></td>
<td>4 / 6 WAZRSLAM-004V2006-00255TND</td>
<td>6 / 8 WAZRSLAM-004V2008-00255TND</td>
<td>8 / 10 WAZRSLAM-004V2010-00255TND</td>
</tr>
<tr>
<td><strong>ND 8 mm</strong></td>
<td>4 / 6 WAZRSLAM-008V2006-00255TND</td>
<td>6 / 8 WAZRSLAM-008V2008-00255TND</td>
<td>8 / 10 WAZRSLAM-008V2010-00255TND</td>
</tr>
</tbody>
</table>

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**STANDARD**  
*L = 25 mm  
*L = 50 mm  
*L = 100 mm  
*L = 150 mm  
*L = 200 mm

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Foto similar Foto similar Foto similar
Accessories and spare parts: Silicon caps

Applications: Covering of line ends, repair of outer covers, strengthening of passages, manufacturing of insulations.

Technical data: Black, smooth, elastic and extremely tear proof. Wall thickness approx. 3 mm. High chemical resistance. Very low humidity absorption, very good elasticity. Long time temperature stability -60 °C / + 240 °C. Tolerances of dimensions ±10%

Handling: Cut with a sharp knife. Expand slightly to cover and glue with silicon Art.-Nr. WZZ00629-000ST090.

<table>
<thead>
<tr>
<th>Art.-Nr.</th>
<th>Description</th>
<th>ID</th>
<th>AD</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>WZK00715-028SB034</td>
<td>Black silicon cap, without cable outlet</td>
<td>28 mm</td>
<td>34 mm</td>
<td>100 mm</td>
</tr>
<tr>
<td>WZK00709-038SB044</td>
<td>Black silicon cap, without cable outlet</td>
<td>38 mm</td>
<td>44 mm</td>
<td>110 mm</td>
</tr>
<tr>
<td>WZK00704-058SB064</td>
<td>Black silicon cap, without cable outlet</td>
<td>58 mm</td>
<td>64 mm</td>
<td>110 mm</td>
</tr>
<tr>
<td>WZK00716-028SB034</td>
<td>Black silicon cap, with cable outlet</td>
<td>28 mm</td>
<td>34 mm</td>
<td>100 mm</td>
</tr>
<tr>
<td>WZK00708-038SB044</td>
<td>Black silicon cap, with cable outlet</td>
<td>38 mm</td>
<td>44 mm</td>
<td>110 mm</td>
</tr>
<tr>
<td>WZK00703-058SB064</td>
<td>Black silicon cap, with cable outlet</td>
<td>58 mm</td>
<td>64 mm</td>
<td>110 mm</td>
</tr>
</tbody>
</table>

Accessories and spare parts: Silicon foam hoses

Applications: Insulation of pipes, fittings and passages, mechanical protection of sensitive parts.

Technical data: Fine pored, closed cell silicon foam hose sold by the meter. Light, elastic, tear proof. High chemical resistance. Very low humidity absorption, very good elasticity. Long time temperature stability -60 °C / + 240 °C. Tolerances of dimensions ±10%

Handling: Cut to length with a sharp knife. Fix with Velcro tape Art.-Nr. WZZ00622-005HF020.

<table>
<thead>
<tr>
<th>Art.-Nr.</th>
<th>Description</th>
<th>ID</th>
<th>AD</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>WZI01336-018SR030</td>
<td>Red silicon foam hose</td>
<td>18 mm</td>
<td>30 mm, sold by the meter</td>
<td></td>
</tr>
<tr>
<td>WZI01337-018SB032</td>
<td>Silicone foam hose with black silicon skin</td>
<td>18 mm</td>
<td>32 mm, sold by the meter</td>
<td></td>
</tr>
<tr>
<td>WZI01313-021SR040</td>
<td>Red silicon foam hose</td>
<td>21 mm</td>
<td>40 mm, sold by the meter</td>
<td></td>
</tr>
<tr>
<td>WZI01315-021SB042</td>
<td>Silicone foam hose with black silicon skin</td>
<td>21 mm</td>
<td>42 mm, sold by the meter</td>
<td></td>
</tr>
<tr>
<td>WZI01312-040SR060</td>
<td>Red silicon foam hose</td>
<td>40 mm</td>
<td>60 mm, sold by the meter</td>
<td></td>
</tr>
<tr>
<td>WZI01331-008SB042</td>
<td>Silicone foam hose with black silicon skin</td>
<td>8 mm</td>
<td>42 mm, sold by the meter</td>
<td></td>
</tr>
<tr>
<td>WZZ00622-005HF020</td>
<td>Velcro tape, hooks on front side, fleece on rear side</td>
<td>20 mm wide, 5 mm strong, 5 m reel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WZZ00629-000ST090</td>
<td>Transparent silicon glue</td>
<td>90 ml tube incl. nozzle and winding hook</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Winkler GmbH is an independent, medium-sized company located in Heidelberg (Germany). For 30 years we have been developing and manufacturing a broad range of electric heating solutions for industry and laboratory applications.

We supply reliable and durable products made of high-quality materials.

We are the right partner for innovative and quick answers to your requirements. Customized solutions and flexible manufacturing are our particular strengths. Our experienced specialists will offer you sound advice and - together with you - develop the heating solution tailored to your application.

Winkler - Your heating solution™

Our product range

- Silicone heaters & heating foils
- Heating jackets
- PILZ® Laboratory heating mantles
- Heated hoses
- ATEX heated lines & heated hoses

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