Instructions for installations and operation

Heated lines and heated hoses

Safety instructions

Important safety instructions for the use of heated lines **and heat**ed **hoses**
Please read the instructions for installation and operation very carefully before using the heated lines / heated hoses. Pay attention to the information on the type plate and any warnings on the product. The instructions are an important element of the product; they must be available to all user. Keep the instructions in a safe place for later use of the product. The persons commissioned with assembly and operation must have the appropriate professional competence.
Heated lines / heated hoses are used in areas where particular operating conditions exist and where certain requirements must be fulfilled. Please consider this and obtain information about the relevant regulations beforehand to ensure trouble-free operation as intended.
If you have any questions, do not hesitate to contact us (s. section 13, Contact). We will be happy to advise you and provide assistance to ensure safe and proper operation of our heated line / heated hose.

Heated lines and heated hoses are electrical equipment
In order to prevent dangers from the electrical current, regular inspection and maintenance of the heated lines / heated hoses is required and documented in accordance with the currently applicable rules of technology (VDE / DGVU V3 / ...).

For safe operation, a residual current circuit breaker of 30 mA shall be provided.
This must be checked for function before commissioning and at regular intervals.

Additional safety information
In case of obvious damage, the heated line / heated hose must be taken out of operation immediately and must no longer be used. The cause of the damage must be determined and eliminated.

Possible causes:

- mechanical damage to the outer or inner sheath caused by external forces
- mechanical damage to the connection cables / screw-in joints caused by external forces
- brittle or broken protective tube caused by thermal stress or extreme exposure to the sun

Avoid any overheating of the heated line / heated hose. Observe the minimum and maximum operation temperatures and never exceed or undercut these. Overheating can occur in many ways. Please check the operating and ambient conditions in advance and monitor the first heating processes.
Monitored operation with suitable temperature controllers and/or temperature cut-outs
(e.g. Winkler Series WRW-500 / WRT560SW / WRT570SW / WRW00223-UNIXW00K / WRWB0223-UNIWW00K) is a requirement for heating jackets to be operated as intended.

Guidelines and regulations
Design, production and inspection of the heating jackets / heating mats are according to the following guidelines and regulations:

EU-Low Voltage Directive 2014/35/EU from 26.02.2014
EU-Electromagnetic Compatibility Directive 2014/30/EU from 26.02.2014
EU Directive 2011/65/EU RoHS Directive
EN 60519-1 / -2 (VDE0721-1) Safety In electro heat Installations
EN 60398 (VDE0721-50) Industrial electro heat Installations
DIN VDE 0100-600 Testing
DIN VDE 0701-0702 Recurrent Tests

With this Winkler heater you have acquired a high-quality product which can successfully be operated within its application when considering corresponding standards and regulations. It is always our main objective that the products manufactured by us function to your full satisfaction and meet the desired requirements. As a rule, the installation and intended use must be in compliance with the valid regulations for electric heating systems (VDE) and the recognized rules of engineering practice (DIN, accident prevention regulations).

The headted lines / heated hoses may only be installed by suitably trained technical personnel in accordance with the following instructions for installation and operation.
If the heaters are operated in conditions deviating from these installation and operating instructions or are not operated as intended all warranty claims expire, and the product could also be damaged. If you have any questions, please contact us and ask for assistance (see chapter 13, Contact). We will be happy to help you.

In the following, the heated line / heated hose is also called "heater" for short.

Content

1 General information

The central element of the heated hose is the inner tube or hose core through which the fluid flows. It is made of high-grade PTFE with a smooth surface. Since the PTFE hose core does not in itself possess any high-pressure resistance, it is covered with stainless steel braiding, i. e. one layer of stainless-steel armouring for medium pressure and two layers for high pressure. The integrated fittings are moulded into the hose structure with a defined pressure and time period. The heating system consists of high-grade heat conductor alloys combined with different insulating materials depending on temperature. The thermal insulation is adapted to the temperature range and the specific heated hose type and finished on both sides with temperature resistant connection caps. The entire heated hose is designed in such a way that the high flexibility of the pressure hose or the bending potential of the tube is hardly affected.

It is important to observe the corresponding minimum bending radius in relation to the length of the heating hose or the nominal cross-section (see section 7, Minimum bending radii of heated hoses). The maximum operating temperatures are stated on the type plate and must on no account be exceeded at any point along the length of the heated hose. Use suitable control devices for the temperature control.

The entire hose is designed in adaptation to the valid regulations or Directives and reflects the state of the art. EC conformity is indicated by the CE marking on the type plate (see section 12, Declaration of EC conformity).

2 Area of application

The heated hoses can be used in many industrial fields under the operating conditions specified in the present instructions. The area of application ranges from freeze protection, e.g., -20°C, via temperature maintenance to temperature increases up to max. 200° C. The standard nominal voltage of the heated hoses is 230 V (other supply voltages are possible!). The maximum permissible ambient temperature (environment) spans from –20° C to + 40° C.

Suitable temperature control devices (controller/cut-out unit) must be provided to ensure that the max. Fluid temperature is not exceeded. The heating power depends on the hose length and cross-section. You will find the exact data specified on the yellow type plate attached to the electrical connecting cable.

Different ambient temperatures along the hose route will result in different internal temperatures. The decisive factor for temperature control is the ambient temperature at the sensor location, and to avoid overheating the sensor should therefore be installed at the point where the highest ambient temperature occurs.

Since the product is a heating system with a flexible range of application, all the relevant Directives, rules and regulations need to be determined and complied with, including monitoring of compliance. In addition, it is absolutely essential to observe the following manufacturer's information (instructions for installation and operation). Before putting the system into operation, please check which regulations or internal works rules are applicable in your case to ensure safe and trouble-free use of the heated hose.

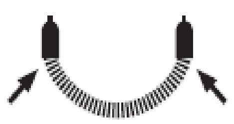
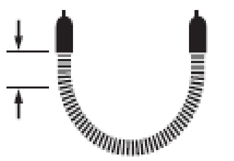
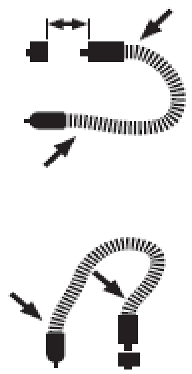
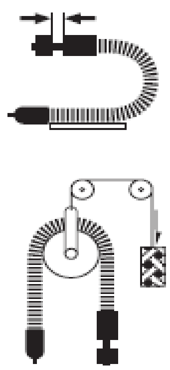
3 Installation / putting into operation

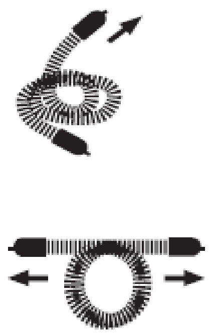
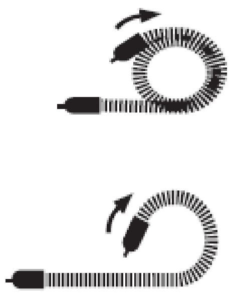
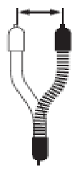
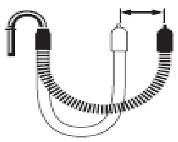
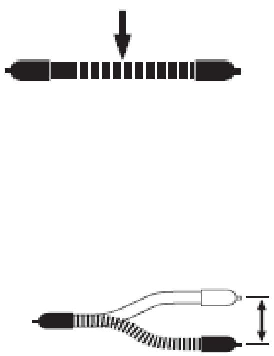
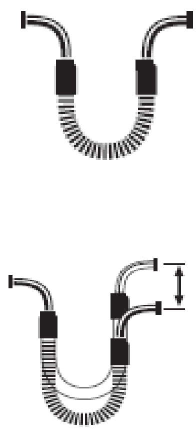
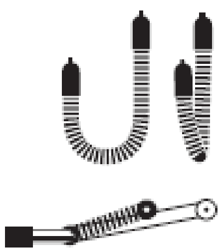
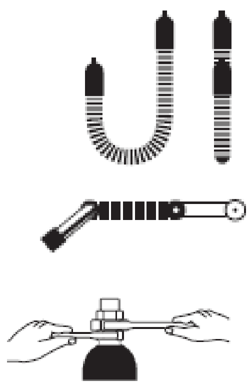
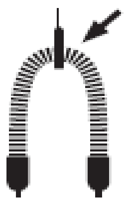
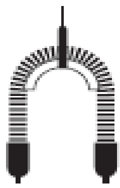
1. Check the data on the type plate to make sure that the type, design, mains voltage, power and operating temperature correspond to your specifications. Check visually if the hose design corresponds to the one ordered by you. If in doubt, compare with your documentation. Does the heated hose meet the conditions for the intended application or is it unsuitable for this purpose?
2. If you use clamps or similar fasteners for supporting the hose, it must be ensured that pressing does not reduce the external diameter by more than 10 % at the most. Above this 10 % limit, there is a risk of damage to heat conductors, control leads and sensor wires.
3. If there are control cores running through the hose, please observe the electrical load capability of these cores. Their standard cross-section is 0.75 mm2.
4. Please ensure that you are using the correct type of temperature controller. Controller rating, sensor type and temperature range must be compatible. Is the heated hose connected to the correct controller? An accidentally reversed sensor, for example, will result in heating up the hose until it is completely destroyed. There will be no such problems if you employ the available Winkler hose controller systems.
5. If the heated hose is laid outdoors must be protected against wind, because it would otherwise be subjected to cooling and may then not be able to attain the desired temperature. Likewise, the heated hose should not be exposed to rain or direct solar radiation for any length of time. In such cases suitable covering must be provided for protection.
6. Observe all the following installation guidelines (wrong-right chart). These guidelines were drawn up on the basis of many years of experience and fault analysis to avoid the most common causes of failure.
7. Do not use the fitting to pull the heated hose. The fittings are resistant to pressure, but more susceptible to tension forces.
8. Neither should the connecting cable be used for pulling the heated hose because it is not suitable for this.
9. Are there any special rules or regulations applicable at the place of installation and has the installation taken this into account?
10. The operator/customer must check if the material that comes into contact with the fluid is resistant to the fluid to be heated (> see technical data). If you have any questions in this respect, please contact us directly for advice (s. contact).
11. Always monitor the first heating-up phases of the heated hose very carefully so that any possible faults can be detected and, where appropriate, remedied at an early stage.
12. Check whether any nearby objects, plant components or other parts could cause damage to the heated hose or impair its function and, where applicable, remove or rearrange such items.
13. Any accessible (exposed) electroconductive parts must be included into the equipotential bonding measures.
14. It is recommended to use a residual current device RCD (FI) of IF < 30mA.

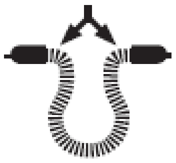
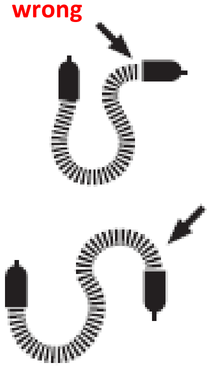
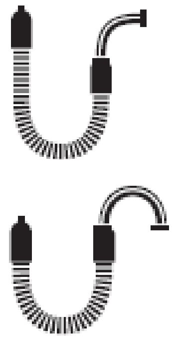
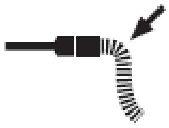
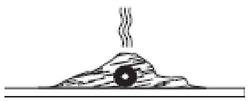
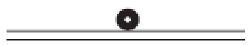
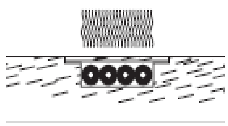
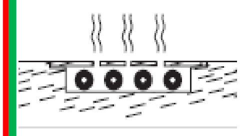
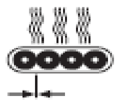
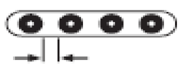
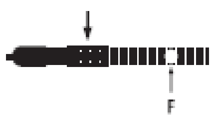
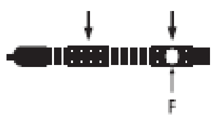
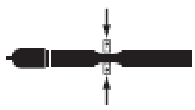
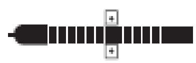
4 During operation

1. Has the installation / putting into operation been carried out successfully in accordance with the present instructions and guidelines?
2. Check the first heating-up phase exactly and monitor the further operation of the heated hose.
3. Make sure that the fluid at the inflow or inlet point is not hotter than the max. Permissible heated hose temperature, otherwise the heated hose could suffer damage at this point.
4. Extreme movements or vibrations, shaking etc. should be avoided during operation of the heated hose.
5. If you want to remove the heating hose, you should first check that the hose has cooled down and that it is totally disconnected from the mains power supply.
6. The fitting should never be used to pull the heated hose; the fittings are resistant to pressure, but more susceptible to tension forces.
7. It can happen that a fitting becomes clogged up when the liquid hardens and that the fitting only becomes unclogged after a certain heating-up period. Do not try to shorten this waiting period by applying heat externally (e.g. using a burner etc.). This will damage the heated hose, and waiting for a replacement delivery will certainly take longer!
8. If you notice any damage to the heated hose or abnormal functioning during operation, the hose must be switched off and disconnected from the power supply immediately. For this purpose, a disconnection device (master switch) with a minimum contact gap of 3mm is to be provided by the customer together with a 16A or 20A fuse depending on the lead cross-section. Any fault needs to be exactly analysed in order to determine the cause. Our experienced specialists will be pleased to assist you.
9. Avoid exposing the hose to direct solar radiation for any length of time or, if unavoidable, provide suitable protection.

5 Installation guidelines

		wrong	right
1.	If the heated hose is too short, it will be bent excessively at the connection ends. **Remedy**: Include a straight section (5 x hose diameter). A large bending radius will increase the service life of the hose.		
2.	Hose is laid with a sagging part. **Remedy**: Supports or rollers with counterweight.		

3.	 Caution: The heating tube may be not operated in the rolled up condition or lying on top of each other, because otherwise the outside coat (Corrugated tube) can be destroyed. Pulling at the end of a rolled-up hose will result in torsional stress and a bending radius smaller than permissible. **Remedy**: Unroll the hose ring without pulling at the hose. Observe minimum bending radius (5 x hose diameter).	**wrong** 	**right** 
4.	Compression along the longitudinal axis due to wrong installation or during movement will reduce the pressure resistance. Stretch compensation by fixed hoses leads to their destruction. **Remedy**: Bends at connection points. **wrong**  **right** 		
5.	Torsional movements will destroy the heated hose. This is often due to wrong installation, particularly to turning the hose in the wrong direction when connecting it up. **Remedy**: Ensure that the hose axes run parallel and that the direction of motion is on one plane. Use a counter-wrench during installation to prevent twisting the hose.		
6.	Corners are danger spots because of the risk of kinks and bending stress. **Remedy**: Saddle support or roller with suitable diameter.		

7.	Excessive bending stress just behind the connection points is damaging. **Remedy**: Pipe bends wrong  right 	wrong 	right 
8.	With hand-held equipment, the risk of kinks is particularly great. **Remedy**: Depending on working position, fit bend or anti-kink system (e.g., wire spiral).		
9.	If powdery substances, adhesives or other materials with thermal insulation properties are spilt onto the heated hose, overheating will occur at these points. **Remedy**: Constant cleaning/removing of such materials and eliminating the cause.		
10.	If heated hoses are laid in a closed channel or duct, this will result in heat concentration. **Remedy**: The hoses must not be in contact with each other. Additionally, adequate ventilation should be provided.		
11.	Bundling of hoses or laying hoses in close contact next to each other will lead to overheating at the points of contact. **Remedy**: Always leave sufficient space between the hoses.		
12.	Heat concentration with overheating can also be caused by wrapping other materials around the heated hose. If the sensor area is wrapped up, the remaining hose section will cool down.		
13.	When fixing the hose with clamps or similar it must be ensured that the outer structure is not squeezed.		

6 Maintenance and repair / inspections

1. Should any defects become apparent on the outside of the heated hose or the connecting mains lead, the heated hose must be disconnected immediately from the mains supply, removed and sent back to our works for inspection. Never open the heated hose or any of its components on your own initiative, i.e. unauthorized.
2. Inspection or maintenance of the heated hose should be carried out at regular intervals to guarantee operational safety. The inspection intervals should be chosen in relation to the operating conditions on site. However, according to DGUV V3 (safety instructions for electrical installations and equipment) inspections by a qualified electrician should take place every 6 months using suitable measurement and test equipment.
3. The service life of the heated hose will depend on the actual operating conditions. Therefore, it is not possible to make a generally valid statement about the length of the service life. However, the service life will generally be shorter under severe operating conditions as against occasional use under optimum conditions. For more information, please contact us directly for competent advice.
4. If a cut-out switches the hose off permanently, the cause has to be analysed before putting the hose back into service and appropriate measures have to be taken to prevent recurrence. (Special operation > safety-specific applications)
5. If you intend to use the heated hose for another purpose than originally planned, please get in touch with our specialists to check if it is really suited to this. Unauthorized change of use is not permitted.
6. Any changes on the hose performed by the customer will endanger the operational safety and will automatically result in the manufacturer's warranty becoming invalid.
7. If you have any problems or questions, please contact us directly for quick and competent advice. (see contact below).

7 Minimum bending radii of heated hoses

The heated hoses have been designed to withstand bending stress. However, non-observance of the minimum bending radius or kinks or strong torsional movement will lead to the destruction of the heated hose. The permissible bending radius depends on the material and the nominal diameter (DN) of the heated hose.
Generally: Minimum bending radius > 5 x outer hose diameter
Should you require any other bending radius, please get in touch with us so that we can advise you!

8 General technical data

(For specific technical data, see yellow type plate on the heated hose.)

Max. ambient temperature	- 20 °C to + 40 °C
Max. operating temperature	depending on hose type stated on the type plate
Nominal operating voltage	230 V / 50 Hz (other voltages possible)
Nominal power	depending on hose type stated on the type plate
Power tolerance (standard)	- 5 % / + 10 %
Heated hose diameter	+/- 10 %
Heated hose length (standard)	+ / - 2 %
Connecting mains lead	1,5 m
Connecting sensor lead	1,5 m
Chemical resistance	resistant against all chemicals, including acids and lyes of any concentration. Exception: molten alkali metals and fluorine compounds.

9 Pressure load for PTFE basic hoses

The pressure load capacity of the flexible heated hoses varies according to the different working temperatures. Please observe the values in the table below! Up to a temperature of 200°C, the load capacity can still be stated, but as from 250°C it drops to 0 bar. In the range in between, the pressure should be carefully calculated depending on the given load using a correction factor of 0.7 related to 24° C. It is important to take account of pressure peaks. They can be very high and are not indicated on normal pressure gauges. The operating pressure must never be exceeded.
For custom-made products, the values of the pressures can be found on the type plate.

Medium pressure

Static operating pressure for medium pressure hose – T1 (bar)

Operating temperature	DN 4	DN 6	DN 8	DN 10	DN 13	DN 16	DN 20	DN 25	DN 32	DN 40
24 °C	275	240	200	175	150	135	100	80	-	-
100 °C	261	228	190	166	143	128	95	76	-	-
150 °C	248	216	180	158	135	122	90	72	-	-
200 °C	228	199	166	145	125	112	83	66	-	-
to 250 °C	206	180	150	131	113	101	75	60	-	-

Dynamic operating pressure for medium pressure hose – T1 (bar)

Operating temperature	DN 4	DN 6	DN 8	DN 10	DN 13	DN 16	DN 20	DN 25	DN 32	DN 40
24 °C	173	151	126	110	95	85	63	50	-	-
100 °C	165	144	120	105	90	81	60	48	-	-
150 °C	156	136	113	99	85	77	57	45	-	-
200 °C	144	125	105	92	78	71	52	42	-	-
to 240 °C	130	113	95	83	71	64	47	38	-	-

Burst pressure for medium pressure hose – T1 (bar)

Operating temperature	DN 4	DN 6	DN 8	DN 10	DN 13	DN 16	DN 20	DN 25	DN 32	DN 40
24 °C	1,100	960	800	700	600	540	400	320	-	-
100 °C	1,045	912	760	665	570	513	380	304	-	-
150 °C	990	864	720	630	540	486	360	288	-	-
200 °C	913	797	664	581	498	448	332	266	-	-
to 240 °C	825	720	600	525	450	405	300	240	-	-

High pressure

Static operating pressure for high pressure hose – T2 (bar)

Operating temperature	DN 4	DN 6	DN 8	DN 10	DN 13	DN 16	DN 20	DN 25	DN 32	DN 40
24 °C	-	275	250	225	200	175	150	130	70	50
100 °C	-	261	238	214	190	166	143	124	67	48
150 °C	-	248	225	203	180	158	135	117	63	45
200 °C	-	228	205	187	166	145	125	108	58	42
to 250 °C	-	206	188	169	150	131	113	98	53	38

Dynamic operating pressure for high pressure hose – T2 (bar)

Operating temperature	DN 4	DN 6	DN 8	DN 10	DN 13	DN 16	DN 20	DN 25	DN 32	DN 40
24 °C	-	173	158	142	126	110	95	82	44	32
100 °C	-	165	150	135	120	105	90	78	42	30
150 °C	-	156	142	128	113	99	85	74	40	28
200 °C	-	144	131	118	105	92	78	68	37	26
to 250 °C	-	130	118	106	95	83	71	61	33	24

Burst pressure for high pressure hose – T2 (bar)

Operating temperature	DN 4	DN 6	DN 8	DN 10	DN 13	DN 16	DN 20	DN 25	DN 32	DN 40
24 °C	-	1,100	1,000	900	800	700	600	520	280	200
100 °C	-	1,045	950	855	760	665	570	494	266	190
150 °C	-	990	900	810	720	630	540	468	252	180
200 °C	-	913	830	747	664	581	498	432	232	166
bis 250 °C	-	825	750	675	600	525	450	390	210	150

Maximum pressure

Static operating pressure for maximum pressure hose – T3 (bar)

Operating temperature	DN 4	DN 6	DN 8	DN 10	DN 13	DN 16	DN 20	DN 25	DN 32	DN 40
24 °C	-	500	475	450	400	400	300	275	250	-
100 °C	-	475	451	428	380	380	285	261	238	-
150 °C	-	450	428	405	360	360	270	248	225	-
200 °C	-	415	394	374	332	332	249	228	208	-
bis 250 °C	-	375	356	338	300	300	225	206	188	-

Dynamic operating pressure for maximum pressure hose – T3 (bar)

Operating temperature	DN 4	DN 6	DN 8	DN 10	DN 13	DN 16	DN 20	DN 25	DN 32	DN 40
24 °C	-	315	299	284	252	252	189	173	158	-
100 °C	-	299	284	269	239	239	180	165	150	-
150 °C	-	284	269	255	227	227	170	156	142	-
200 °C	-	261	248	235	209	209	157	144	131	-
bis 250 °C	-	236	224	213	189	189	142	130	118	-

Burst pressure for maximum pressure hose – T3 (bar)

Operating temperature	DN 4	DN 6	DN 8	DN 10	DN 13	DN 16	DN 20	DN 25	DN 32	DN 40
24 °C	-	2,000	1,900	1,800	1,600	1,600	1,200	1,100	1,000	-
100 °C	-	1,900	1,805	1,710	1,520	1,520	1,140	1,045	950	-
150 °C	-	1,800	1,710	1,620	1,440	1,440	1,080	990	900	-
200 °C	-	1,660	1,577	1,494	1,328	1,328	996	913	830	-
bis 250 °C	-	1,500	1,425	1,350	1,200	1,200	900	825	750	-

Test pressure:
The test pressure is 50% above the specified static operating pressure.
The **pressure specifications of the basic hose type 7** depend on the temperature and are available on request.

10 Warranty

Winkler warrants the product to the original purchaser for a period of twelve (12) months from the date of delivery (handover of the goods).
In the event of justified complaints, Winkler shall, at its option, either remedy the defect or deliver a replacement. Winkler shall be entitled to have the defects remedied by third parties.
For details, please refer to our general conditions of purchasing and ordering at www.winkler.org.

11 Disposal

Environmental information for industrial customers within the EU:
The WEEE Directive 2012/19/EU aims to prevent waste from electrical and electronic equipment and to reduce such waste through reuse, recycling and other forms of recovery.

The symbol indicates that the product should be disposed of separately from regular commercial/household waste. It is your responsibility to dispose of this product only through the legally prescribed disposal channels or the appropriate collection points designated by the government or local authorities.

Proper disposal and recycling will help prevent potential negative consequences for the environment and human health. If you need more information on how to dispose of your waste equipment, please contact your local authorities, municipal waste disposal services or the dealer where you purchased the product.

12 Declaration of EC conformity

EU-DECLARATION OF CONFORMITY

CE

Manufacturer:	**WINKLER AG** **Englerstrasse 24** **69126 Heidelberg**	
Contact:	**Phone: + 49 6221 3646 0** **sales@winkler.org**	**Fax: + 49 6221 3646 40** **www.winkler.org**
Product group:	**Heated lines and hoses WA.. / WS.. (modular system)**	
Product:	**WA.. / WS..**	
Directives:	**EU Directive 2014/35/EU** **Low Voltage Directive** from 26.02.2014 “Electrical equipment for use within certain voltage limits” **EU Directive 2014/30/EU** **Electromagnetic compatibility** from 26.02.2014	

We hereby declare that the basic safety and health requirements of the above-mentioned EU directives directive were complied with when planning and manufacturing this product.

Other national standards and technical specifications applied:

EN 60519-1 / -2 (VDE 0721-1):2020-12
Safety in electro heat installations

EN 60398 (VDE 0721-50):2016-02
Industrial electro heat installations

Any modification to the product without our consent will make this declaration invalid.

Heidelberg, 11th August 2025

Winkler AG

Daniel Ernst
COO / Vorstand

EU-DECLARATION OF CONFORMITY

CE

Manufacturer:	**WINKLER AG** **Englerstrasse 24** **69126 Heidelberg**	
Contact:	**Phone: + 49 6221 3646 0** **sales@winkler.org**	**Fax: + 49 6221 3646 40** **www.winkler.org**
Product group:	**Heated lines and hoses WA.. / WS.. (modular system)**	
Product:	**BEB / BEM.. BIB / BIM.. BSB / BSM..**	
Directives:	**EU Directive 2014/35/EU** **Low Voltage Directive** from 26.02.2014 "Electrical equipment for use within certain voltage limits" **EU Directive 2014/30/EU** **Electromagnetic compatibility** from 26.02.2014	

We hereby declare that the basic safety and health requirements of the above-mentioned EU directives directive were complied with when planning and manufacturing this product.

Other national standards and technical specifications applied:

EN 60519-1 / -2 (VDE 0721-1):2020-12
Safety in electro heat installations

EN 60398 (VDE 0721-50):2016-02
Industrial electro heat installations

Any modification to the product without our consent will make this declaration invalid.

Heidelberg, 11th August 2025

Winkler AG

Daniel Ernst
COO / Vorstand

13 Contact

Winkler AG	
Englerstrasse 24	**Phone:** +49 6221 3646 0
69126 Heidelberg	sales@winkler.org
Deutschland	www.winkler.org