

Installation and Operating Manual

UL and CSA certified Heated Hoses Type K, KA and KR
Not for use in Explosive Atmospheres
For industrial use only



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Manual heated hose-US
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Before installing this product and starting up the equipment, carefully read all the technical and safety information included in this manual. Keep the Installation and Operating Manual in a safe place for future use!



This Installation and Operating Manual contains important instructions for safe installation, use, handling and maintenance of the Kletti Heated Hoses (the “product”).

The Installation and Operating Manual is part of the product and must be kept in a safe place. It should be kept near the equipment into which this product is installed, readily accessible to persons working with this product.

Before installing this product and starting up the equipment, carefully read and make sure to understand this Installation and Operating Manual and all the safety instructions and installation instructions included.

Comply with all safety and handling instructions included in the manual!

In addition, comply with all local occupational health and safety regulations (such as OSHA or CanOSH) applying at the installation site of the product.

Do not modify this product! Any unauthorized modification of the product will make the product unsafe and will void the warranty.

CERTIFICATION

The heated hoses were tested in accordance with the standard for Safety Electric Heating Appliances UL 499:2014/R:2017 UL and Construction and Test of Industrial Heating Equipment (R1999) CSA C22.2 No.88:2019.

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Contents

1	Overview.....	5
1.1	Construction	5
1.2	General description.....	5
2	Safety	6
2.1	Signal words and safety alert symbols	6
2.2	Safety symbols used in this manual.....	7
2.3	Personnel requirements.....	8
2.4	Personal protective equipment.....	8
2.5	Safety warnings and instructions	9
2.6	Intended use	10
2.7	Improper use	11
2.8	Residual risks	11
2.9	Reasonably foreseeable misuse	11
3	Detailed description	12
4	Delivery and storage	14
4.1	Safety	14
4.2	Delivery / Unpacking.....	14
4.3	In-plant transport.....	14
4.4	Storage.....	14
5	Installation and start-up.....	15
5.1	Safety	15
5.2	Installation into a new machine or system.....	16
5.3	Mechanical installation.....	16
5.4	Proper handling and mounting	17
5.5	Electrical connection.....	20
5.6	Initial start-up	21
6	Operation.....	22
7	Maintenance, repairs, service life.....	22
7.1	Safety	23
7.2	Preventative maintenance	23
7.3	Exchange of exchangeable medium hoses -ATL	23
7.4	Repairs	27
7.5	Service life and maximum shelf life	27
7.6	Troubleshooting	27

8	Disassembly and disposal	28
8.1	Safety	28
8.2	Disassembly	28
8.3	Disposal.....	29
9	Technical specifications	29
9.1	Technical outline data	29
9.2	Current-Power-diagram 12 - 600V	30
9.3	Type code.....	31
9.4	Pressure hoses (inner hose).....	32
9.5	Fittings.....	54
9.6	Warranty.....	54
9.7	Specifications and tolerances	54

1 Overview

1.1 Construction

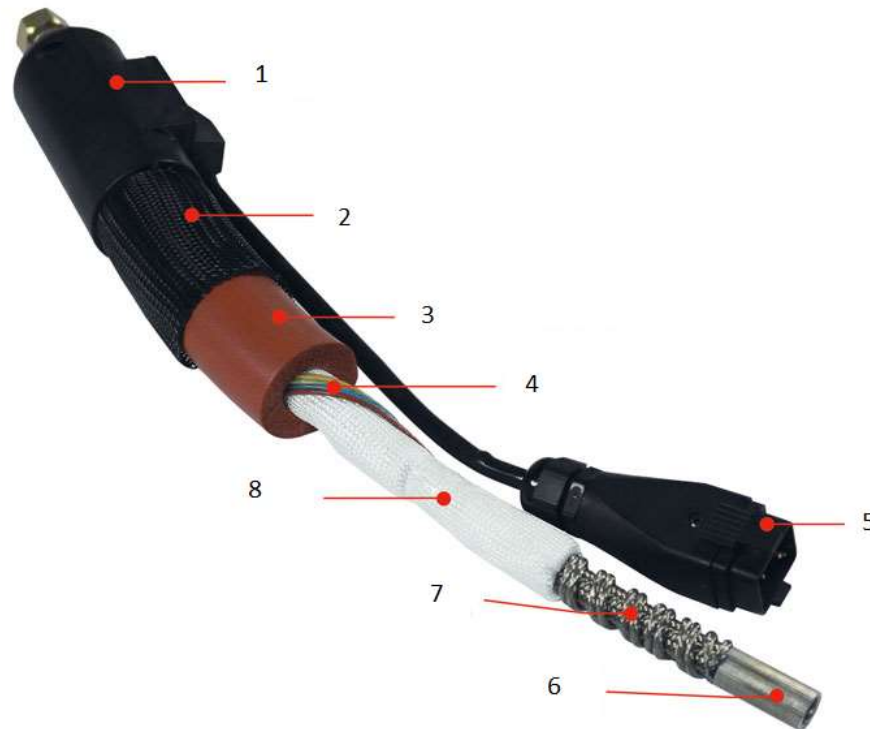


Figure 1 Example construction of the heated hose

- | | |
|---|--|
| 1 | Cap |
| 2 | Protective sleeve |
| 3 | Highly flexible thermal insulation |
| 4 | Control wires |
| 5 | Electric connector (plug) |
| 6 | PTFE inner tube with stainless steel protective braiding |
| 7 | Heating conductor and temperature sensor |
| 8 | Heat-resistant aramid felt |

1.2 General description

The heated hose is design to carry specific liquid or gaseous media. The “K” heating hose is designed to transport hot melt adhesive from an adhesive heating system to the hot melt applicator. The “KA” heating hose is designed for gaseous medias.

The “KR” heating hose type is specially designed for robot use and has special features for this

The heated hose’s task is to keep the medium at a constant temperature during transport and to compensate for heat losses.

The “K” and the “KR” heating hose is the link between systems such as a hot melt adhesive heating system and an application head or heated hand gun and is then part of a machine.

2 Safety

ALWAYS read this section carefully BEFORE installing or using the heated hose. Also, comply with all safety instructions and installation instructions in this manual and on the product.

2.1 Signal words and safety alert symbols

The safety instructions and warnings in the manual or on the product follow a specific logic. The severity and probability of the hazard is denoted by a signal word. A signal word panel consists of a safety alert symbol and signal word centered on a contrasting rectangular background. The following signal words and symbols are used to identify safety messages throughout these instructions:



The signal word “**Danger**” indicates a hazardous situation which, if not avoided, will result in death or serious injury.



The signal word “**Warning**” indicates a hazardous situation which, if not avoided, could result in death or serious injury.



The signal word “**Caution**” indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.








The signal word “**Notice**” indicates a situation which, if not avoided, could result in damage to the equipment or its environment.







When you see these signal words in this manual, be alert. Your safety is involved! Carefully read and understand the messages that follow.

2.2 Safety symbols used in this manual

Hazard warning symbols

	General or multiple hazard		Toxic material hazard
	Hot surface hazard		High pressure hazard
	Electric shock hazard		

Mandatory action symbols

	Safety Instruction		Wear eye protection
	Read the manual		Wear protective clothing
	Lockout/tagout		Wear safety gloves

2.3 Personnel requirements

Heated hoses must only be installed, put into operation and maintained by **qualified personnel** meeting the following requirements:

- Personnel must thoroughly understand the equipment and its safe installation, operation, maintenance, and repair.
- Personnel must have been trained to safely install, operate, maintain, and/or repair the equipment.
- Personnel must be familiar with all relevant safety rules and regulations.

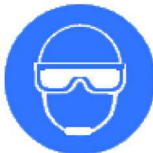
The company operating the equipment must ensure that its personnel meets these requirements.

Observe the instructions given in this manual referring to certain activities and take note of the qualifications required for these activities.

2.4 Personal protective equipment

Personnel must wear the appropriate protective equipment:

To prevent burns:



- For eye protection, wear safety glasses with side shields or a face shield meeting the requirements of ANSI Z87.1 or EN 166.



- Wear heat-resistant protective gloves.



- Wear long-sleeved protective clothing.

2.5 Safety warnings and instructions

This product is an industrial electric-heating system. When planning, designing, testing, operating and maintaining the system, observe the Installation and Operation Instructions and comply with all local occupational health and safety regulations (such as OSHA or CanOSH) applying at the installation site of the product. Also comply with instructions in the international standards **IEC60204-1, IEC 60519-1, IEC 60519-2 and IEC 61140**.

This section lists safety instructions relevant to this product:

⚠ DANGER



Explosion hazard

Heating of explosive media or media which release explosive gases when heated will lead to explosions.

- **Do not install the heated hose in a hazard zone (potentially explosive atmosphere).**

⚠ WARNING



Risk of burns

Parts of the heated hose, such as the fittings, and hot melt material can be very hot causing severe burns.

- **Wait for the hot parts to cool completely before touching them.**
- **Use personal protective equipment, such as safety goggles, heat-resistant protective gloves and safety clothing.**

Risk of overheating

Without a temperature control, the hose can heat up exceeding the maximum operating temperature. This can result in injuries, destruction of the heated hose and destruction of your system.

- **Never operate the heated hose without a temperature sensor and without a temperature control.**

Risk of electric shock



The heated hose is an electrical device. There is an electric shock hazard if the hose is improperly handled. Failure to follow safety procedures can result in injury or death.

- **Only suitably trained specialist personnel (qualified electricians) are permitted to connect the equipment electrically based on local connection requirements and regulations.**
- **Always connect the equipment to ground/earth (refer to IEC 61140 “protective earthing”)**
- **Never squeeze the electric cable or operate the heated hose with a damaged electric cable.**

SAFETY WARNINGS AND INSTRUCTIONS (Cont'd)



WARNING

Toxic material hazard

There may be a risk of injury through inhalation of potentially hazardous hot melt material vapors.

- **Carefully read the Safety Data Sheet (SDS) provided by your supplier.**

High pressure hazard

The heated hose carries media at high pressures.

- **To avoid damage caused by impact from pressurized fluids, relieve the pressure before opening any connection or performing maintenance work.**



Skin puncture hazard

High-pressure fluid from hose leaks, or ruptured components may pierce the skin. This requires immediate medical attention!

- **Regularly check the hose for cuts, bulges or other damage.**
- **To avoid damage caused by the impact of pressurized fluids, relieve the pressure before opening any connection or performing maintenance work.**

2.6 Intended use

The heated hose is designed for industrial use only!

The heated hose is designed for operation within the maximum limits specified in the technical data for the:

- Connecting voltage
- Operating temperature
- Operating pressure.

The heated hose must only be handled (installed, used, maintained) by qualified and authorized personnel.

The following instructions and regulations must be observed:

- Safety and operating instructions in this manual
- Written instructions of the facility operator
- Occupational health and safety regulations.

Processing of corrosive products or food products is permitted only with stainless steel fittings.

2.7 Improper use

The heated hose is **not designed for**:

- Use in a hazardous area
- Heating explosive media or media which release explosive gases when heated
- Feeding substances not compatible with the hose core materials

The heated hose must not be used when damaged in any way.

2.8 Residual risks

Some residual risks cannot be avoided when installing, using or maintaining the heated hose:

- Risk of injury from devices to which the hose is mounted, such as robots.
- Risk of burns from exposed parts, such as hose fittings or hot melt applicators.
- Risk of burns when attaching and removing the heated hose.
- Risk of potentially hazardous adhesive fumes. Avoid inhalation!

2.9 Reasonably foreseeable misuse

The following is considered misuse of the heated hose:

- Use by unqualified or uninstructed personnel.
- Incorrect connection of the hose.
- Installing a hose not suitable for the application.
- Improper repair.
- Processing of erosive products.

3 Detailed description

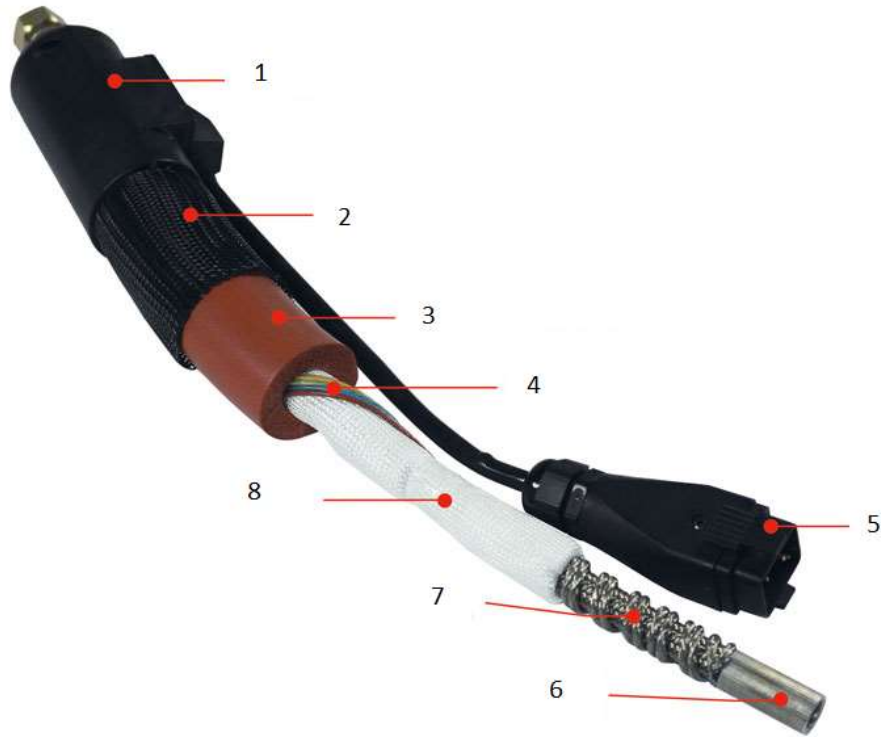


Figure 2 example construction of the heated hose

- | | | | |
|---|------------------------------------|---|--|
| 1 | Cap | 6 | Inner tube |
| 2 | Protective sleeve | 7 | Heating conductor and temperature sensor |
| 3 | Highly flexible thermal insulation | 8 | Heat-resistant aramid felt |
| 4 | Control wires | | |
| 5 | Electric connector (plug) | | |

Refer to Figure 2 above for the following description.

We have various basic inner tubes for heating hose designs, which we list here as follows:

01 = PTFE-T1 with one braided layer (250°C/482°F) also exchangeable -ATL

02 = PTFE-T2 with two braided layer (250°C/482°F)

03 = PTFE-T3 with three braided layer (250°C/482°F)

04 = PFA-T1 with one braided layer (250°C/482°F) also exchangeable -ATL

05 = PFA-T2 with two braided layer (250°C/482°F)

06 = SS-T1 stainless steel corrugated hose with one braided layer (250°C/482°F)

07 = SS-T2 stainless steel corrugated hose with two braided layer (250°C/482°F)

08 = PTFE-C1 corrugated hose with one braided layer (200°C/392°F)

09 = PTFE-C11 corrugated hose with one braided layer (250°C/482°F)

10 = PTFE-ATWE corrugated hose with one braided layer (200°C/392°F)

11 = PTFE-TWF corrugated hose with one braided layer (250°C/482°F)

12 = PFA-C1 corrugated hose with one braided layer (200°C/392°F)

13 = PA-NY300 hose with 3 braided layer (100°C/212°F)

14 = PA-NY500 hose with 3 braided layer (100°C/212°F)

A = PTFE tube (250°C/482°F) also exchangeable

B = PFA tube (250°C/482°F) also exchangeable

The usual configuration, the heated hose consists of a high-quality **PTFE/PFA inner tube (6) with stainless steel protective braiding**. The PTFE/PFA inner tube, carrying the liquid or gaseous medium, is resistant to high temperatures up to 482 °F (250 °C), high operating pressures and aggressive substances covering a wide range of applications. Please also note the other variants with stainless steel or PA inner tube in the previous list. Select the type of pressure hose depending on your operating pressure and temperature, referring to **Chapter 9.4 "Pressure hoses"**.

An appropriate **fitting** is press-fitted to the basic hose. Note that the inner diameter of the fitting differs from the nominal width of the hose and, therefore, restricts the hose passage by design.

The **heating conductor (7)** is designed to German VDE guidelines. It is protected against moisture and has a nickel-plated copper braiding for grounding.

A **temperature sensor** is installed to control the operating temperature of the heated hose. In the standard configuration, the temperature sensor is located on the inner tube, usually about 20 inches (500mm) from the electrical connection. In the case of heating hoses with low voltage up to 42VAC, an additional temperature sensor (max. 446 ° F / 230 ° C) is permanently installed. With heating hoses > 42VAC an additional temperature sensor (max. 446 ° F / 230 ° C) can be installed as an option. If additional control lines or single-wire conductors are required, these can also be incorporated into the heated hose on request.

Select the **thermal insulation** (3) depending on your operating temperature.

A **protective sleeve** (2) protects the thermal insulation against mechanical damage. At both ends, **silicone caps** or **hard polyamide caps** (1) are attached.

The standard version has a standard plug for connection to the Kletti temperature control. The standard plug has pins for heating and for the temperature sensor. Alternatively, the individual conductors for non-standard versions are marked appropriately. Other plugs on request.

4 Delivery and storage

For proper and safe operation, the heated hose must be carefully unpacked, transported and stored as described in this section.

4.1 Safety



Heated hoses can be very long and/or very heavy.

- **2 persons are required for safe handling of heating hoses.**

4.2 Delivery / Unpacking

NOTICE: Do not damage the heated hose when unpacking!

- **Handle the fittings, the hard caps and the connecting cable with care.**
- **Make sure not to kink the heated hose.**
- **Do not bend more than the minimum bending radius (see Chapter 9.4 Pressure hoses).**

4.3 In-plant transport

Package the heated hose properly for in-plant transport. Protect the ends of the heated hose with the fittings. Protect the connecting cable with the corresponding plug. In addition, these parts must be protected with bubble wrap or similar material. Do not bend more than the minimum bending radius (see **Chapter 9.4 Pressure hoses**).

4.4 Storage

Store the heated hose protected from direct sunlight or UV-intensive light. Do not let the heated hose come in contact with flammable material. Make sure storage temperature is between 32 and 122 °F (0 and 50 °C) and humidity between 35 und 85%RH.

5 Installation and start-up

5.1 Safety

DANGER



Explosion hazard

Heating of explosive media or media which release explosive gases when heated will lead to explosions.

- **Do not install the heated hose in a hazard zone (potentially explosive atmosphere).**

WARNING



Risk of injuries

Installation of the heated hose by unqualified personnel can result in injuries and equipment damage.

- **Ensure that heated hoses are installed and put into operation only by qualified personnel.**
- **Personnel must have the necessary training to install mechanical, hydraulic and electrical parts.**



Risk of electric shock

If the system into which the heated hose is to be installed is still live, there is a risk of electric shock.

- **Follow the lockout/tagout procedure: Switch off the power supply main switch and secure it with a padlock to protect against inadvertent switching on while installing the heated hose.**



Risk of burns

Exposed parts, such as fittings, can be extremely hot. If touched, this can result in severe injuries.

- **Wear heat-protective safety gloves.**



NOTICE

Read these installation instructions carefully and observe all points listed when installing the equipment. Failure to observe these installation instructions can result in malfunctions or, under certain conditions, EMC regulations may not be fulfilled.

These instructions do not contain all the information on regulations, standards, etc. to be observed when working on the heated hose in combination with systems. It is the responsibility of the operator of the equipment to identify, obtain and observe these regulations and standards, as required for the specific application.

5.2 Installation into a new machine or system

NOTICE: When installing the heated hose into a new machine or system, it is your responsibility to comply with all relevant regulation such as, but not limited to, U.S. Federal OSHA (Occupational Safety and Health Administration) requirements, the State's equivalent agency (such as Cal/OSHA in California) or CanOSH in Canada. You must:

- Observe all safety instructions and residual risks in these operating instructions during installation.
- Provide full technical documentation, including the operating instructions for the completed system.

Installation of this heated hose into a machine or system can add additional hazards. Check whether it is necessary to add further instructions to the machine's or system's operating instructions because of these hazards.

Ensure that anyone working on or with the machine has read these operating instructions before starting to work on or with the machine.

5.3 Mechanical installation

When installing the heated hoses, always follow all the instructions in **Chapter 5.1 Safety** and relevant safety regulation such as, but not limited to, U.S. Federal OSHA (Occupational Safety and Health Administration) requirements, the State's equivalent agency (such as Cal/OSHA in California) or CanOSH in Canada.

Follow all instructions in **Chapter 5.4 Proper handling and mounting**.

NOTICE: When operating the hose rolled up or stacked, there is a risk of excessive heat build-up which can destroy the heated hose.

- **Do not roll up or stack the heated hose.**

Strain can damage the hose fittings.

- **Make sure not to install the fittings under strain.**

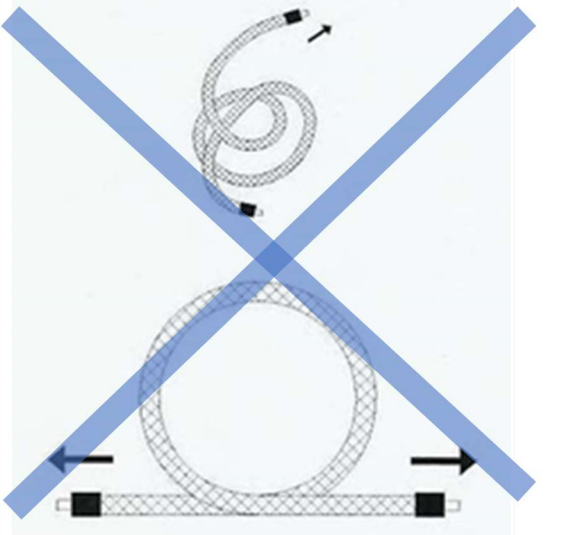
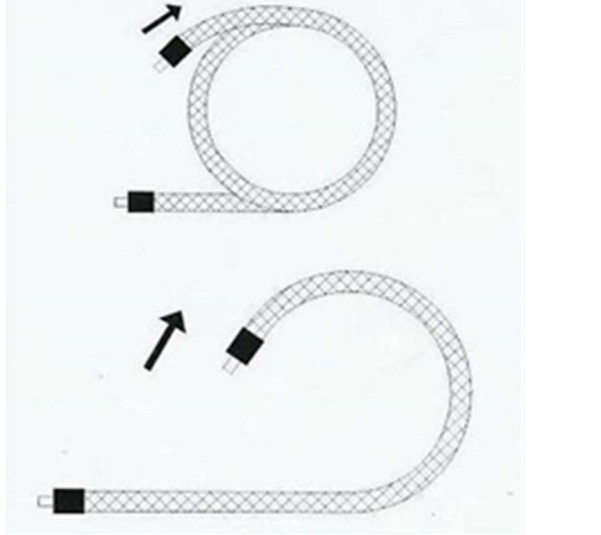
Excessive bends can damage the heated hose.

- **Make sure not to bend the hose more than the minimum bending radius as specified in Chapter 9.4 Pressure hoses.**

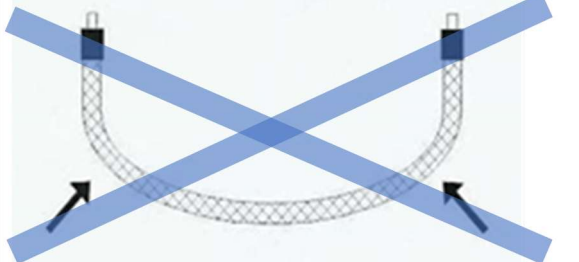
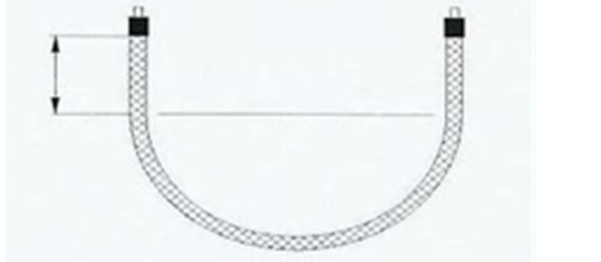
Heat accumulation can damage the machine and/or the heated hose.

- **Do not install closer than 0.8 inches (or 20 mm) to a (vertical, horizontal, or other) surface.**

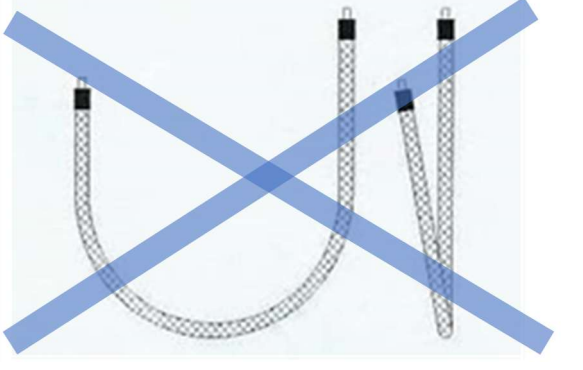
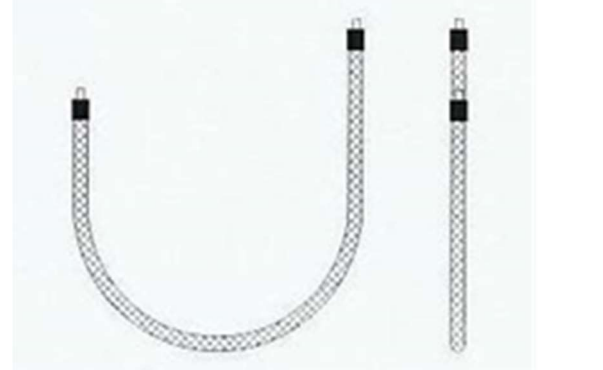
5.4 Proper handling and mounting

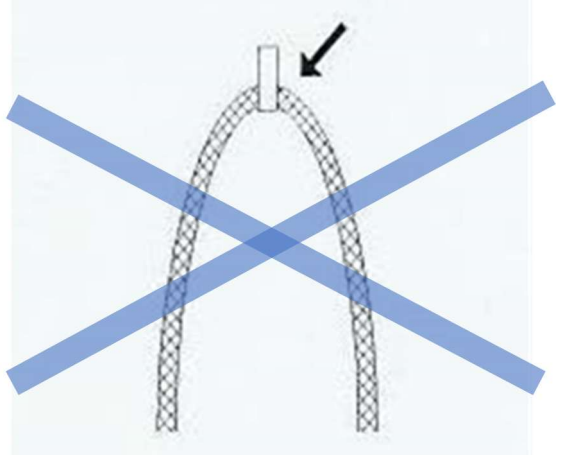
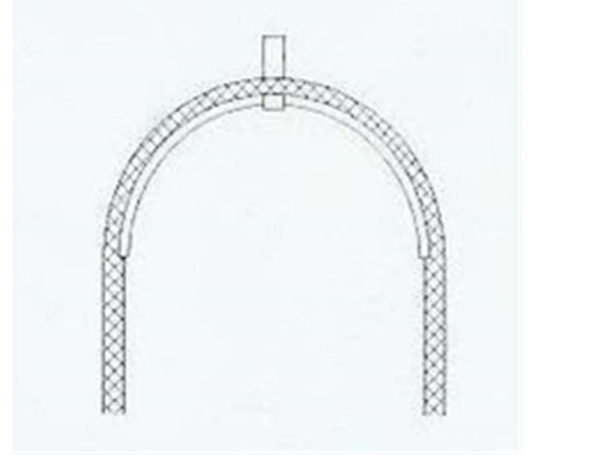
INCORRECT	CORRECT
	
<p>Pulling or dragging the rolled-up heated hoses by the hose ends causes torsional stress, as well as a critically small bending radius.</p>	<p>Carefully unwind the heated hose from the roll, without pulling.</p>

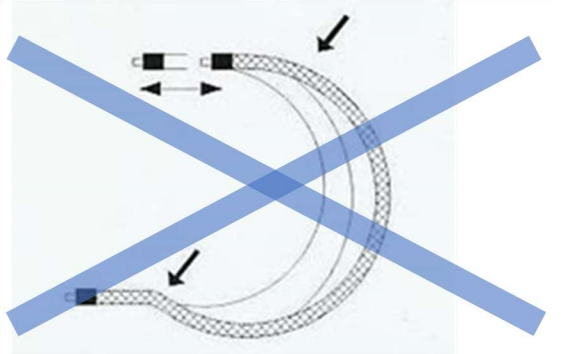
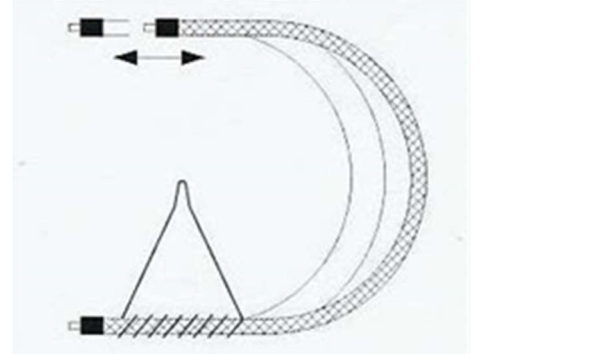
▲ CAUTION The heating hose must not be operated in a rolled up or stacked up condition!!!
Danger of heat accumulation – the heating hose may be destroyed

INCORRECT	CORRECT
	
<p>If heated hoses are too short, they will be kinked at the connections.</p>	<p>Provide for a straight section of heated hose (about 5x the hose diameter) at the connections. A wide bending radius ensures a longer service life.</p>

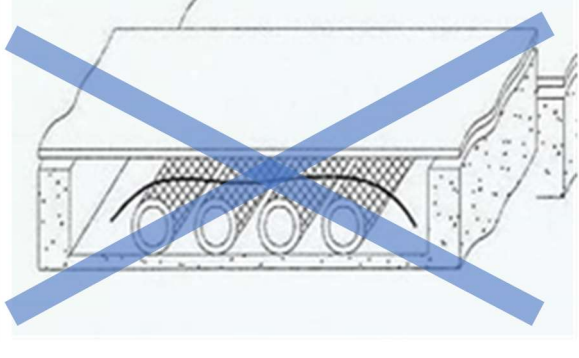
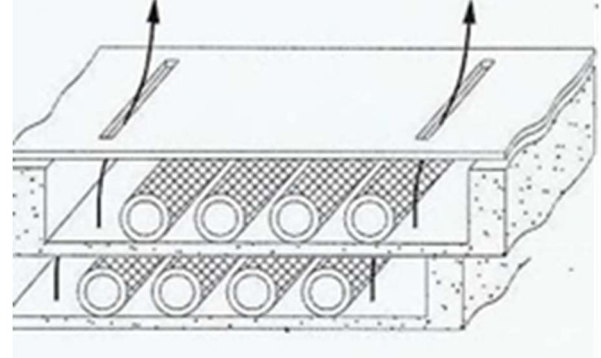
Installation and Operation Manual Heated Hoses

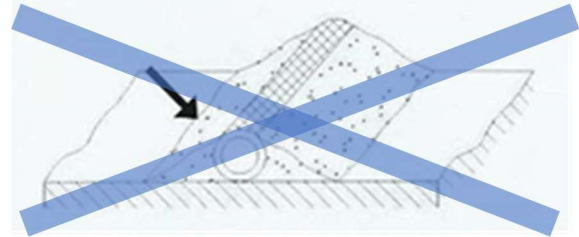
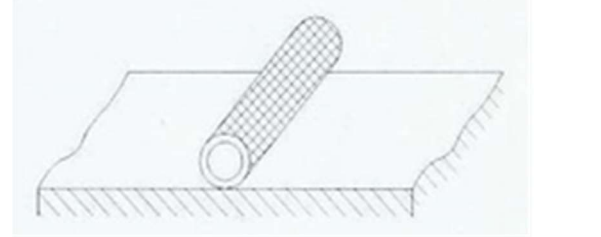
INCORRECT	CORRECT
	
<p>The heated hoses can be destroyed by torsional motions caused by improper installation.</p>	<p>Make sure the axes of the heated hose run parallel and all hose motions are always in the same plane.</p>

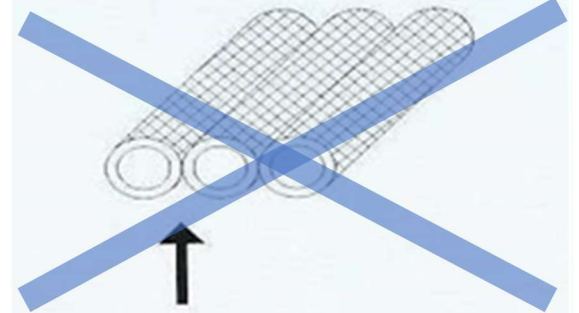
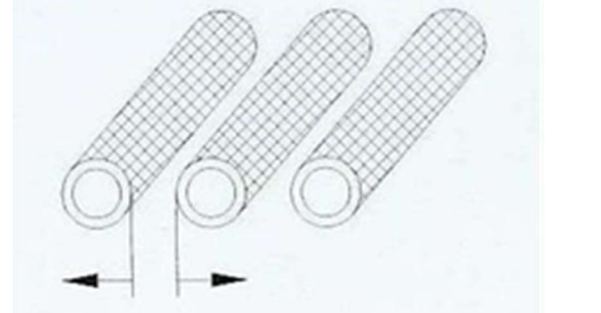
INCORRECT	CORRECT
	
<p>Avoid diversions. These can cause kinking and bending stress.</p>	<p>Use a saddle-shaped device or roll with the appropriate diameter to ensure the minimum bending radius, see Chapter 9.4 Pressure hoses.</p>

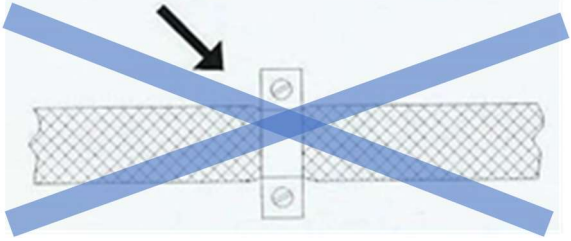
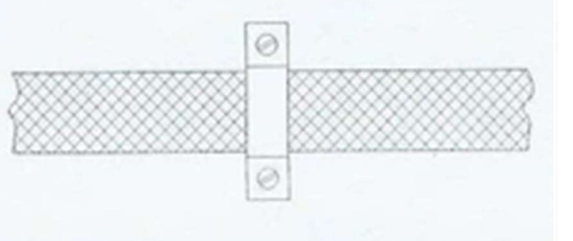
INCORRECT	CORRECT
	
<p>Inappropriate installation may cause the heated hose to sag.</p>	<p>Use a spiral heated-hose suspension.</p>

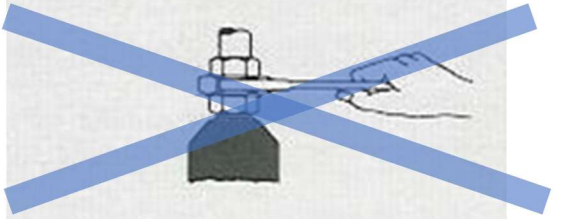
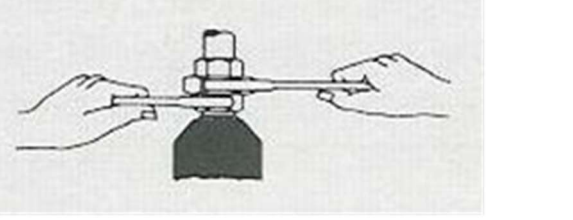
Installation and Operation Manual Heated Hoses

INCORRECT	CORRECT
	
<p>Heated hoses mounted within a closed channel or shaft will cause heat build-up.</p>	<p>Heated hoses must not touch each other. Provide sufficient ventilation!</p>

INCORRECT	CORRECT
	
<p>Heated hoses will overheat if powdery substances, adhesives or other thermo-insulating materials are spilled on them.</p>	<p>Regularly clean the heated hoses and eliminate the cause of the spill.</p>

INCORRECT	CORRECT
	
<p>Bundling or embedding heated hoses with contact between them will cause overheating of contact areas.</p>	<p>Install heated hoses with sufficient spacing.</p>

INCORRECT	CORRECT
	
<p>When using mounting brackets to install the heated hose, excessive squeezing can damage the protective layer and can destroy the heated hose or damage the medium.</p>	<p>During installation, squeeze the outer heat insulation onto the heating conductor by no more than 10% of the diameter. Use the optional special brackets when installing heated hoses with a corrugated tube for exterior protection.</p>

INCORRECT	CORRECT
	
<p>Using only one wrench when connecting the fitting will twist the heated hose.</p>	<p>Use a second wrench when connecting the fitting to avoid twisting the heated hose!</p>

5.5 Electrical connection

When installing the heated hoses, always follow all the instructions in **Chapter 5.1 Safety** and relevant safety regulation such as, but not limited to, U.S. Federal OSHA (Occupational Safety and Health Administration) requirements, the State's equivalent agency (such as Cal/OSHA in California) or CanOSH in Canada.

Use the following procedure to electrically connect the heated hose. Observe these operating instructions and all applicable safety precautions for installing and operating electrical equipment.

1. Check the hose type plate and your order specifications. Make sure the specifications match.
2. Make sure that the supply voltage corresponds to the voltage specified on the type plate of the heated hose.
3. Make sure that the nominal power for the heating hose does not exceed the maximum power output of the connected temperature control (resistive load).
4. Complete the electrical connections as shown in the separate connection diagram, observing all applicable electrical regulations.
5. Route the electrical supply lines to the heated hose so that they are free of tension under all conditions and cannot be pinched or sheared off under any circumstances.

6. If possible, use shielded cables for the sensor lines and signal wires and shielded compensation wires for the thermocouples.
7. **⚠ CAUTION** To be install only with overcurrent protection device, see installation instruction below 9! Protect the heated-hose supply circuit against overcurrent using suitable fuses.
8. Wiring terminals for permanent connection to the power supply shall be provided with wiring terminals or leads for the connection of conductors having an ampacity of not less than 125 percent of the current rating of the product! Use only recognized and certified wiring terminals according to standard UL 1977 and/or CSA-C22.2 No. 182.3 or similar! A terminal provided for the connection of a grounded circuit conductor shall be made of or plated with a metal white in color, or have the word "white
9. According to IEC 60519-1, a line protection must ensure that the nominal value of the fuse is matched to the specific load. The line protection must be connected in series before the heated hose (including the control). However, the maximum fuse rating must not exceed 16A. Use a conductor with a cross section of at least AWG 16 (1.5 mm²).

5.6 Initial start-up

Before switching on the system:

WARNING! There is a risk of overheating. Without proper heat control, the heated hose can heat up and exceed the maximum operating temperature. This can result in injuries, destruction of the heated hose and destruction of your system.

- **Always operate the heated hose with a temperature sensor and with a temperature control.**

NOTICE: An improper electrical connection can severely damage the heated hose or the entire system.

- **Carefully recheck the electrical connections.**

For the initial start-up, make sure the heated hose is not in any critical process condition, such as incorrect pressure, incorrect flow rate, etc. Because the temperature control is not yet adapted to the system, this can cause malfunction and damage.

Before starting up the system, make sure to comply with the instructions in this manual and all local occupational health and safety regulations (such as OSHA or CanOSH) applying at the installation site of the product. Also comply with instructions in the international standards **IEC60204-1, IEC 60519-1, IEC 60519-2 and IEC 61140.**

Document all the checks done to demonstrate compliance with these regulations and standards.

Follow the instructions in the temperature control operating manual to configure the process.

Only use temperature controls that are compatible with the temperature sensor type in the heated hose.

Start-up of the system

When starting up the process, be sure to follow the instructions in the operating manual for the temperature control.

WARNING! The heated hose must not be used at operating temperatures above the operating temperature specified on the rating plate.

The heated hose must reach its operating temperature first before you can increase the system pressure to your operating pressure. The medium can still be solid in the fittings, thus blocking the flow. The heated hose takes around 15 to 30 minutes to reach operating temperature.

NOTICE: When the heated hose has reached operating temperature, retighten the fittings.

WARNING! Exposed parts, such as fittings, can be extremely hot. If touched, this can result in severe injuries.

The resistance of the flexible heated hose to pressure depends on the operating temperature range (see **Chapter 9.4 Pressure hoses**). For operating temperatures up to 482 °F (250 °C), please look in the corresponding tables.

WARNING! Never exceed the specified operating pressure!

Make sure there are no pressure surges. These can be very high and are not indicated by normal pressure gauges.

6 Operation

Operation takes place via the corresponding superior control / regulation, see therefore the corresponding operating manual.



The regulation of the connected system in terms of pressure and temperature must be so safe that the permitted operating parameters of a heating hose cannot be exceeded.

Otherwise serious hazards cannot be excluded.

The used system that controls the pressure and the temperature with which the heating hoses are operated must have safe regulations.

The safety of the overall system is thus essentially determined by the control of the system. The manufacturer of the system must explain the quality of the system and the associated safety.

With long heating hoses >6,0m, it may happen that a material flow stagnation can lead to a temperature increase above the set operating temperature on the opposite site of the sensor position. Therefore, a temperature reduction of approx. 10K should be provided for material flow stagnation of temperature critical media.

7 Maintenance, repairs, service life

7.1 Safety



Risk of burns

Exposed parts, such as fittings, can be extremely hot. If touched, this can result in severe injuries.

- **Wear heat-protective safety gloves.**



7.2 Preventative maintenance

When maintaining the system, observe these Installation and Operation Instructions, in particular Chapter 2 Safety.

Comply with all local occupational health and safety regulations (such as OSHA or CanOSH) applying at the installation site of the product.

See the chart below for required maintenance procedures and maintenance intervals.

d = daily, m = monthly, y = yearly

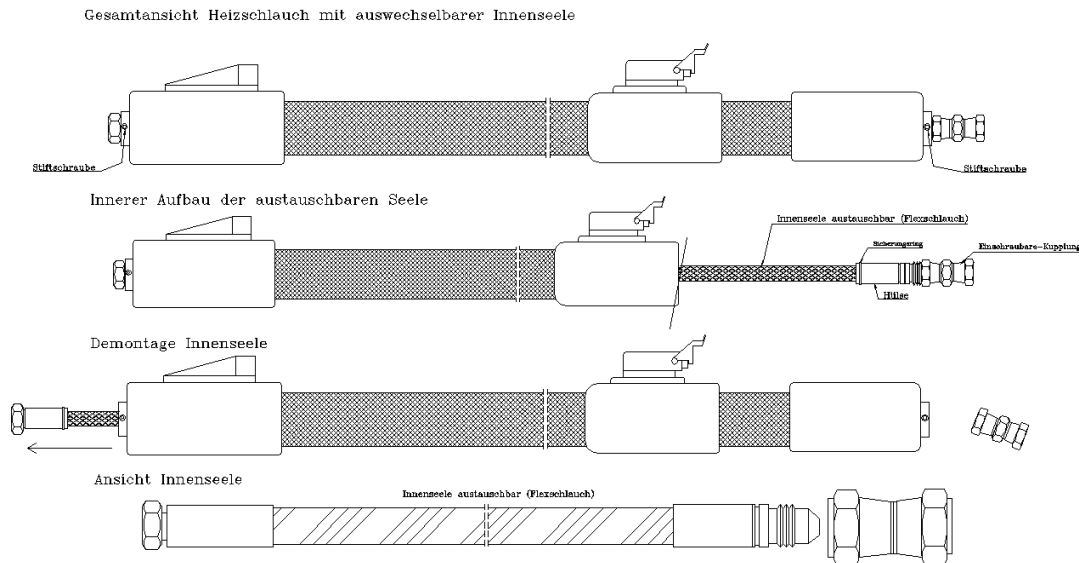
Maintenance procedure	d	m	y
Perform a visual inspection for leaks, cuts, bulges or other damage. Replace if damaged.	X		
Clean the heated hoses of any spilled material or other dirt and debris to prevent overheating.	X		
Tighten the fitting union nuts.		X	
Check the heating equipment and the temperature control for proper function.			X

7.3 Exchange of exchangeable medium hoses -ATL

This heated hose system consists of a carrier hose and an exchangeable medium hose. The nominal size of the carrier hose depends on the required nominal size of the core. Due to the structure and handling, the hose length is open Max. 12m limited. See drawing A to C.

These systems are particularly suitable for processing reactive adhesives. In the event of contamination or blockage, only the inner core is replaced, the carrier hose (on which the heater is located) is retained. The exchange can only be carried out with straight heating hoses.

This heated hose system is designed for an operating temperature of max. 210 ° C (note nameplate). The pressure load refers to the medium hose and is in the tech. Data 9.4 page 32 can be seen at T1



1. Before the exchangeable medium hose can be changed, the following precautions must be taken.

- Check the new medium hose for correct nominal size, thread type of the fittings and length
- Complete cooling to room temperature of the heating hose
- For the exchange, the suitable wrenches become the union nut of the Fittings and an Allen key 2.5mm required
- Disconnection of the electrical connector from the power supply and securing them against being switched on again
- Loosen the union nuts of the fittings on the heating hose to the system and to the application head
- Place the heating hose straight along the entire length on a table top or floor
- Cleaning the fittings and grub screws from adhesive residue



Example heating hose

2. Loosen the double fitting using a wrench with suitable wrench size (the setscrews must also be firmly tightened).



3. Loosen all grub screws in the holding fittings of the carrier hose with an Allen key (2,5mm)



4. Pull out the medium hose on the side with the fixed fitting and possibly clean the carrier hose fittings.



If the medium hose does not come loose because the adhesive is stuck between the carrier and the medium hose, the heating hose must be heated up to operating temperature until the medium hose can be easily pulled out. Caution, risk of burns. Wear gloves and protective clothing.




5. Pull the new medium hose: Loosen the double fitting on the new medium hose.
6. When inserting the new medium hose into the carrier hose, make sure that the external thread looks completely out of the carrier hose fitting. Tighten all setscrews and make sure they are tight (secure the threads of the set screws with thread lock example LOCTITE 243).



7. Fasten the double fitting with the appropriate wrench.



8. Install the heating hose in the system and ensure that the  medium hose is well connected to the ground via the system and the application head, since the detachable connection of the medium hose of the carrier hose means that a reliable and firm connection cannot be established.
9. Then put the system back into operation and retighten the fittings after the operation temperature has been reached before starting with adhesive flow. Check for leaks in the system during operation.

7.4 Repairs

Do not continue using the heated hose if the heated hose or the system of which is a part:

- shows visible damage,
- no longer functions as intended,
- has been subject to overloading, or
- has been overheated.

If the heated hose can no longer be safely used, it must be decommissioned and locked out against accidental reuse. Attach a sign “**Defective, do not use**” or similar.

NOTICE: If the heated hose is repaired by anyone other than the manufacturer, this voids all warranties or guarantees.

- Heated hoses must be sent to the manufacturer for repairs.

If the heated hose is defective, send it to the manufacturer together with a description of the defect. Use the RMA form on the website www.kletti-gmbh.de.

7.5 Service life and maximum shelf life

According to the European standard EN 20066, heated hoses must not be used longer than 6 years including storage of any kind. The maximum shelf life is 2 years, which must not be exceeded.

7.6 Troubleshooting

If the hose does not heat, check for the following possible causes:

The application system is switched off.

- **Switch on the system and refer to the application system manual.**

The temperature control is not functioning.

- **Refer to the manual for the temperature control.**

Electrical connections are loose or the connector is broken.

- **Tighten or replace the connectors.**

8 Disassembly and disposal

8.1 Safety

⚠ WARNING



Risk of electric shock

If the system into which the heated hose is installed is still live, there is a risk of electric shock.

- **Follow the lockout/tagout procedure: Switch off the power supply main switch and secure it with a padlock to protect against inadvertent switching on while the heated hose is detached.**



High pressure hazard

The system and the hot melt material are pressurized. Any material squirting out when the hose is detached can result in serious burns.

- **Relieve the pressure before disconnecting heated hoses.**

8.2 Disassembly

Use the following procedure to disassemble the heated hose. Observe these operating instructions and all applicable safety precautions for electrical equipment.

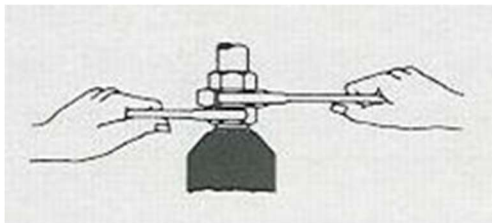


Figure 3 Loosening union nuts with two wrenches

1. Unplug all electrical connections.
2. Loosen the union nuts of the fittings using two wrenches, as shown in **Figure 3**.
3. Remove the heated hose.

8.3 Disposal

The original packaging protects the heated hose from transport damage. The packaging material is recyclable in accordance with environmental and technical disposal criteria.

Returning the packaging to the materials cycle reduces the amount of waste and saves raw materials.

Dispose of the packaging material no longer required at a designated recycling center.

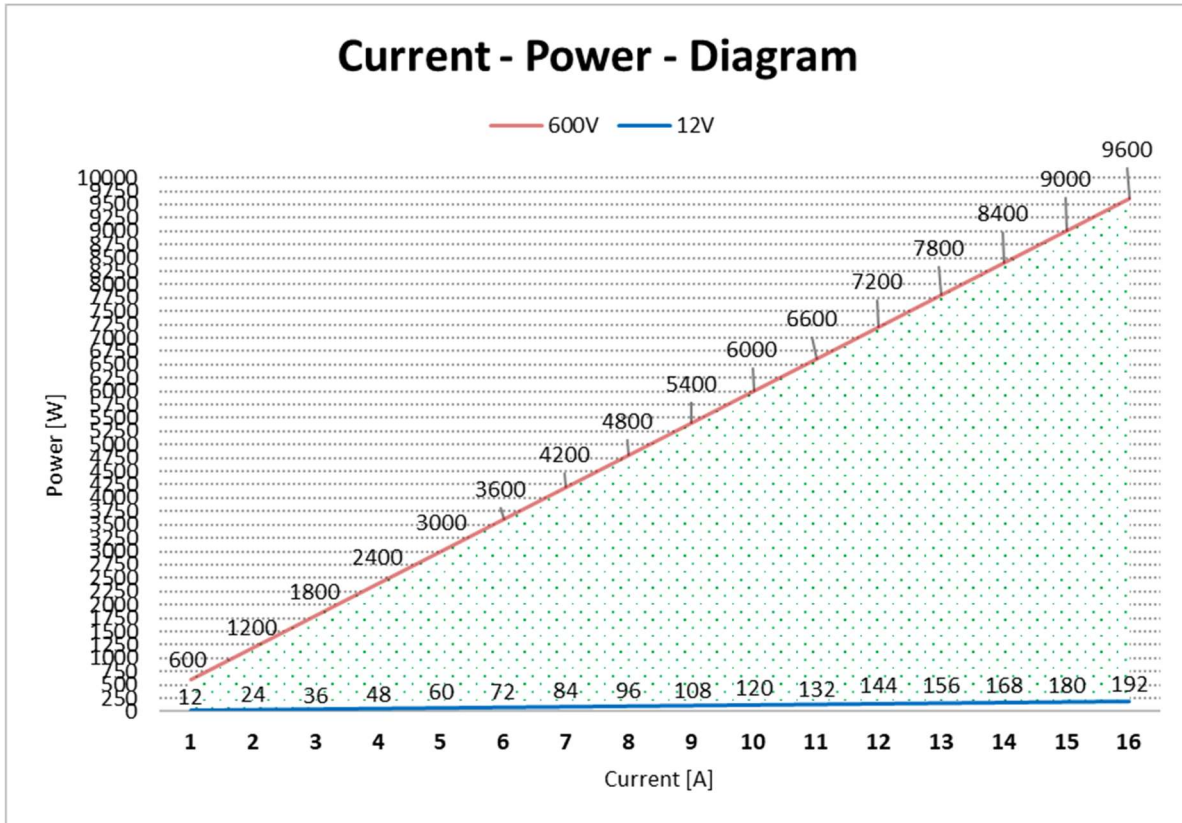
Dispose of the heated hose in accordance with local electrical waste regulations.

9 Technical specifications

9.1 Technical outline data

Rated voltage:	12-600VAC +-10%
Rated Power/heating circuit:	max. 192W until 9600W +5%/-10%
Rated current/heating circuit:	Max. 16A
Rated frequency:	50 - 60 Hz
Protection Class	I
Ingress protection (IEC 60529)	IP54 Standard or IP65 or IP66 if not specified otherwise
Length tolerance	<= 3,28ft (1,0m) = +-4 > 3,28ft (1,0m) = +-2%
Rated pressure ranges	0 – 7252psi (0 - 500 bar)
Thermal conductivity ranges	30 - 600 W/m

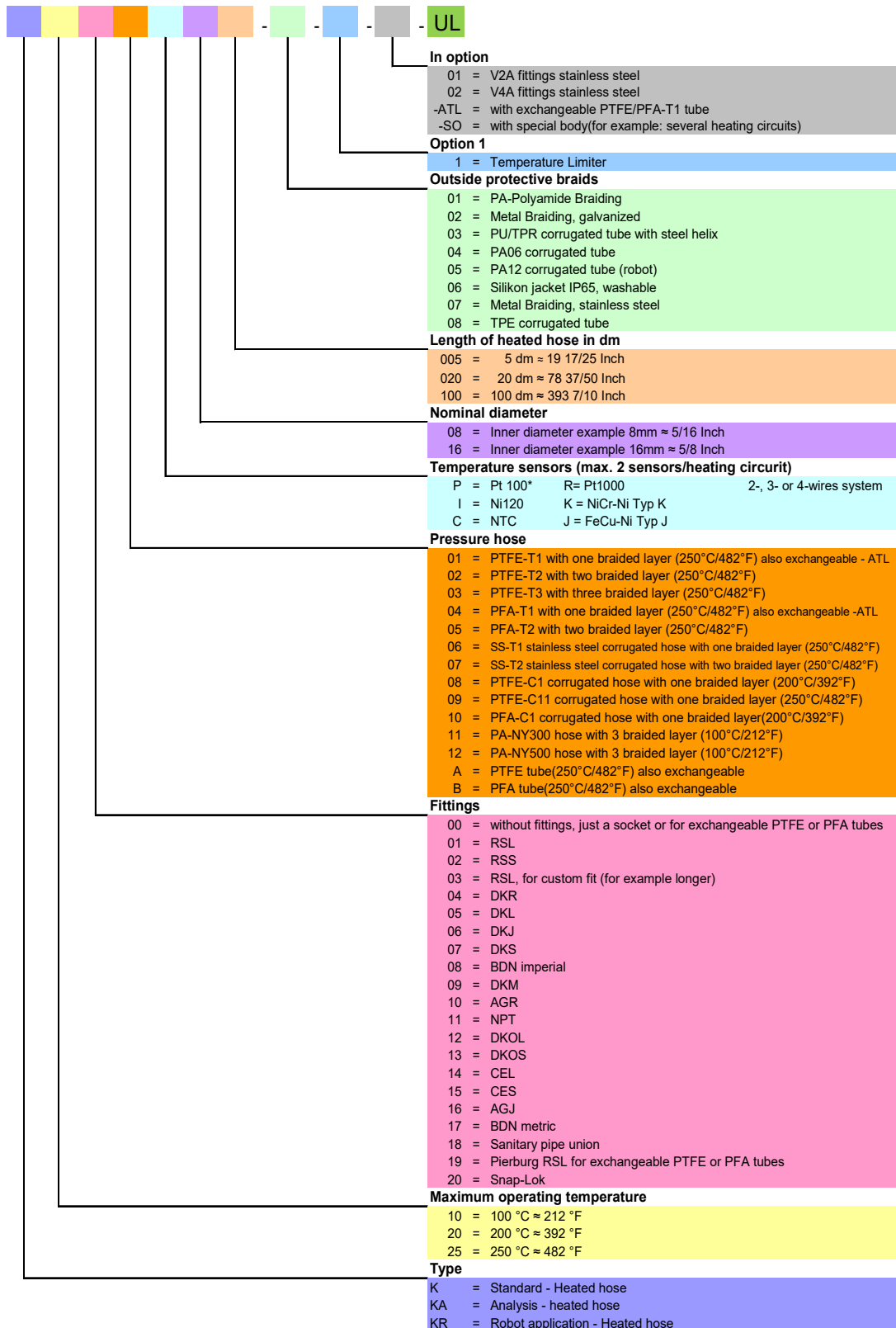
9.2 Current-Power-diagram 12 - 600V



9.3 Typecode

Type Code:

As a rule, the technical specification for a heating hose are indicated by the type code on the type plate.
Other identifications on request - special hoses are marked specifically



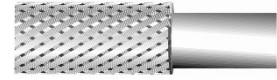
9.4 Pressure hoses (inner hose)

Type K, KA or KR PTFE/PFA-T1 smooth hose

with one braided layer of steel wire (1.4301)

operating temperature -94 until 482°F (-70...250°C)

max. installation length 19,7 until 3937inch (0,5...100m).



Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	3	4	6	8	10	12	16	20	25
Nominal-Inner Diameter NW (DN) in inch	0,12	0,16	0,24	0,32	0,40	0,48	0,64	0,80	1,00
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	180	220	180	160	140	120	105	80	64
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	2610	3190	2610	2320	2030	1740	1523	1160	928
Max. Working Pressure at 212°F (100°C) in bar	162	198	162	144	126	108	95	72	58
Max. Working Pressure at 212°F (100°C) in psi	2349	2871	2349	2088	1827	1566	1370	1044	835
Max. Working Pressure at 392°F (200°C) in bar	144	176	144	128	112	96	84	64	51
Max. Working Pressure at 392°F (200°C) in psi	2088	2552	2088	1856	1624	1392	1218	928	742
Max. Working Pressure at 482°F (250°C) in bar	108	132	108	96	84	72	63	48	38
Max. Working Pressure at 482°F (250°C) in psi	1566	1914	1566	1392	1218	1044	914	696	557
Ordinary value W/m	80	80	110	130	150	180	240	300	350
Min. bending radius in mm	40	50	75	100	120	135	160	200	250
Min. bending radius in inch	2	2	3	4	5	5	6	8	10

Installation and Operation Manual Heated Hoses

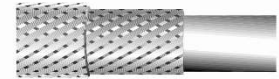
Type K or KR PTFE/PFA-T2 smooth hose

with two braided layers of steel wire (1.4301)

operating temperature -94 until 482°F (-70...250°C)

max. installation length 19,7 until 3937inch (0,5...100m) to nominal inner Diameter 0,98inch (25mm),

max installations length 19,7 until 1890inch (0,5...48m) to nominal inner Diameter 1,57inch (40mm).



Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6	8	10	12	16	20	25	32	40
Nominal-Inner Diameter NW (DN) in inch	0,24	0,32	0,40	0,48	0,64	0,80	1,00	1,28	1,60
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	220	200	180	160	140	120	104	56	40
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	3190	2900	2610	2320	2030	1740	1508	812	580
Max. Working Pressure at 212°F (100°C) in bar	198	180	162	144	126	108	94	50	36
Max. Working Pressure at 212°F (100°C) in psi	2871	2610	2349	2088	1827	1566	1357	731	522
Max. Working Pressure at 392°F (200°C) in bar	176	160	144	128	112	96	83	45	32
Max. Working Pressure at 392°F (200°C) in psi	2552	2320	2088	1856	1624	1392	1206	650	464
Max. Working Pressure at 482°F (250°C) in bar	132	120	108	96	84	72	62	34	24
Max. Working Pressure at 482°F (250°C) in psi	1914	1740	1566	1392	1218	1044	905	487	348
Ordinary value W/m	110	130	150	180	240	300	350	400	500
Min. bending radius in mm	75	100	120	135	160	200	250	500	850
Min. bending radius in inch	3	4	5	5	6	8	10	20	34

Installation and Operation Manual Heated Hoses

Type K or KR PTFE-T3 smooth hose

with two layers of high tensile steel wires and one braided layer of stainless steel (1.4301) wire

operating temperature -94 until 482°F (-70...250°C)

max. installation length 19,7 until 3937inch (0,5...100m) to nominal inner Diameter 0,98inch (25mm),

max installations length 19,7 until 1890inch (0,5...48m) to nominal inner Diameter 1,26inch (32mm).



Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6	8	10	12	16	20	25	32
Nominal-Inner Diameter NW (DN) in inch	0,24	0,32	0,40	0,48	0,64	0,80	1,00	1,28
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	400	380	360	320	320	240	200	200
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	5800	5510	5220	4640	4640	3480	2900	2900
Max. Working Pressure at 212°F (100°C) in bar	360	342	324	288	288	216	180	180
Max. Working Pressure at 212°F (100°C) in psi	5220	4959	4698	4176	4176	3132	2610	2610
Max. Working Pressure at 392°F (200°C) in bar	320	304	288	256	256	192	160	160
Max. Working Pressure at 392°F (200°C) in psi	4640	4408	4176	3712	3712	2784	2320	2320
Max. Working Pressure at 482°F (250°C) in bar	240	228	216	192	192	144	120	120
Max. Working Pressure at 482°F (250°C) in psi	3480	3306	3132	2784	2784	2088	1740	1740
Ordinary value W/m	110	130	150	180	240	300	350	400
Min. bending radius in mm	75	100	120	135	160	200	240	280
Min. bending radius in inch	3	4	5	5	6	8	10	11

Installation and Operation Manual Heated Hoses

Type K PTFE/PFA-T1 smooth hose exchangeable in a carrier hose SS-T1

with one braided layer of steel wire (1.4301)
 operating temperature -94 until 482°F (-70...250°C)
 max. installation length 19,7 until 393,7inch (0,5...10m).



Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6	8	10	12	16	20
Nominal-Inner Diameter NW (DN) in inch	0,24	0,32	0,40	0,48	0,64	0,80
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	180	160	140	120	105	80
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	2610	2320	2030	1740	1523	1160
Max. Working Pressure at 212°F (100°C) in bar	162	144	126	108	95	72
Max. Working Pressure at 212°F (100°C) in psi	2349	2088	1827	1566	1370	1044
Max. Working Pressure at 392°F (200°C) in bar	144	128	112	96	84	64
Max. Working Pressure at 392°F (200°C) in psi	2088	1856	1624	1392	1218	928
Max. Working Pressure at 482°F (250°C) in bar	108	96	84	72	63	48
Max. Working Pressure at 482°F (250°C) in psi	1566	1392	1218	1044	914	696
Carrier hose SS-T1 Typ KB Nominal-Inner Diameter NW (DN) in mm	16	16	20	25	25	32
Carrier hose SS-T1 Typ KB Nominal-Inner Diameter NW (DN) in inch	0,64	0,64	0,80	1,00	1,00	1,28
Ordinary value W/m	110	130	150	180	240	300
Min. bending radius in mm	5xOD	5xOD	5xOD	5xOD	5xOD	5xOD
Min. bending radius in inch	5xOD	5xOD	5xOD	5xOD	5xOD	5xOD

Installation and Operation Manual Heated Hoses

Type KA PTFE/PFA smooth hose exchangeable

operating temperature -94 until 482°F (-70...250°C)
 max. installation length 19,7 until 1890inch (0,5...48m).



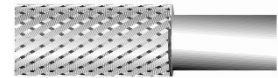
Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	2	3	4	6	8	10	12
Nominal-Inner Diameter NW (DN) in inch	0,08	0,12	0,16	0,24	0,32	0,40	0,48
Max. Working Pressure at 482°F (250°C) in bar	6	6	6	6	4	4	4
Max. Working Pressure at 482°F (250°C) in psi	87	87	87	87	58	58	58
Ordinary value W/m	120	120	130	150	180	240	300
Min. bending radius in mm	5xOD	5xOD	5xOD	5xOD	5xOD	5xOD	5xOD
Min. bending radius in inch	5xOD	5xOD	5xOD	5xOD	5xOD	5xOD	5xOD

All tubes are installed in a PTFE-T1 carrier hose with suitable fittings

Type KA PTFE/PFA-T1 smooth hose not exchangeable

operating temperature -94 until 482°F (-70...250°C)
 max. installation length 19,7 until 3937inch (0,5...100m).



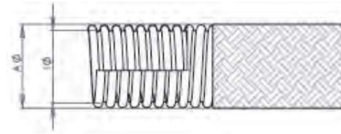
Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	3	4	6	8	10	12
Nominal-Inner Diameter NW (DN) in inch	0,12	0,16	0,24	0,32	0,40	0,48
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	180	220	180	160	140	120
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	2610	3190	2610	2320	2030	1740
Max. Working Pressure at 212°F (100°C) in bar	162	198	162	144	126	108
Max. Working Pressure at 212°F (100°C) in psi	2349	2871	2349	2088	1827	1566
Max. Working Pressure at 392°F (200°C) in bar	144	176	144	128	112	96
Max. Working Pressure at 392°F (200°C) in psi	2088	2552	2088	1856	1624	1392
Max. Working Pressure at 482°F (250°C) in bar	108	132	108	96	84	72
Max. Working Pressure at 482°F (250°C) in psi	1566	1914	1566	1392	1218	1044
Ordinary value W/m	100	100	120	130	150	180
Min. bending radius in mm	40	50	75	100	120	135
Min. bending radius in inch	2	2	3	4	5	5

Installation and Operation Manual Heated Hoses

Type K, KA or KR PTFE-C1 corrugated hose BW1

In spiral form, giving them excellent self-cleaning properties with one braided layer of steel wire and reinforcing fibreglass operating temperature -65 until 399°F (-54...204°C) max. installation length 19,7 until 1890inch (0,5...48m).



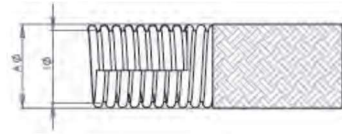
Suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	10	12	16	20	25	32	40	50
Nominal-Inner Diameter NW (DN) in inch	0,40	0,48	0,64	0,80	1,00	1,28	1,60	2,00
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	83	83	69	69	62	50	41	28
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	1204	1204	1001	1001	899	725	595	406
Max. Working Pressure at 212°F (100°C) in bar	75	75	62	62	56	45	37	25
Max. Working Pressure at 212°F (100°C) in psi	1083	1083	900	900	809	653	535	365
Max. Working Pressure at 392°F (200°C) in bar	66	66	55	55	50	40	33	22
Max. Working Pressure at 392°F (200°C) in psi	963	963	800	800	719	580	476	325
Max. Vacuum Pressure at 68°F to 122°F (20°-50°C) in mbar	945	945	945	945	675	405	337	168
Max. Vacuum Pressure at 68°F to 122°F (20°-50°C) in psi	13,7	13,7	13,7	13,7	9,8	5,9	4,9	2,4
Max. Vacuum Pressure at 212°F (100°C) in mbar	851	851	851	851	608	365	303	151
Max. Vacuum Pressure at 212°F (100°C) in psi	12,3	12,3	12,3	12,3	8,8	5,3	4,4	2,2
Max. Vacuum Pressure at 392°F (200°C) in mbar	756	756	756	756	540	324	270	134
Max. Vacuum Pressure at 392°F (200°C) in psi	11,0	11,0	11,0	11,0	7,8	4,7	3,9	1,9
Ordinary value W/m	150	180	240	300	350	400	500	600
Min. bending radius in mm	25	37	50	62	75	82	200	250
Min. bending radius in inch	1,00	1,48	2,00	2,48	3,00	3,28	8,00	10,00

Installation and Operation Manual Heated Hoses

Type K, KA or KR PTFE-ATWE with FDA approval corrugated hose

In spiral form, giving them excellent self-cleaning properties
with one braided layer of stainless steel wire 1.4301/1.4306
operating temperature -94 until 392°F (-70...200°C)
max. installation length 19,7 until 1890inch (0,5...48m).



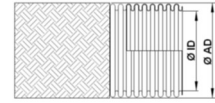
Suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6,00	8,00	10,00	13,00	16,00	20,00	25,00	32,00	40,00	50,00
Nominal-Inner Diameter NW (DN) in inch	1/4	5/16	3/8	1/2	5/8	3/4	1,0	1.1/4	1.1/2	2.0
Max.Working Pressure at 68°F to 248°F (20°-120°C) in bar	129	103	103	77	62	52	34	25	22	17
Max.Working Pressure at 68°F to 248°F (20°-120C) in psi	1871	1494	1494	1117	899	754	493	363	319	247
Max. Working Pressure at 320°F (160°C) in bar	77	62	62	46	37	31	20	15	13	10
Max. Working Pressure at 320°F (160°C) in psi	1123	896	896	670	539	452	296	218	191	148
Max. Working Pressure at 392°F (200°C) in bar	26	21	21	15	12	10	7	5	4	3
Max. Working Pressure at 392°F (200°C) in psi	374	299	299	223	180	151	99	73	64	49
Ordinary value W/m	110	130	150	180	240	300	350	400	500	600
Min. bending radius in mm	18	20	20	25	51	64	89	125	152	200
Min. bending radius in inch	0,71	0,80	0,80	1,00	2,00	2,52	3,50	4,92	6,00	8,00

Installation and Operation Manual Heated Hoses

Type K, KA or KR PTFE-TFW corrugated hose

with parallel corrugation, making them very flexible
 with one braided layer of stainless steel wire 1.4301/1.4306
 operating temperature -67 until 482°F (-55...250°C)
 max. installation length 19,7 until 1890inch (0,5...48m).



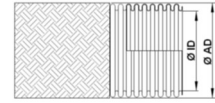
Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	10,00	13,00	16,00	20,00	25,00	32,00	40,00	50,00	65,00	80,00
Nominal-Inner Diameter NW (DN) in inch	3/8	1/2	5/8	3/4	1,0	1.1/4	1.1/2	2.0	2.1/2	3.15
Max.Working Pressure at 68°F to 120°F (20°-49°C) in bar	100	84	80	72	64	51	42	28	20	16
Max.Working Pressure at 68°F to 120°F (20-49°C) in psi	1450	1218	1160	1044	928	740	609	406	290	232
Max. Working Pressure at 212°F (100°C) in bar	93	78	74	67	60	47	39	26	19	15
Max. Working Pressure at 212°F (100°C) in psi	1349	1133	1079	971	863	688	566	378	270	216
Max. Working Pressure at 392°F (200°C) in bar	85	71	68	62	54	43	36	24	17	14
Max. Working Pressure at 392°F (200°C) in psi	1233	1035	986	887	798	629	518	345	247	197
Max. Working Pressure at 482°F (250°C) in bar	80	67	64	58	51	41	34	22	16	13
Max. Working Pressure at 482°F (250°C) in psi	1160	974	928	835	742	592	487	325	232	186
Ordinary value W/m	150	180	240	300	350	400	500	600	700	850
Min. bending radius in mm	50	65	80	100	125	150	200	250	320	380
Min. bending radius in inch	2,00	2,50	3,15	4,00	5,00	5,90	8,00	10,00	13,00	15,00

Installation and Operation Manual Heated Hoses

Type K, KA or KR PTFE-C11 corrugated hose PH370

with parallel corrugation, making them very flexible
 with one braided layer of stainless steel wire 304/316
 operating temperature -65 until 482°F (-54...250°C)
 max. installation length 19,7 until 1890inch (0,5...48m).



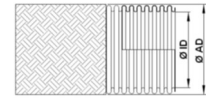
Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6,60	8,13	9,65	12,83	16,00	19,18	25,93	31,88	38,23	50,93
Nominal-Inner Diameter NW (DN) in inch	1/4	5/16	3/8	1/2	5/8	3/4	1,0	1.1/4	1.1/2	2.0
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	140	128	120	108	80	64	44	36	28	20
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	2030	1856	1740	1566	1160	928	638	522	406	290
Max. Working Pressure at 212°F (100°C) in bar	133	122	114	103	76	61	42	34	27	19
Max. Working Pressure at 212°F (100°C) in psi	1929	1763	1653	1488	1102	882	606	496	386	276
Max. Working Pressure at 392°F (200°C) in bar	115	105	98	89	66	52	36	30	23	16
Max. Working Pressure at 392°F (200°C) in psi	1665	1522	1427	1284	951	761	523	428	333	238
Max. Working Pressure at 482°F (250°C) in bar	84	77	72	65	48	38	26	22	17	12
Max. Working Pressure at 482°F (250°C) in psi	1218	1114	1044	940	696	557	383	313	244	174
Ordinary value W/m	110	130	150	180	240	300	350	400	500	600
Min. bending radius in mm	20	20	20	25	50	65	90	110	150	200
Min. bending radius in inch	0,80	0,80	0,80	1,00	2,00	2,60	3,60	4,40	6,00	8,00

Installation and Operation Manual Heated Hoses

Type K, KA or KR PFA-C1 corrugated hose BWF1

with parallel corrugation, making them very flexible
 with one braided layer of steel wire and reinforcing fibreglass
 operating temperature -65 until 392F (-54...200°C)
 max. installation length 19,7 until 1890inch (0,5...48m).



Suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	8	10	12	16	20
Nominal-Inner Diameter NW (DN) in inch	0,32	0,40	0,48	0,64	0,80
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	72	70	70	70	42
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	1044	1015	1015	1015	609
Max. Working Pressure at 212°F (100°C) in bar	65	63	63	63	38
Max. Working Pressure at 212°F (100°C) in psi	940	914	914	914	548
Max. Working Pressure at 392°F (200°C) in bar	58	56	56	56	34
Max. Working Pressure at 392°F (200°C) in psi	835	812	812	812	487
Max. Vacuum Pressure at 68°F to 122°F (20°-50°C) in mbar	360	350	350	350	210
Max. Vacuum Pressure at 68°F to 122°F (20°-50°C) in psi	5,2	5,1	5,1	5,1	3,0
Max. Vacuum Pressure at 212°F (100°C) in mbar	324	315	315	315	189
Max. Vacuum Pressure at 212°F (100°C) in psi	4,7	4,6	4,6	4,6	2,7
Max. Vacuum Pressure at 392°F (200°C) in mbar	288	280	280	280	168
Max. Vacuum Pressure at 392°F (200°C) in psi	4,2	4,1	4,1	4,1	2,4
Ordinary value W/m	130	150	180	240	300
Min. bending radius in mm	25	37	40	50	62
Min. bending radius in inch	1,00	1,48	1,60	2,00	2,48

Installation and Operation Manual Heated Hoses

Type KA stainless steel corrugated hose SS-T1 ICA

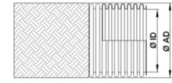
with parallel corrugation for gas transportation

with one braided layer of stainless steel wire 1.4541

operating temperature -328 until 1022°F (-200...550°C)

length 19,7 to 1890inch (0,5 to 48m) until nominal inner diameter to 1,28inch(32mm);

length 19,7 to 472inch (0,5 to 12m) until nominal inner diameter from 1,6 to 6,0inch (40 to 150mm).



Suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	10	13	16	20	25	32	40	50	65	80	100	125	150
Nominal-Inner Diameter NW (DN) in inch	0,40	0,52	0,64	0,80	1,00	1,28	1,60	2,00	2,60	3,20	4,00	5,00	6,00
Max.Working Pressure at 68°F to 122°F (20°-50°C) in bar	49,0	46,0	43,0	33,0	26,0	23,0	20,0	16,0	14,0	12,0	9,0	8,0	6,5
Max.Working Pressure at 68°F to 122°F (20°-50°C) in psi	711	667	624	479	377	334	290	232	203	174	131	116	94
Max. Working Pressure at 212°F (100°C) in bar	41	38	36	27	22	19	17	13	12	10	7,5	6,6	5,4
Max. Working Pressure at 212°F (100°C) in psi	590	554	518	397	313	277	241	193	168	144	108	96	78
Max. Working Pressure at 392°F (200°C) in bar	36	34	32	24	19	17	15	12	10	8,9	6,7	5,9	4,8
Max. Working Pressure at 392°F (200°C) in psi	526	494	461	354	279	247	215	172	150	129	97	86	70
Max. Working Pressure at 482°F (250°C) in bar	34	32	30	23	18	16	14	11	10	8,4	6,3	5,6	4,6
Max. Working Pressure at 482°F (250°C) in psi	497	467	436	335	264	233	203	162	142	122	91	81	66
Ordinary value W/m	150	180	240	300	350	400	500	600	700	850	1000	1250	1500
Min. bending radius in mm	190	210	285	310	375	405	480	550	675	750	920	1160	1320
Min. bending radius in inch	8	8	11	12	15	16	19	22	27	30	37	46	53

Installation and Operation Manual Heated Hoses

Type KA stainless steel corrugated hose SS-T2 ICB

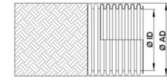
with parallel corrugation for gas transportation

with one braided layer of stainless steel wire 1.4541

operating temperature -328 until 1022°F (-200...550°C)

length 19,7 to 1890inch (0,5 to 48m) until nominal inner diameter to 1,28inch(32mm);

length 19,7 to 472inch (0,5 to 12m) until nominal inner diameter from 1,6 to 4,0inch (40 to 100mm).



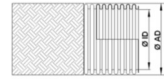
Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	10	13	16	20	25	32	40	50	65	80	100
Nominal-Inner Diameter NW (DN) in inch	0,40	0,52	0,64	0,80	1,00	1,28	1,60	2,00	2,60	3,20	4,00
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	69,0	66,0	59,0	49,0	39,0	33,0	26,0	21,0	16,0	14,0	13,0
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	1001	957	856	711	566	479	377	305	232	203	189
Max. Working Pressure at 212°F (100°C) in bar	57	55	49	41	32	27	22	17	13	12	10,8
Max. Working Pressure at 212°F (100°C) in psi	830	794	710	590	469	397	313	253	193	168	156
Max. Working Pressure at 392°F (200°C) in bar	51	49	44	36	29	24	19	16	12	10,4	9,6
Max. Working Pressure at 392°F (200°C) in psi	740	708	633	526	418	354	279	225	172	150	139
Max. Working Pressure at 482°F (250°C) in bar	48	46	41	34	27	23	18	15	11	9,8	9,1
Max. Working Pressure at 482°F (250°C) in psi	700	670	599	497	396	335	264	213	162	142	132
Ordinary value W/m	150	180	240	300	350	400	500	600	700	850	1000
Min. bending radius in mm	205	225	305	330	385	415	490	570	685	770	960
Min. bending radius in inch	8	9	12	13	15	17	20	23	27	31	38

Installation and Operation Manual Heated Hoses

Type K stainless steel corrugated hose SS-T1 FBA

For food, pharmaceuticals, chemicals; broadly wavy ring; FDA approval
with one braided layer of stainless steel wire 1.4541
operating temperature -328 until 1022°F (-200...550°C)



length 19,7 to 1890inch (0,5 to 48m) until nominal inner diameter to 1,28inch(32mm);

length 19,7 to 472inch (0,5 to 12m) until nominal inner diameter from 1,6 to 6,0inch (40 to 150mm).

Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6	8	10	13	16	20	25	32	40	50	65	80	100	125	150
Nominal-Inner Diameter NW (DN) in inch	0,24	0,32	0,40	0,52	0,64	0,80	1,00	1,28	1,60	2,00	2,60	3,20	4,00	5,00	6,00
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	92,0	75,0	66,0	52,0	41,0	33,0	26,0	26,0	21,0	21,0	16,0	15,0	10,0	8,5	7,0
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	1334	1088	957	754	595	479	377	377	305	305	232	218	145	123	102
Max. Working Pressure at 212°F (100°C) in bar	67	55	48	38	30	24	19	19	15	15	12	11	7,3	6,2	5,1
Max. Working Pressure at 212°F (100°C) in psi	974	794	699	550	434	349	275	275	222	222	169	159	106	90	74
Max. Working Pressure at 392°F (200°C) in bar	56	46	40	32	25	20	16	16	13	13	10	9,2	6,1	5,2	4,3
Max. Working Pressure at 392°F (200°C) in psi	814	663	584	460	363	292	230	230	186	186	142	133	88	75	62
Max. Working Pressure at 482°F (250°C) in bar	53	44	38	30	24	19	15	15	12	12	9,3	8,7	5,8	4,9	4,1
Max. Working Pressure at 482°F (250°C) in psi	774	631	555	437	345	278	219	219	177	177	135	126	84	71	59
Ordinary value W/m	110	130	150	180	240	300	350	400	500	600	700	850	1000	1250	1500
Min. bending radius in mm	110	130	150	165	195	225	260	300	340	390	460	660	750	1000	1250
Min. bending radius in inch	4	5	6	7	8	9	10	12	14	16	18	26	30	40	50

Installation and Operation Manual Heated Hoses

Type K and KA stainless steel corrugated hose SS-T1 FPCA

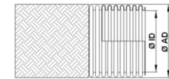
parallel, tightly corrugated for tight bending radii

with one braided layer of stainless steel wire 1.4541

operating temperature -328 until 1022°F (-200...550°C)

length 19,7 to 1890inch (0,5 to 48m) until nominal inner diameter to 1,28inch(32mm);

length 19,7 to 472inch (0,5 to 12m) until nominal inner diameter from 1,6 to 6,0inch (40 to 150mm).



Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	13	16	20	25	32	40	50	65	80	100	125	150
Nominal-Inner Diameter NW (DN) in inch	0,52	0,64	0,80	1,00	1,28	1,60	2,00	2,60	3,20	4,00	5,00	6,00
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	52,0	41,0	36,0	26,0	26,0	21,0	21,0	16,0	15,0	10,0	8,5	7,0
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	754	595	522	377	377	305	305	232	218	145	123	102
Max. Working Pressure at 212°F (100°C) in bar	43	34	30	22	22	17	17	13	12	8,3	7,1	5,8
Max. Working Pressure at 212°F (100°C) in psi	626	493	433	313	313	253	253	193	181	120	102	84
Max. Working Pressure at 392°F (200°C) in bar	38	30	27	19	19	16	16	12	11,1	7,4	6,3	5,2
Max. Working Pressure at 392°F (200°C) in psi	558	440	386	279	279	225	225	172	161	107	91	75
Max. Working Pressure at 482°F (250°C) in bar	36	29	25	18	18	15	15	11	10,5	7,0	6,0	4,9
Max. Working Pressure at 482°F (250°C) in psi	528	416	365	264	264	213	213	162	152	102	86	71
Ordinary value W/m	180	240	300	350	400	500	600	700	850	1000	1250	1500
Min. bending radius in mm	124	146	169	195	225	255	293	245	495	593	1000	1250
Min. bending radius in inch	5	6	7	8	9	10	12	10	20	24	40	50

Installation and Operation Manual Heated Hoses

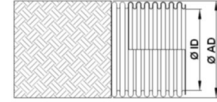
Type K and KA stainless steel corrugated hose SS-T1 KBA

parallel corrugated, standard hose

with one braided layer of stainless steel wire 1.4404

operating temperature -328 until 1022°F (-200...550°C)

length 19,7 to 1890inch (0,5 to 48m)



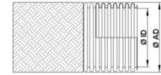
Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6	8	10	13	16	20	25	32	40	50
Nominal-Inner Diameter NW (DN) in inch	0,24	0,32	0,40	0,52	0,64	0,80	1,00	1,28	1,60	2,00
Max.Working Pressure at 68°F to 122°F (20°-50°C) in bar	92,0	75,0	66,0	52,0	41,0	33,0	26,0	26,0	21,0	21,0
Max.Working Pressure at 68°F to 122°F (20°-50°C) in psi	1334	1088	957	754	595	479	377	377	305	305
Max. Working Pressure at 212°F (100°C) in bar	67	55	48	38	30	24	19	19	15	15
Max. Working Pressure at 212°F (100°C) in psi	974	794	699	550	434	349	275	275	222	222
Max. Working Pressure at 392°F (200°C) in bar	56	46	40	32	25	20	16	16	13	13
Max. Working Pressure at 392°F (200°C) in psi	814	663	584	460	363	292	230	230	186	186
Max. Working Pressure at 482°F (250°C) in bar	53	44	38	30	24	19	15	15	12	12
Max. Working Pressure at 482°F (250°C) in psi	774	631	555	437	345	278	219	219	177	177
Ordinary value W/m	110	130	150	180	240	300	350	400	500	600
Min. bending radius in mm	80	125	129	139	160	169	190	260	300	320
Min. bending radius in inch	3	5	5	6	6	7	8	10	12	13

Installation and Operation Manual Heated Hoses

Type K and KR stainless steel corrugated hose SS-T1 DCA S

parallel thick-walled for high pressure applications with one braided layer of stainless steel wire 1.4541



operating temperature -328 until 1022°F (-200...550°C)

length 19,7 to 1890inch (0,5 to 48m) until nominal inner diameter to 1,28inch(32mm);

length 19,7 to 472inch (0,5 to 12m) until nominal inner diameter from 1,6 to 6,0inch (40 to 150mm).

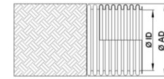
Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	20	25	32	40	50	65	80	100	125	150
Nominal-Inner Diameter NW (DN) in inch	0,80	1,00	1,28	1,60	2,00	2,60	3,20	4,00	5,00	6,00
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	49,0	39,0	33,0	30,0	26,0	23,0	16,0	13,0	10,5	8,2
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	711	566	479	435	377	334	232	189	152	119
Max. Working Pressure at 212°F (100°C) in bar	41	32	27	25	22	19	13	10,8	8,7	6,8
Max. Working Pressure at 212°F (100°C) in psi	590	469	397	361	313	277	193	156	126	99
Max. Working Pressure at 392°F (200°C) in bar	36	29	24	22	19	17	11,8	9,6	7,8	6,1
Max. Working Pressure at 392°F (200°C) in psi	526	418	354	322	279	247	172	139	113	88
Max. Working Pressure at 482°F (250°C) in bar	34	27	23	21	18	16	11,2	9,1	7,4	5,7
Max. Working Pressure at 482°F (250°C) in psi	497	396	335	305	264	233	162	132	107	83
Ordinary value W/m	300	350	400	500	600	700	850	1000	1250	1500
Min. bending radius in mm	600	680	750	850	950	1050	1280	1430	1700	2100
Min. bending radius in inch	24	27	30	34	38	42	51	57	68	84

Installation and Operation Manual Heated Hoses

Type K and KR stainless steel corrugated hose SS-T2 DCB S

parallel thick-walled for high pressure applications with two braided layer of stainless steel wire 1.4541



operating temperature -328 until 1022°F (-200...550°C)

length 19,7 to 1890inch (0,5 to 48m) until nominal inner diameter to 1,28inch(32mm);

length 19,7 to 472inch (0,5 to 12m) until nominal inner diameter from 1,6 to 6,0inch (40 to 150mm).

Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	20	25	32	40	50	65	80	100	125	150
Nominal-Inner Diameter NW (DN) in inch	0,80	1,00	1,28	1,60	2,00	2,60	3,20	4,00	5,00	6,00
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	79,0	66,0	59,0	52,0	43,0	33,0	26,0	21,0	16,0	13,0
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	1146	957	856	754	624	479	377	305	232	189
Max. Working Pressure at 212°F (100°C) in bar	66	55	49	43	36	27	22	17,4	13,3	10,8
Max. Working Pressure at 212°F (100°C) in psi	951	794	710	626	518	397	313	253	193	156
Max. Working Pressure at 392°F (200°C) in bar	58	49	44	38	32	24	19,2	15,5	11,8	9,6
Max. Working Pressure at 392°F (200°C) in psi	848	708	633	558	461	354	279	225	172	139
Max. Working Pressure at 482°F (250°C) in bar	55	46	41	36	30	23	18,2	14,7	11,2	9,1
Max. Working Pressure at 482°F (250°C) in psi	802	670	599	528	436	335	264	213	162	132
Ordinary value W/m	300	350	400	500	600	700	850	1000	1250	1500
Min. bending radius in mm	640	710	790	900	1000	1100	1380	1500	1800	2300
Min. bending radius in inch	26	28	32	36	40	44	55	60	72	92

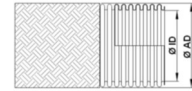
Installation and Operation Manual Heated Hoses

Type K and KR stainless steel corrugated hose SS-T2 ABB S

parallel thick-walled for high pressure applications with two braided layer of stainless steel wire 1.4404

operating temperature -328 until 1022°F (-200...550°C)

length 19,7 to 1890inch (0,5 to 48m)



Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6	8	10	13	16
Nominal-Inner Diameter NW (DN) in inch	0,24	0,32	0,40	0,52	0,64
Max.Working Pressure at 68°F to 122°F (20°-50°C) in bar	164,0	164,0	148,0	195,0	195,0
Max.Working Pressure at 68°F to 122°F (20°-50°C) in psi	2378	2378	2146	2828	2828
Max. Working Pressure at 212°F (100°C) in bar	120	120	108	142	142
Max. Working Pressure at 212°F (100°C) in psi	1736	1736	1567	2064	2064
Max. Working Pressure at 392°F (200°C) in bar	100	100	90	119	119
Max. Working Pressure at 392°F (200°C) in psi	1451	1451	1309	1725	1725
Max. Working Pressure at 482°F (250°C) in bar	95	95	86	113	113
Max. Working Pressure at 482°F (250°C) in psi	1379	1379	1245	1640	1640
Ordinary value W/m	110	130	150	180	240
Min. bending radius in mm	110	130	150	165	195
Min. bending radius in inch	4	5	6	7	8

Installation and Operation Manual Heated Hoses

Type K and KA stainless steel corrugated hose SS-T1 IBA

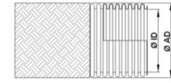
parallel corrugated, DVGW worksheet G260, DIN 3384 approval

with one braided layer of stainless steel wire 1.4404

operating temperature -328 until 1022°F (-200...550°C)

length 19,7 to 1890inch (0,5 to 48m) until nominal inner diameter to 1,28inch(32mm);

length 19,7 to 472inch (0,5 to 12m) until nominal inner diameter from 1,6 to 4,0inch (40 to 100mm).



Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6	8	10	13	16	20	25	32	40	50	65	80	100
Nominal-Inner Diameter NW (DN) in inch	0,24	0,32	0,40	0,52	0,64	0,80	1,00	1,28	1,60	2,00	2,60	3,20	4,00
Max. Working Pressure at 68°F to 122°F (20°-50°C) in bar	98,0	89,0	49,0	46,0	43,0	33,0	26,0	23,0	20,0	16,0	13,0	12,0	9,0
Max. Working Pressure at 68°F to 122°F (20°-50°C) in psi	1421	1291	711	667	624	479	377	334	290	232	189	174	131
Max. Working Pressure at 212°F (100°C) in bar	72	65	36	34	31	24	19	17	15	12	9	9	6,6
Max. Working Pressure at 212°F (100°C) in psi	1037	942	519	487	455	349	275	243	212	169	138	127	95
Max. Working Pressure at 392°F (200°C) in bar	60	54	30	28	26	20	16	14	12	10	7,9	7,3	5,5
Max. Working Pressure at 392°F (200°C) in psi	867	787	433	407	380	292	230	203	177	142	115	106	80
Max. Working Pressure at 482°F (250°C) in bar	57	52	28	27	25	19	15	13	12	9	7,5	7,0	5,2
Max. Working Pressure at 482°F (250°C) in psi	824	748	412	387	362	278	219	193	168	135	109	101	76
Ordinary value W/m	110	130	150	180	240	300	350	400	500	600	700	850	1000
Min. bending radius in mm	140	165	190	210	185	310	375	405	480	550	675	750	920
Min. bending radius in inch	6	7	8	8	7	12	15	16	19	22	27	30	37

Installation and Operation Manual Heated Hoses

Type K and KR PA-HIGH PRESSURE smooth hose PA-T3 NY300

with three layers

operating temperature -40 until 212°F (-40...100°C)

max installations length 19,7 until 1890inch (0,5...48m)



Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6,30	8,20	9,70	12,80	16,00	19,60	25,00	32,00
Nominal-Inner Diameter NW (DN) in inch	1/4	5/16	3/8	1/2	5/8	3/4	1,0	1.1/4
Max.Working Pressure at 68°F to 122°F (20°-50°C) in bar	360	320	300	280	264	240	220	220
Max.Working Pressure at 68°F to 122°F (20°-50°C) in psi	5220	4640	4350	4060	3828	3480	3190	3190
Max. Working Pressure at 212°F (100°C) in bar	324	288	270	252	238	216	198	198
Max. Working Pressure at 212°F (100°C) in psi	4698	4176	3915	3654	3445	3132	2871	2871
Ordinary value W/m	110	130	150	180	240	300	350	400
Min. bending radius in mm	70	100	120	165	200	240	280	400
Min. bending radius in inch	3	4	5	7	8	10	11	16

Installation and Operation Manual Heated Hoses

Type K and KR PA-HIGH PRESSURE smooth hose PA-T3 NY500

with three braided layer 2x Aramid fiber, 1x steel braid
 operating temperature -40 until 212°F (-40...100°C)
 max installations length 19,7 until 1890inch (0,5...48m)



Not suitable for vacuum

Nominal-Inner Diameter NW (DN) in mm	6,60	8,10	9,80	13,00	16,30	19,18	25,93
Nominal-Inner Diameter NW (DN) in inch	1/4	5/16	3/8	1/2	5/8	3/4	1,0
Max.Working Pressure at 68°F to 122°F (20°-50°C) in bar	560	560	560	472	400	360	252
Max.Working Pressure at 68°F to 122°F (20°-50°C) in psi	8120	8120	8120	6844	5800	5220	3654
Max. Working Pressure at 212°F (100°C) in bar	504	504	504	425	360	324	227
Max. Working Pressure at 212°F (100°C) in psi	7308	7308	7308	6160	5220	4698	3289
Ordinary value W/m	110	130	150	180	240	300	350
Min. bending radius in mm	35	60	90	100	160	180	250
Min. bending radius in inch	1	2	4	4	6	7	10



All data for pressure and temperature on the type plate are maximum values

Bending radius:

The following rules must be observed for the heated structure!

The minimum bending radius of the heated hose is calculated using the following formula:

$$\textit{Minimum bending radius}_{\textit{Heated hose}} = 5 \cdot \textit{Outer diameter}_{\textit{Heated hose}}$$

If the minimum bending radius of the basic hose is larger compared to the one of the heated hose (5 x outer diameter), then the minimum bending radius of the basic hose must be used.

In the event that the minimum bending radius of the external protection is larger compared to the one of the basic hose or the heated hose, the minimum bending radius of the external protection must be specified. As a rule, this can occur with corrugated hoses that are used as external protection.

In summary:

The weakest component of the "heated hose" assembly is always to be specified. The weakest component is the one with the largest minimum bending radius.

9.5 Fittings

The fitting size depends on the nominal inner diameter (DN) and nominal width (NW) of the heated hose. Note that the inner diameter of the fitting is not identical to the nominal width of the heated hose. The inner diameter, therefore, restricts the heated hose passage by design.

Nominal diameter DN (NW) of the PTFE core	4	6	8	10	12	16	20	25	32	40
(mm)										
(in)	0.16	0.24	0.31	0.39	0.47	0.63	0.79	0.98	1.26	1.58
Inner diameter of fitting (mm)	3.0	4.5	6.0	7.5	10.0	12.5	16.0	20.1	27.5	31.5
(in)	0.12	0.18	0.24	0.29	0.39	0.49	0.63	0.79	1.08	1.24

9.6 Warranty

Kletti GmbH (hereinafter “Kletti”) provides the following limited warranty to the original purchaser (hereinafter “the Customer”):

If the product is used by the Customer in a 1-shift operation, Kletti provides a limited warranty against defects in design, material or workmanship for a period of 12 months from the date of shipment (hereinafter “the Warranty Period”). In this case, all parts that Kletti determines to have failed as a result of defects in design, material or workmanship and that the customer has returned by freight prepaid, will be replaced by like parts free of charge, unless agreed otherwise. Kletti is not liable for damage caused by natural wear and tear or incorrect handling.

If the product is used by the Customer in a 2-shift operation, the Warranty Period is reduced to 6 months. If the product is used by the Customer in a 3-shift operation, the Warranty Period is reduced to 4 months.

9.7 Specifications and tolerances

Refer to the type plate for the specifications of your heated hose.

Supply voltage, refer to type plate: AC +/- 10%

Electrical performance tolerance: +5% / -10%

Length tolerance: <= 3,28ft (1,0m) = +-4%

> 3,28ft (1,0m) = +/- 2%

Sensor: Refer to type plate

Electrical connection: As ordered by customer

Ambient temperature: -40 to 140°F (-40 to 60°C)

Ingress protection (IEC 60529): IP54 or IP65 or IP66 if not specified otherwise

Electrical safety: In accordance with EN IEC 60204-1