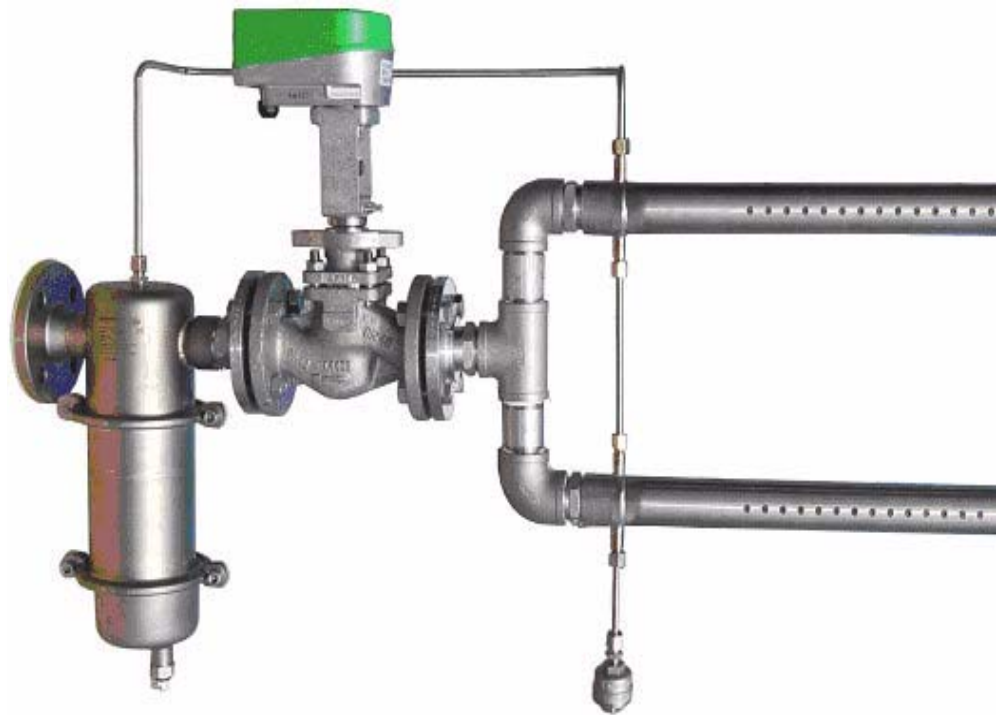


### Steam Injection Humidifiers DDS



for existing steam nets

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DDS January 2011

Information in this manual is subject to change or alterate without prior notice.



**Warning, Hazardous Voltage:** All work to be performed by trained personnel only. All electrical installation and servicing of the electrical components of this unit to be performed by qualified electricians only. Disconnect power supply before installation and servicing!

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## 1. Introduction

Dear Customer,

HygroMatik steam Injection humidifiers, produce dry steam for humidification in A/C ducting and other applications.

Your steam injection humidifier comprises steam separators, steam lances, steam trap, control valve and actuator. It is extremely economical, safe in operation and easy to use.

In order to operate the HygroMatik steam injection humidifier in a safe, orderly and economical fashion please take the time to read this operating manual.

Please use the steam injection humidifier in a proper condition, use only as it is intended and with regard to all the safety and hazard indications and notes in this manual.

If you have any queries at all please get in touch as follows:

**AIRTREND Limited**

Predstavništvo u Beogradu

Kumanovska 14, 11000 Beograd

Tel: 011 383 68 86, 308 57 40

Faks: 011 344 41 13

e-mail: gobrid@eunet.rs

web: www.airtrend.rs

### 1.1 Directions for Use

Your HygroMatik steam injection humidifier makes use of existing live steam for humidification purposes.

Proper usage involves strict adherence to our installation, de-and re-installation, commissioning, operation and maintenance requirements as well as proper disposal procedures.

Only qualified and authorised personnel may operate or service the unit. Persons having to do with transport or any work on and with the unit must previously have read and understood the relevant parts of the manual, especially the section on safety requirements. Additionally, the operator must inform such personnel about any possible hazards. Please place an example of the operating instructions, clearly visible, at or near the installed unit.

### 1.2 Typographic Distinctions

- preceded by a bullet: general specifications.
- » preceded by an arrow: Procedures for servicing or maintenance which should or must be performed in the indicated order.
- Installation step which must be checked off.

## 2. Safety Instructions

### Overview

Adherence to these safety instructions are required by law. They are there for your safety and for the prevention of industrial accidents .

### Warnings and Safety symbols

The following safety symbols indicate texts that contain warnings concerning possible hazards. Please familiarise yourself with these symbols.



**Warning:** Ignoring this warning may result in bodily injury and/or damage to the unit.



**Warning, High Voltage:** Dangerous electrical voltage. Ignoring this warning may cause serious bodily injury.



**Note:** Materials or other items that must be disposed of according to the law.



**Note:** Indicates explanations or cross references to other parts of the manual.

## 2.1 Operational Safety Instructions

### Overview

In the case of malfunction shut off steam supply and make sure it cannot be opened by unauthorised personnel. Correct malfunction immediately.

After repair, operational safety must be checked out by authorised personnel.

Use only original spare parts.

National laws also fully apply to the use of this steam injection humidifier.

### Accident prevention laws

Please comply with accident prevention laws:

See UVV Electrical Appliances and associated units (VBG 4). This can prevent injury to yourself and others.

### Operating the Steam Injection Humidifier

Please do not do any work in such a way as to endanger the safe operation of the unit.

Check all safety and monitoring elements regularly for correct functioning.

Do not remove disable or de-install any safety-relevant items.

## Installation, de-installation, servicing and repair

Steam injection humidifier parts on which maintenance or repair work is to be done must be disconnected from voltage and the steam supply shut off. Installation of any additional parts is allowed only after written permission from the manufacturer.

### Electrical

Only qualified electricians may carry out electrical work on the unit.

Remove voltage from any components being worked on. If the energy supply is malfunctioning switch off the unit immediately .

After electrical work or repair is carried out all safety elements must be tested for proper functioning.



**Attention:** Use only steam with a minimum pressure of 0,5 bar and a maximum pressure of 4 bar at the entry point of the steam injection humidifier.



**Attention:** Steam pipes are hot and care must be taken accordingly.



**Attention:** use only steam without chemical additives.



**Attention:** Steam supply must be dimensioned so that the steam velocity does not exceed 25 m/s.



**Attention:** The control valves are not stop valves. They have been optimised to control the necessary steam supply. They are metal to metal sealed according to IEC 534-4 Class IV and can, therefore, show a leakage of 0.01 % when supplied. We recommend the use of a stop valve in order to ensure that the steam supply is completely shut off.



**Attention:** There may be impurities in the steam supply. In order to prevent valve damage there must be a filter installed with a pore diameter of <math><0.16\text{ mm}</math>.



**Attention:** In order to maintain a continuous and constant humidification the humidity sensors should not be fitted in the supply duct.

## 2.2 Disposal after de-installation



**Note:** The operator is responsible for the lawful disposal of the steam injection humidifier components.

### 3. Transport

#### Overview



**Note:** If there is any transport damage and/or missing items please get in touch with the transport company or supplier immediately.

#### 3.1 Packing



**Note:** Please observe the pictures on the packing.

The kind of packing used is dependent upon the type of unit supplied. .

Accessories, such as steam traps, that can be part of the complete order are packed separately.

If the control valve is part of the delivery it will be delivered already installed on the steam separator. Additional screw fittings are packaged separately.

Steam lances are delivered in special protective wrappings.

#### 3.2 Temporary storage

The steam injection humidifier must be stored in a dry and frost free area.

#### 3.3 Checking for correct and complete delivery

On delivery please check that:

- the delivery corresponds to the order and delivery note.
- The data on the manufacturer's name plate corresponds to the order and supply note
- All delivered components are in a proper condition



**Note:** Take care when transporting the steam injection humidifier in order to prevent damage especially when loading and unloading.

Take note of time limits for reporting damaged deliveries and damage assessment. Here is a list of time limits :

Transport organisation	after delivery
Post	latest 24 hours.
Rail	latest 7 days
Rail and road	latest 4 days
Package services	immediate



## 4. Function and Assembly

The HygroMatik Steam Injection Humidifier comprises 4 basic elements:

- Separator
- Control valve with or without control operation
- Steam Lances
- Additional materials

There is a stainless steel version **Type A**

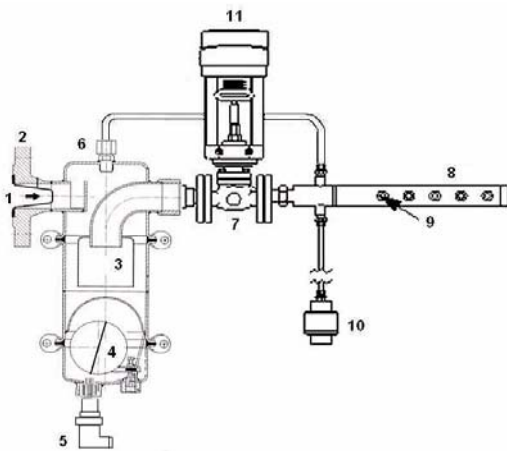
and a mixed material version **Type C**

### 4.1 Function

Steam flows through a **dirt particle trap (1)** over the **Separator interface (2)** into the **Separator (3)**. The separator separates condensation from the steam.

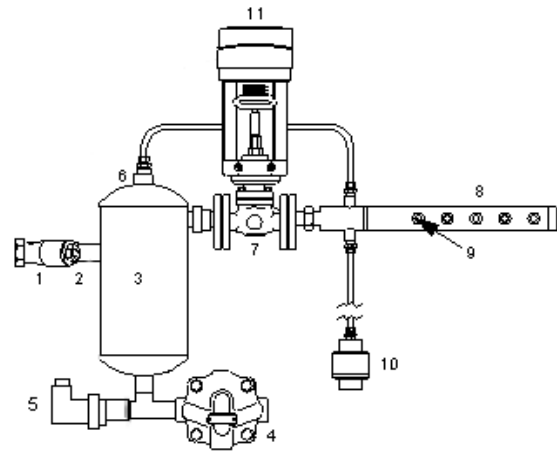
Condensation is drained using the **float controlled condensation drainage**. The **Start-up security feature (5)** measures the temperature at the condensation return. **Operation switch (11)** is activated when the switch temperature has reached approx. 80°C.

Now the main portion of the steam flows through the **control valve (7)**. The amount of steam is regulated over the operation switch (11).



HygroMatik DDS Type A

\*all stainless steel construction



HygroMatik DDS Type C

\*dirt trap, KS-Condensation drain and Valve as castings

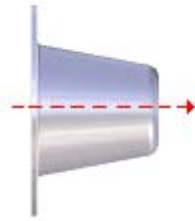
**Steam lances (n) (8)** are flanged or screwed onto the valve exit side.

Dried steam is blown out through the specially formed **nozzles (9)** that take the dried steam from the pipe centre. The nozzles are press-fitted into the steam lances.

The steam lance heating system is fed over **connection (6)** on the separator. Alternatively there is the possibility to seal the separator connection and operate the steam lance heating system from a separate steam reservoir. A thermic **Capsule Condensation Drain (10)** ensures that condensation in the steam lance heating system is drained off.

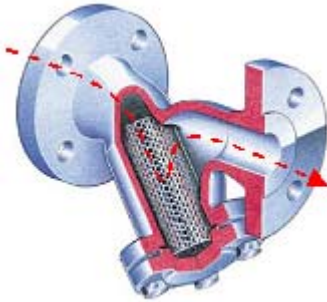
## 5. Strainer

There should be a strainer installed in the steam supply line directly in front of every separator. Only if this is done can it be guaranteed that there are no foreign particles in the humidifier unit.



Strainer type A  
\*installed in the entry flange

Valve cone and valve face in both the control valve and steam trap are sensitive to fouling. Dirt particles between the face and the cone prevent normal closure and have a corrosive effect. .

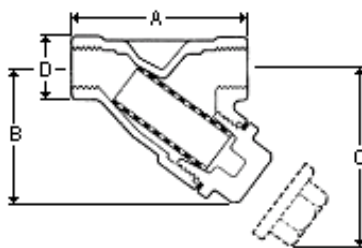


Strainer type C  
\*Principle only; delivery in screwed version

### Function

Steam flows through the inlet in the cylindrical version (type C) or the conical strainer (type A) and through the holes to the exit. Foreign matter is retained by the strainer.

### 5.1 Technical Data



Strainer 12.1 for type C		Vers .20	Vers. 40
Nominal pressure setting		PN 25	
Female thread		3/4"	1 1/2"
Weight		0,60 kg	2,4 kg
Dimensions	A	93mm	153mm
	B	65mm	115mm
	C	110mm	190mm
	D	38mm	62mm
<b>Materials</b>			
Housing		GGG40	
Filter fitting		GGG40	
Seal		Graphite, reinforced with nickel	
Coarse strainer		Stainless steel 316L	
<b>pore size, coarse strainer</b>		0,16mm	

## 6. Separator

The stainless steel separator is the essential component for moisture separation. The separator is available in versions 20 and 40. The separator size is dependent upon the desired steam output and available steam pressure.

### 6.1 Function

Steam flows through the **pipe union (1)** into the separator.

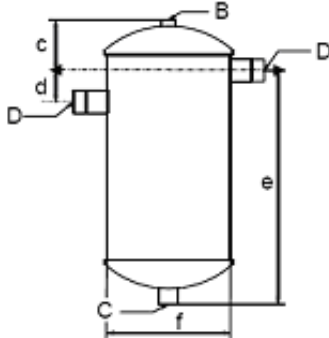
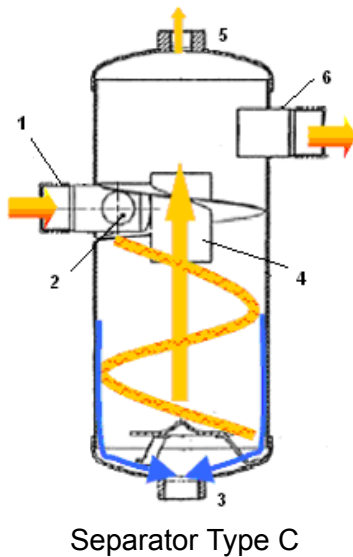
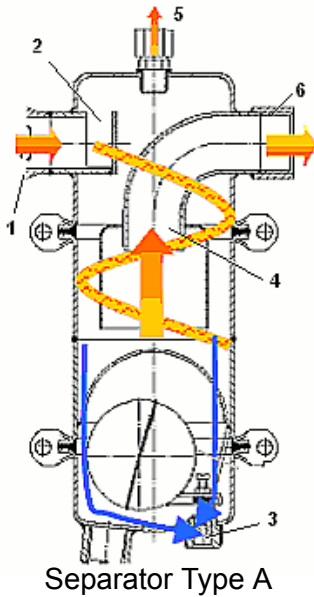
Steam and condensate are separated by the joint action of the **inlet pipe (2)** and the spiral-shaped flow system.

The aerosole droplets present in the steam are thrown against the outer wall by centrifugal force which separates them from the steam phase. The droplets are conveyed through the **drain (3)** into the condensate return. This prevents droplets from being transported by the steam.

Steam is conveyed into the upper part of the separator chamber via a **supply pipe (4)** or directly to the valve.

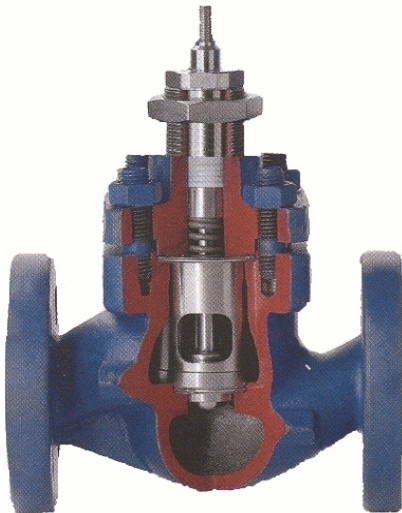
A certain amount of steam flows through the **connector (5)** and feeds the steam lance heating system.

The bulk of the steam exits the separator through the **outlet connection (6)** and flows through the control valve.



### 6.2 Technical Data

Separator		DDS20		DDS40	
		Type A	Type C	Type A	Type C
Thread connections	B	1/4"	1/4"	1/4"	1/4"
	C	1/2"	1/2"	1/2"	1"
	D	DN25	3/4"	DN40	1 1/2"
Weight [kg]		3,6	1,46	7,3	3,70
Dimensions [mm]	c	45	62	60	79
	d	-	43	-	70
	e	235	208	340	316
	f	89	105	122	152
Materials	Housing internal	CrNiMo	1.4301	CrNiMo	1.4301
		Steel	1.4301 VA	iMo Steel	1.4301 VA
Max. Humidification output		270	180	770	730
Steam Pressure		max. 4 bar ü			



## 7. Control Valve and Actuator

The desired steam quantity is set over a control valve, which is located between separator and steam lance. The control valve itself is controlled by an electrical or pneumatic actuator.

If control valve and actuator are included in the delivery the relevant operating and installation instructions will be enclosed.

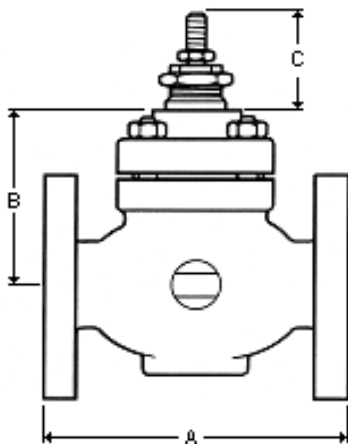
If control units from other manufacturers are used the customer must check whether these are compatible with the steam injection humidifier.

### 7.1 Control Valve

The control valve regulates the steam quantity by means of the valve lift. When the valve is closed the valve cone rests against the valve face. When the valve rods lift the cone there is a resultant gap through which the desired quantity of steam flows. The gap can be widened or narrowed as required.

As a general rule the customer is free to use any typical control valve which is approved for steam control.

Standard are the Spirax-Sarco Valves from HygroMatik. Alternative suppliers can be listed on application.



Spirax-Sarco control valves Type LE33; KE63

Flanged	A	B	C	Kvs-value [m <sup>3</sup> /h]
DN15	130	103	69	0.2, 0.4, 0.5, 1.0, 1.6, 4.0
DN20	150	103	69	6.3
DN25	160	103	69	10.0
DN32	180	132	69	16.0
DN40	200	132	69	25.0

## 7.2 Actuator

The actuator controls the valve cone positioning against the valve face. Through continuous actuation a specific control signal can be assigned to every position of the valve cone.

Control valve signal options	
pneumatic	0,2 - 1,0 bar
electrical	3-Position 24V AC (230V on request)
electrical	0 (2) - 10 V, continuous Supply voltage 24V AC
electrical	0 (4) - 20 mA, continuous Supply voltage 24V AC The 500Ohm (or 2x1KOhm parallel) resistor is connected to over connectors 1 and 3. The resistor is attached under the cover.

To prevent air-duct over-saturation all actuators, even pneumatically operated ones, should be equipped with a fail-safe. This fail-safe closes the control valve immediately in the case of power failure or pressure loss.

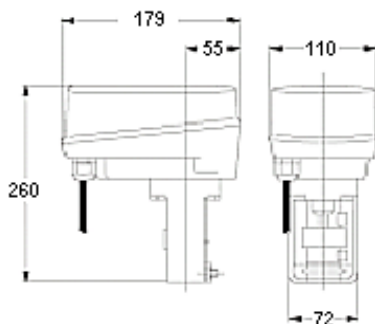
### Electrical Actuator

The spindle and valve cone are set in motion by the electrical actuator by means of a motor.

Electrical Actuators typically require a 24 V AC supply voltage and a control signal of 0-10 V.

Actuators with a 3 position control for modulated control voltages are also available.

In order to comply with DIN 32 730\* an electrical actuator must have a fail-safe function so that in the case of a power failure the control valve is reset into a safe position (fully closed).



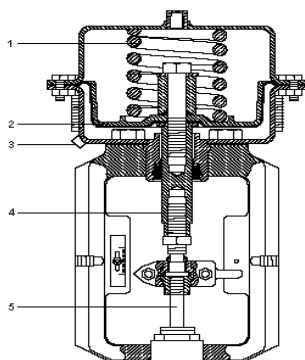
Type HygroMATIK B-4115001

### Pneumatic Actuator

Pneumatic Actuators are controlled using compressed air (e.g. 0,2-1bar).

Compressed air is supplied over a **compressed air supply (3)** to a **diaphragm (2)**. As soon as the supply pressure exceeds the **spring (1)** strength the diaphragm is pushed upwards. This pulls the two actuator **spindles (4)** and **control valve (5)** upwards and the actuator opens.

If control pressure drops the spring lowers the spindle again. In the case of a total pressure loss the spring immediately causes the control valve to close.



Type Spirax Sarco PN9000



Electrical Safety switch  
E-4111952

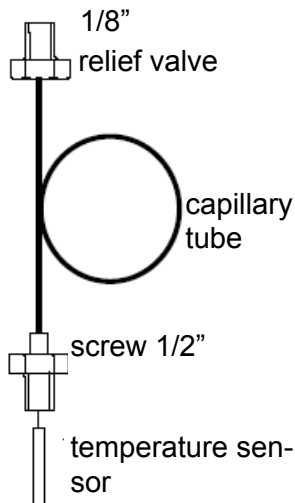
## 8. Start-up safety switch

The start-up safety switch ensures that no condensate from the steam network has entered the air conditioning duct over the steam lances.

### Electrical Start-up safety switch

With an electrical actuator the supply voltage is looped through the start-up safety switch. The start-up safety switch is set to allow the supply voltage through only when a specified temperature (in this case 80°C) is reached.

If the temperature remains below this level the fail-safe function is triggered.



### Pneumatic Start-up safety switch

The pneumatic start-up safety switch keeps an exhaust valve open for compressed air as long as the specified temperature has not been reached.

This prevents control air from entering the actuator.



**Note:** If no start-up safety switch is available it is advisable to let the unit run a few minutes before switching the control on. This allows time for the steam lance heating system to heat the lances.

## 9. Steam Lances

In the **steam lances (1)** dry steam is blown out of specially formed **nozzles (2)**. They are designed for low noise steam emission. The nozzles take steam from the driest area in the steam lance centre.

In order to prevent accumulated condensate or aerosol droplets from being transported with the steam, the steam lances are provided with a **steam lance heating system (3)**. Due to this system such droplets either evaporate or cannot form in the first place.

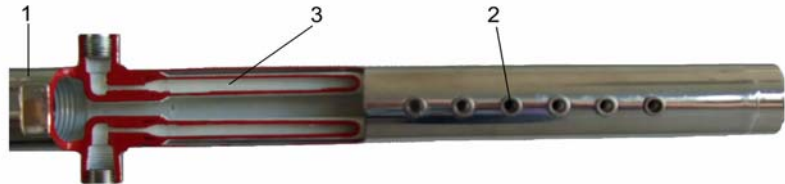
The steam lance heating system can be fed by the separator or from a separate steam reservoir.



**Note:** Steam pressures of 1 bar or higher have an optimum heating effect on the steam lances. With less pressure the pre-heating and re-evaporation times may be lengthened.

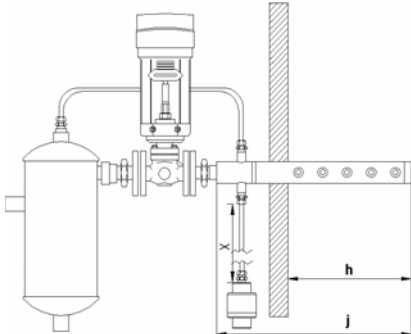
### Re-evaporation

In some cases condensate remains in the steam lances immediately following control valve closure. This condensate is evaporated by the steam lance heating system and exits the steam lances as pressureless steam. Re-evaporation of residual condensate can take up to 20 minutes. The higher the steam pressure the better is the performance of the steam lance heating system and the shorter the evaporation time.



Steam Lances	
Inside thread	M10
casting	rustfree steel casting BS 3146/1.4550
Heating pipe	Stainless steel 1.4404/1.4306
Main pipe	Stainless steel 1.4306
Sealing cap	Stainless steel 1.4306
Clip	Stainless steel 1.4435
Nozzle	Stainless steel 1.4301

## 9.1 Technical Data



Lance-code	Type 20			Type 40		
	h [mm]	j [mm]	Weight [kg]	h [mm]	j [mm]	Weight [kg]
1	218	338	0,88	218	345	1,54
1,5	392	512	1,14	392	519	1,97
2	568	688	1,40	568	695	2,39
3	838	958	1,80	838	965	3,03
4	1148	1268	2,26	1148	1275	3,78
5	1408	1528	2,65	1408	1535	4,40
6	1718	1838	3,11	1718	1845	5,15
7	2018	2138	3,55	2018	2145	5,87
8	2318	2438	4,00	2318	2445	6,59
9	2628	2748	4,46	2628	2755	7,34
10	2938	3058	4,92	2938	3065	8,08
11	3238	3358	5,37	3238	3365	8,80
12	3548	3668	5,83	3548	3675	9,55

\*h - installation length

\*j - total length

\*X- Installation length min. 1m (see Steam Lance heating system)

Steam lances are available as type 20 and 40 in various lengths, suitable for duct widths from 280mm to 3855 mm.

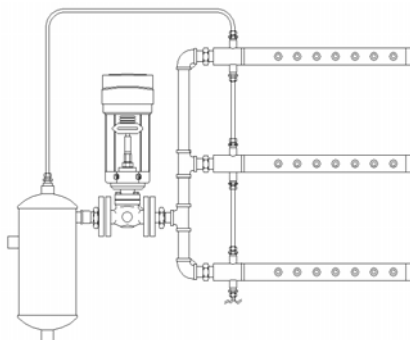
Inst. length h	mm	218	390	568	838	1148	1408	1718	2018	2318	2628	2938	3238	3548
Duct width (max.)*	mm	390	565	835	1130	1405	1715	2015	2315	2625	2935	3245	3545	3855
Duct width (min.)*	mm	220	395	570	840	1150	1410	1720	2020	2320	2630	2940	3240	3550
Lance code		1	1,5	2	3	4	5	6	7	8	9	10	11	12

\*Duct width is internal dimension

## 9.2 Number of steam lances

The steam lance system may comprise multiple steam lances.

With a duct height of more than 1000 mm multiple lances should be positioned horizontally one on top of the other. This ensures an even steam distribution. See table for number of steam lances recommended for various duct heights.



Duct height	No. of Lances
up to 1000 mm	1
1000 - 1700 mm	2
1700 - 2200 mm	3
2200 - 2600 mm	4
over 2600 mm	5





**Check number of steam lances when the following factors apply:**

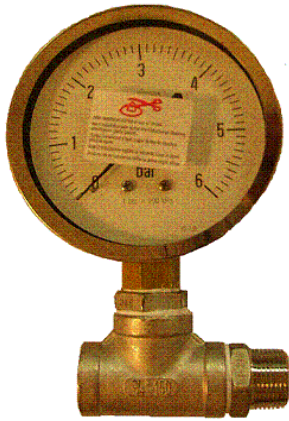
- duct air speed exceeds 5 m/s.
- Duct air temperature under 21°C.
- Last fine mesh filter located less than 3 m behind steam lance.
- Air flow branching occurs less than 1 m behind steam lance.

Depending upon additional parameters such as pre-defined steam output, existing or desired absorption distance or rise in humidity the installation of additional lances may improve efficiency.

**Steam lance piping for multiple steam lances .**

HygroMatik standard supply is for lengths of 300 mm und 450 mm. **Distances are approximate and can vary from installation to installation.** Piping should be installed for even lance distribution along the duct height. Distance between duct floor and ceiling should not exceed 250 mm.

## 10. Pressure Gauge Station



Installation of a pressure gauge on the steam injection unit ensures immediate detection of pressure drops or fluctuations.

The HygroMatik Pressure gauge station consists of an up to 200°C temperature-tested, tubular spring pressure gauge (0-6bar), a T-junction and a dual nipple.

Pressure gauge shut-off valves and fluid-sack pipes are available on request.



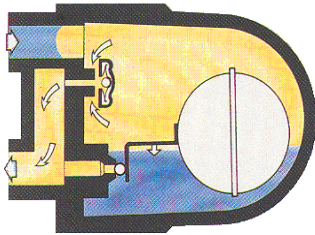
**Note:** The pressure gauge station is installed in front of the steam injection unit.

## 11. Ball Float Steam Trap

After separation from the steam inside the separator condensate is drained out through a ball float steam trap.

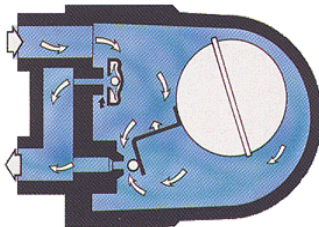
### 11.1 Function

The discharge valve is controlled by the ball float dependent upon the density of the incoming medium.



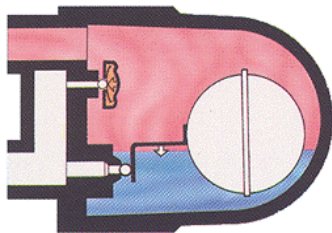
#### Starting Position / Air

When the unit starts, air present in the system is discharged through the thermostatic air extractor fan.



#### Normal Operating Conditions / Condensate

As soon as incoming condensate causes the float to rise, it flows through the valve and extractor fan into the condensate network. Hot condensate closes the thermostatic extractor but the condensate can continue to flow out through the valve.



#### Steam

If steam enters, the thermostatic extractor closes and the float descends until the valve closes.



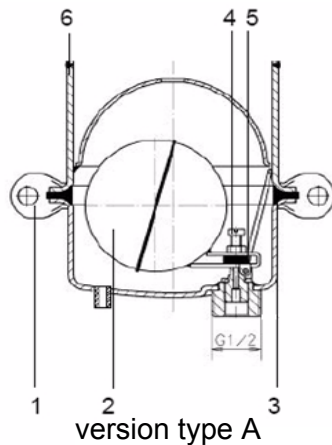
**Warning:** Water hammers can severely damage the ball float. condensate loads in outdoor installations increase the risk of freezing.

**Water Hammers:** Condensate accumulates in depressions. During start-up, steam flows over the condensate causing it to vibrate. This can continue until a certain amount of condensate is carried off. At the next flow bifurcation this condensate hits the first available object at a velocity of up to 25m/s. This impact is known as a water hammer. .

**Condensate load:** Accumulated condensate which cannot drain due to a depression.

## 11.2 Technical Data

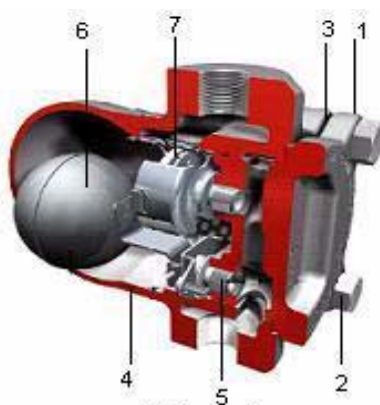
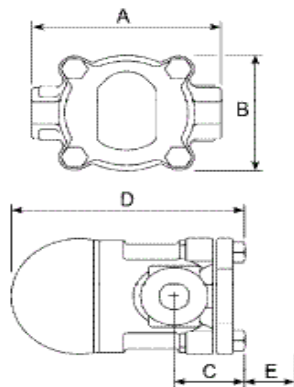
### 11.2.1 KS-Condensate Drain for DDS Type A



Screwfitting :	1/2" external thread	
Materials:		
Clip	1	Stainless steel 1.4404
Float	2	Stainless Steel 1.4404
Flange seal	3	
Soft seal	4	
Adjust. screw	5	Stainless Steel 1.4404
Housing	6	Stainless Steel 1.4404

The KS-Condensate Drain for Type A is integrated into the separator.

### 11.2.2 KS-Condensate Drain for DDS Type C



version type C

Type	Spirax Sarco FT14-4,5	
Nominal pressure setting	PN16	
Screw fitting	1/2" Internal thread	
Dimensions :	A	121 mm
	B	107 mm
	C	67 mm
	D	147 mm
	E	105 mm
Materials:		
Cover	1	Nodular Cast Iron GGG40.3
Screws	2	Steel 8.8
Cover seal	3	nickel-graphite
Housing	4	Nodular Cast Iron GGG40.3
Mainvalve face	5	Stainless Steel 1.4057
Float	6	Stainless Steel 1.4301
Fan	7	Stainless Steel 1.4541+1.4057

The KS-Condensate Drain for Type C is an additional unit that is connected to the separator condensate drain over a connecting piece.

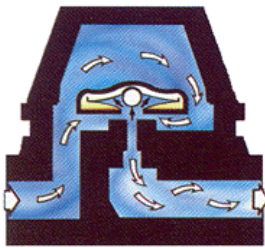
## 12. Thermostatic Capsule Steam Trap

Condensate that has collected in the steam lance heating system is discharged through a thermostatic capsule steam trap.

### 12.1 Function

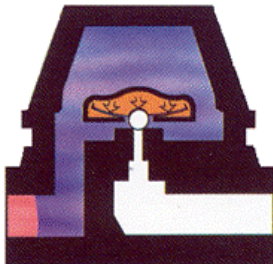
The discharge valve is controlled dependent upon the capsule volume and the temperature and pressure of the incoming medium.

The capsule contains a liquid whose saturation curve parallels that of steam. However, the liquid boiling point is always somewhat less than that of water.



#### Starting Position / Air

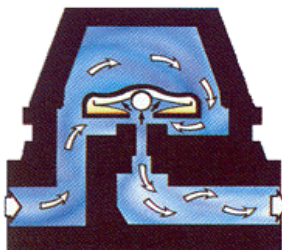
During the start-up process air and condensate are quickly drained over the valve which is still in a cold condition.



#### Steam

If condensate temperature approaches steam saturation temperature due to the steam proximity, capsule pressure becomes higher than the surrounding condensate. The capsule expands and closes the valve just before steam can enter the trap.

The temperature at which the closing process begins is 4K below steam saturation temperature.



#### Normal Operating Conditions / Condensate

Condensate in the piping before the thermic capsule condensate drain cools. The capsule medium cools too and opens the valve. Now the condensate can drain until a temperature increase reheats the capsule and closes the valve.

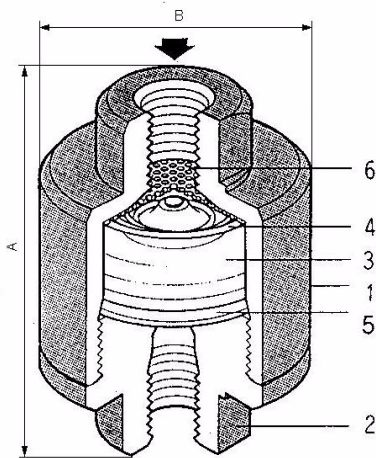


#### Warning:

Do not insulate the thermic capsule steam trap.

The **minimum connection pipe length of 1.0 m** between the lance connection and the drain is absolutely mandatory.

## 12.2 Technical Data



Type	Spirax Sarco MST 21	
max. operating pressure	18 bar	
max. operating temperature	210°C	
Dimensions:	A	50 mm
	B	45 mm
<b>Materials:</b>		
Housing	1	Stainless Steel 1.4305
Cover	2	Stainless Steel 1.4057
Capsule	3	Stainless Steel 1.4541
Spring	4	Stainless Steel 1.4300
Spacer	5	Stainless Steel 1.4301
Strainer	6	Stainless Steel 1.4301
Fill element	Type E	

## 13. Humidification Output

The maximum humidification output [kg/h] of one steam injection unit depends upon the available steam pressure in bar.

Maximum humidification output can be over 700 kg/h and operating pressure of  $p_{max} = 4$  bar.

### 13.1 Output Graphs

The following graphs serve as an aid to determining the necessary Kvs-Values for the control valve, a given steam pressure and a desired humidification output.

The graphs help to determine whether a Type 20 or Type 40 should be selected.

Type 20 up to approx. 270 kg/h.

Type 40 up to approx. 700 kg/h.

### 13.2 Determining the control valve $K_{vs}$ -Value

#### Control Valve $K_{vs}$ - Value:

The Kv-Value corresponds to a water flow rate (in  $m^3/h$ ) through a valve at a pressure difference of 1 bar and a water temperature of 5 - 30 °C.

A Kv-Value is valid only for the corresponding valve lift of a valve. The Kv-Value of a valve at nominal lift (100% open) is described as the Kvs-Wert. Using the Kvs-Value one can determine the maximum possible flow.

$K_v$	flow figure [ $m^3/h$ ]
$K_{vs}$	Valve coefficient [ $m^3/h$ ]

**Example:**

Desired humidification output: 110 kg/h

Operating pressure, p = 2 bar

The length and number of steam lances is determined by the duct dimensions. See Section 9 "Steam Lances".

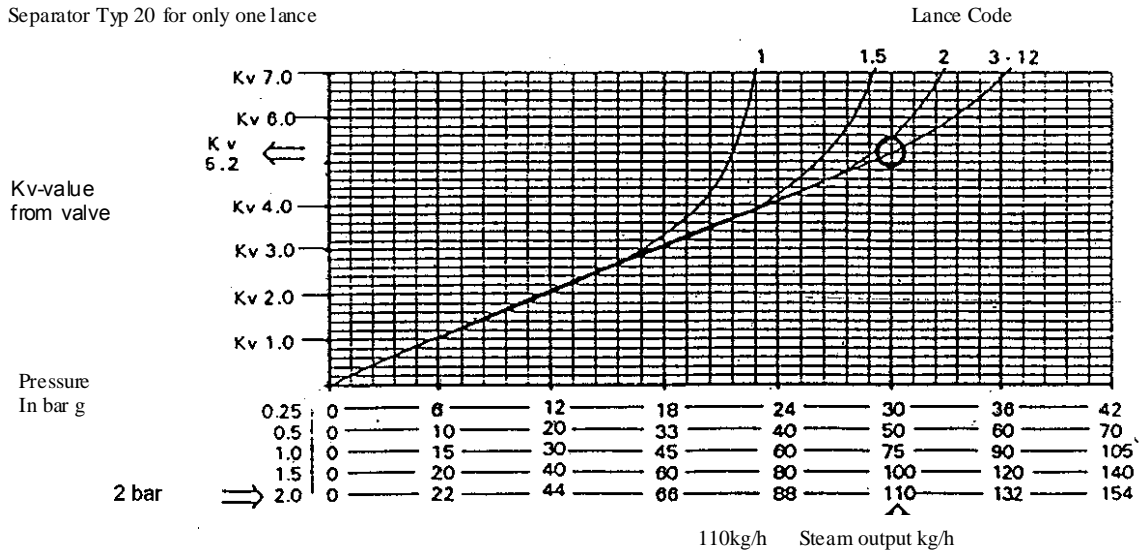
**Result:**

Follow the operating pressure line until the desired humidification output in kg/h is reached.

Run a vertical line upwards from this point until it intersects the plotted curve. The first intersected curve indicates the steam lance code and its minimum length.

Now run a horizontal line to the left and read off the minimum Kv-Wert of the installation on the vertical axis. The minimum Kvs-Value for selecting the control valve is  $K_v = 5,2 \text{ m}^3/\text{h} + 10\% = K_{vS} = 5,7 \text{ m}^3/\text{h}$ . If this value is not present in table 6.4 then it is recommended to take the next higher value.

Separator Typ 20 for only one lance



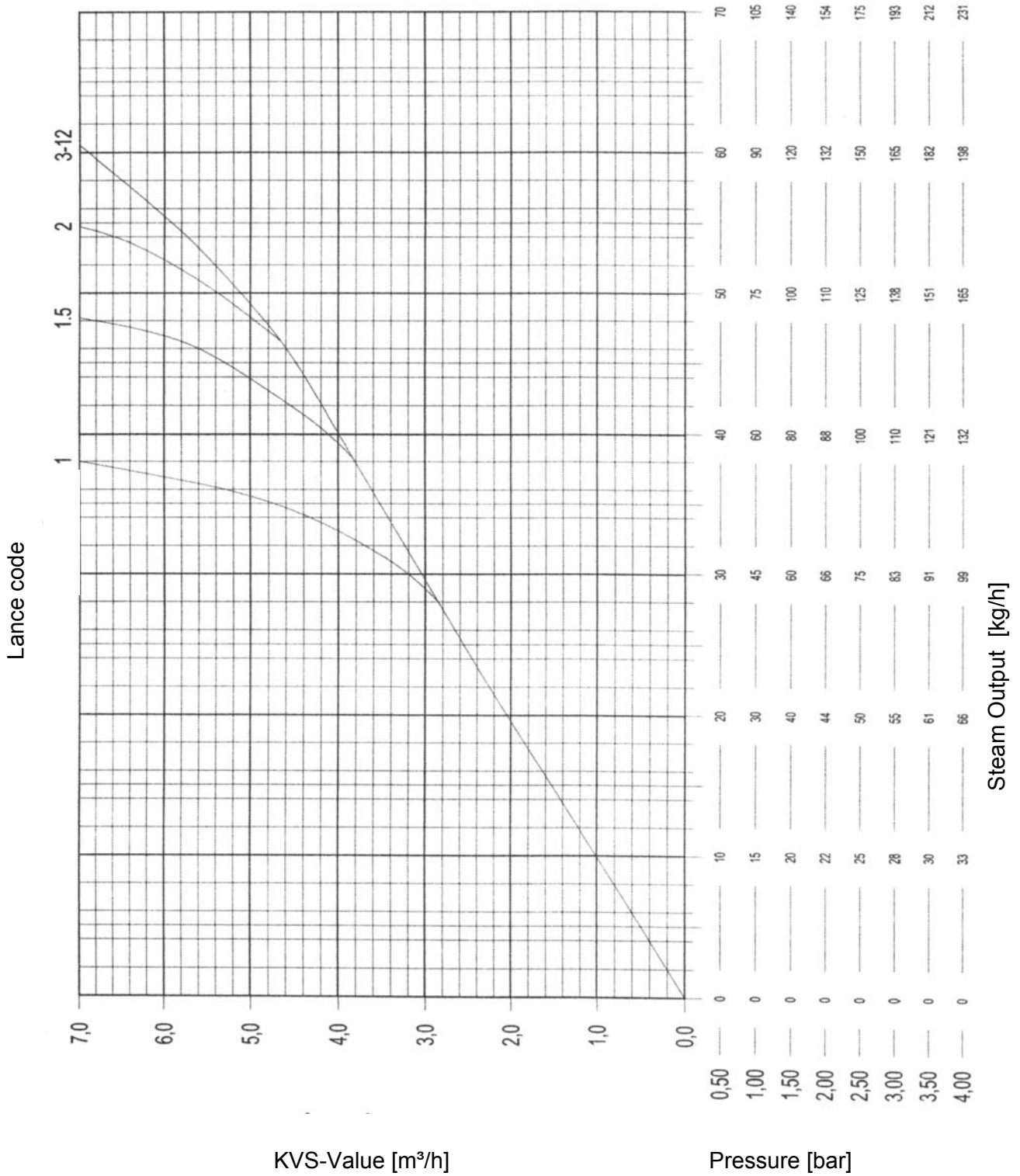
If the customer has not specified something else, then it is always calculated whether the desired output can be achieved with the Type 20. In this case a Type 20 separator and a steam lance of at least code 3 is necessary. Always check whether this result is consistent with the results from Section 9 "Steam Lances."



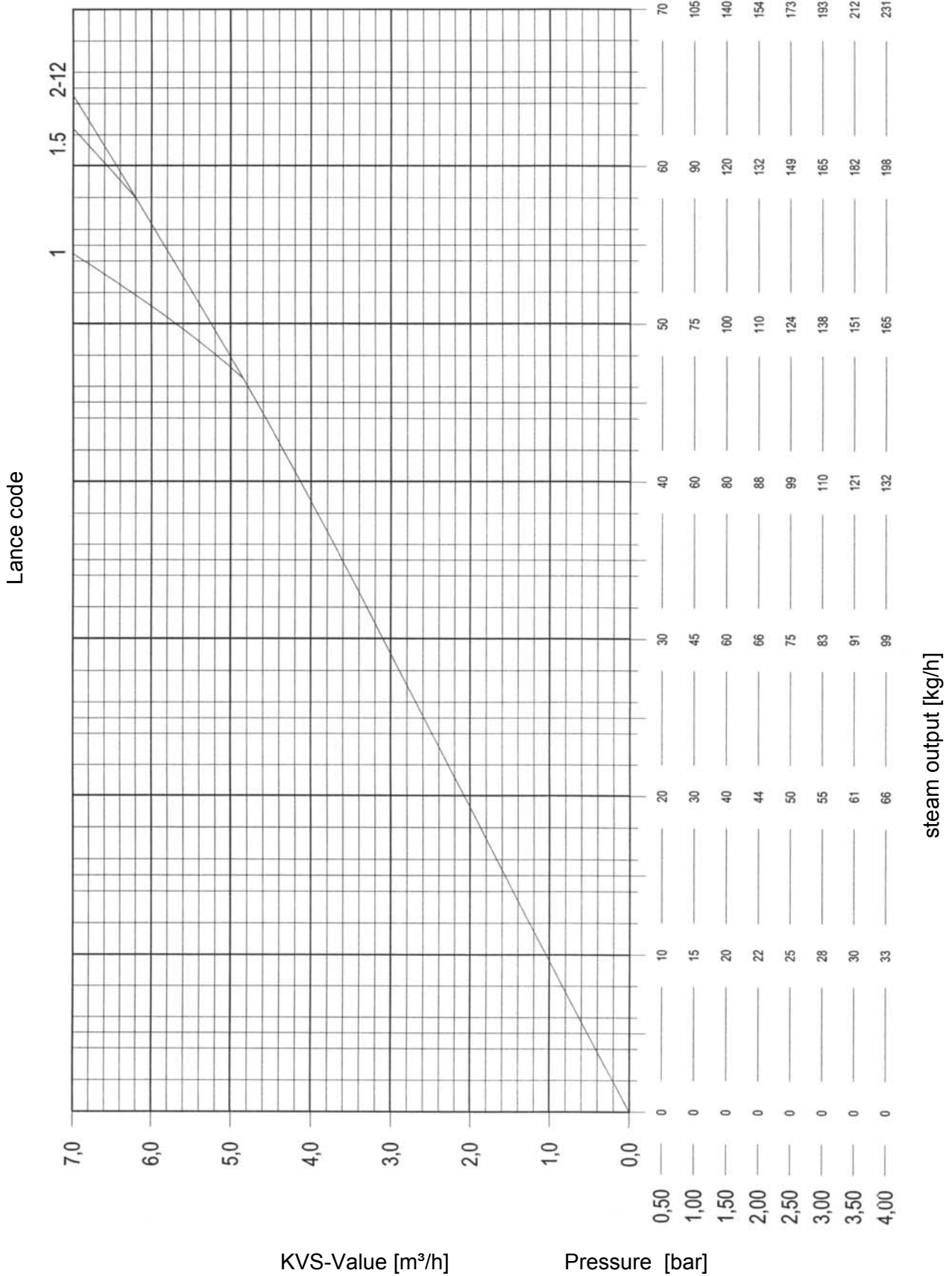
**Note:** The following 4 graphs show Kvs -Values determination.



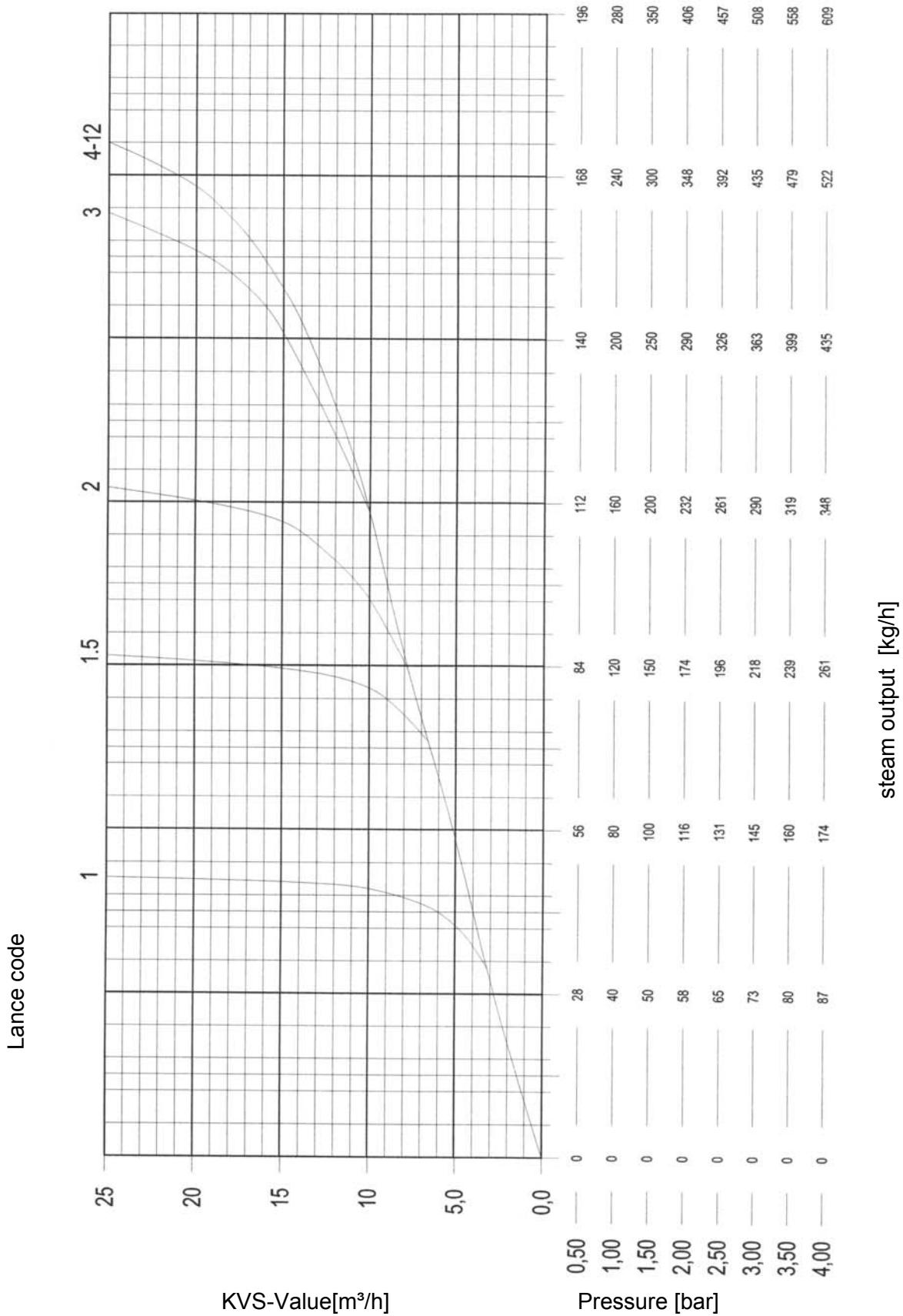
### 13.3 Separator Type 20 with one steam lance



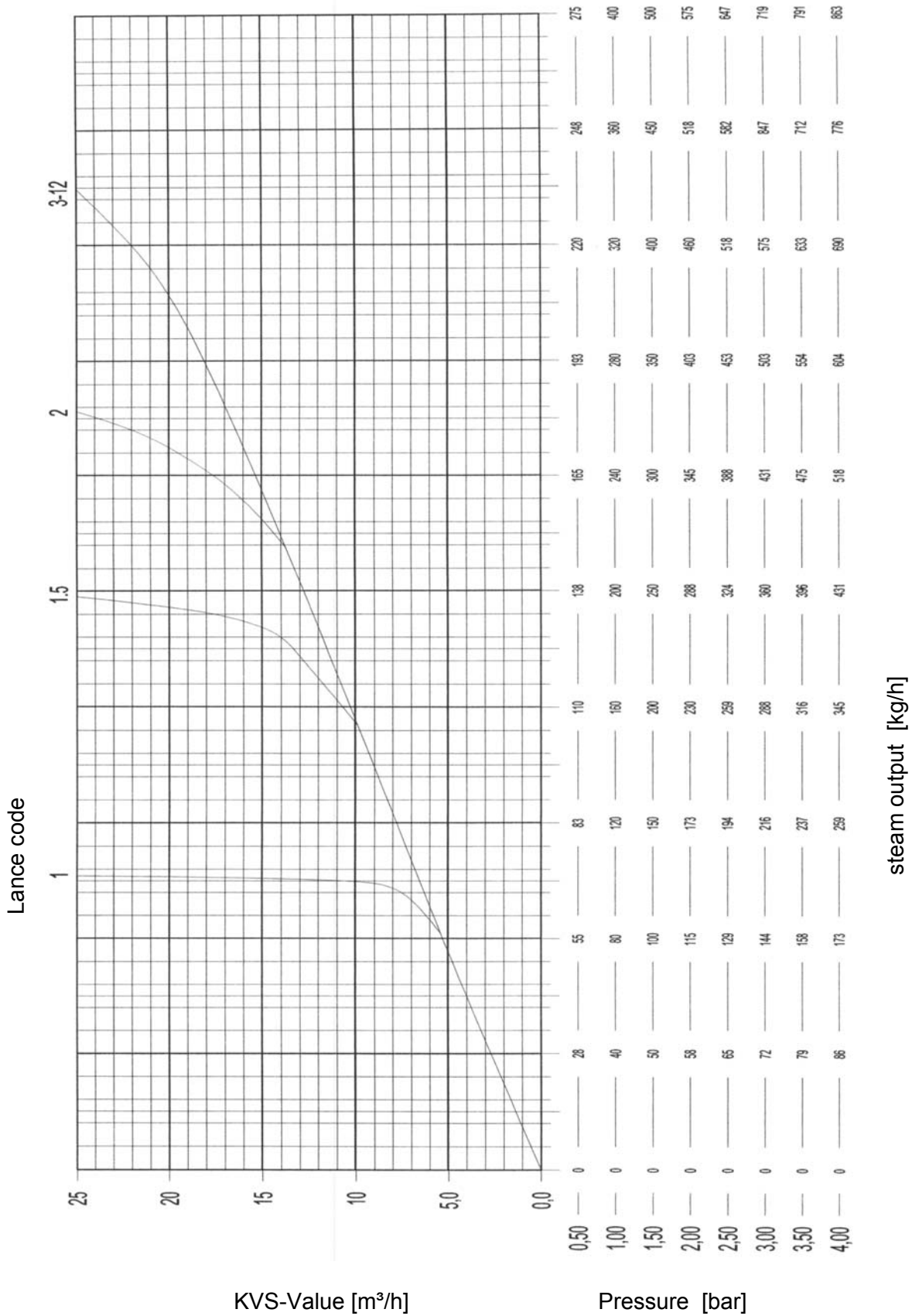
### 13.4 Separator Type 20 with multiple steam lances



### 13.5 Separator Type 40 with one steam lance

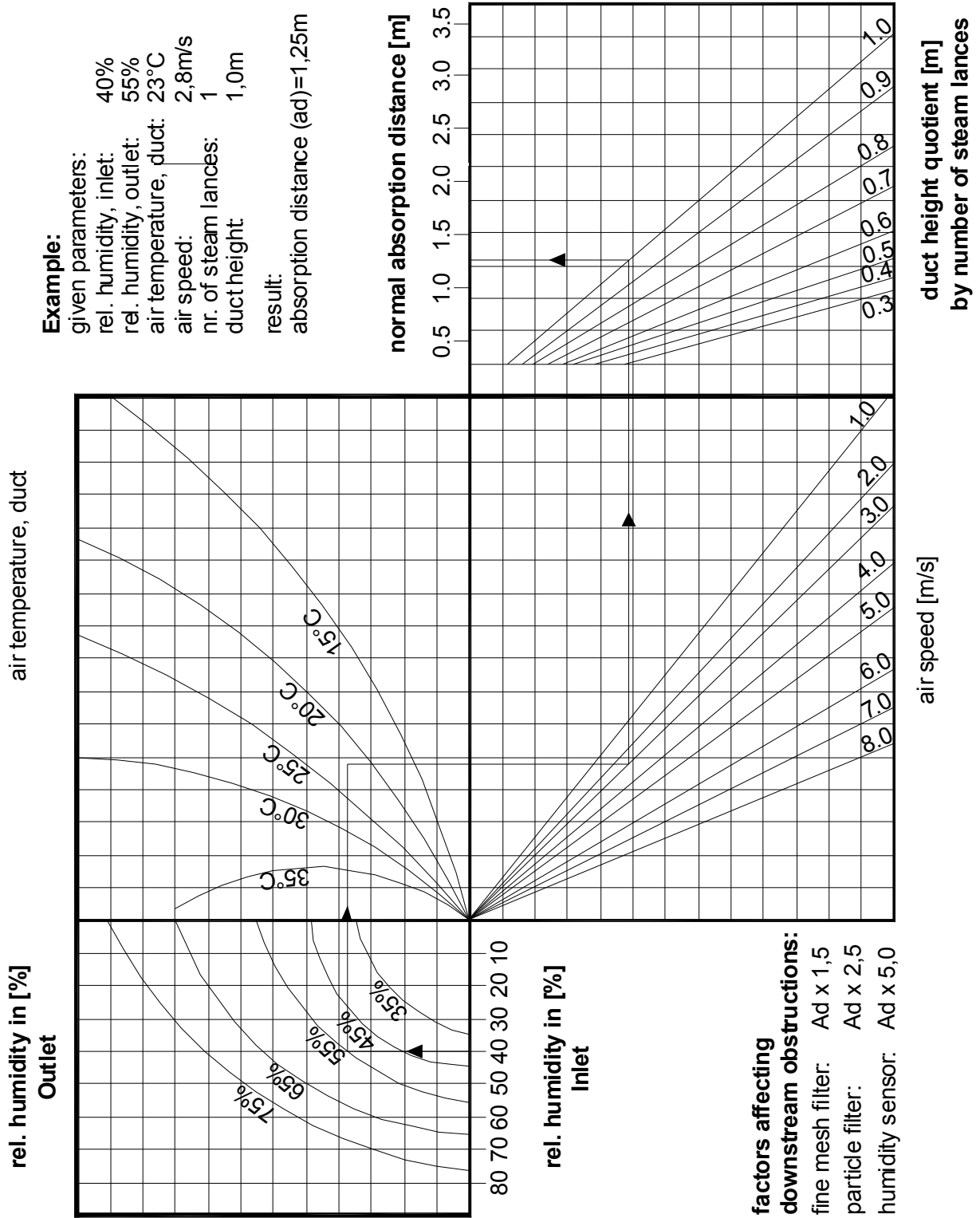


### 13.6 Separator Type 40 with multiple steam lances



## 14. Graph for Determining Absorption Distance

### Absorption Distance: distance from the steam outlet until the end of the visible trail



## 15. Installation

Please read this instruction manual in order to install the HygroMatik steam injection humidifier in a safe and proper manner.



**Warning:** this steam injection humidifier may only be installed by qualified personnel. HygroMatik can accept no responsibility for any damage caused by incorrect installation.

Please observe all safety and hazard instructions supplied with the steam injection humidifier.

The actuator must be disconnected from voltage before beginning installation.

Installation of any additional units is only permitted following written permission by the manufacturer, otherwise all guarantees are null and void.

Individual packing should be opened at the installation site. This can prevent damage to individual items.



**Note:** HygroMatik steam injection humidifiers are delivered largely pre-assembled. If individual components are in the delivery then all installation instructions concerning those items are to be followed.

Normally the steam supply supports are sufficient to support the steam injection system. Should this not be the case then extra supports must be provided (for instance using a fixed and supported U profile arrangement).



**Warning:** Steam lance fittings are not suitable to support the entire humidification unit.



**Note:** Supports are to be done on site.

## 15.1 Attaching steam pipes



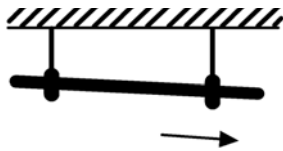
**Warning:** when installing please observe the following:

- all work is to be done by qualified personnel only.
- follow local regulations.
- Use only steam with a minimum pressure of 0,5 bar and a maximum pressure of 4 bar.
- Use only steam with no chemical additives.
- Dimension the on-site steam connections (insulated) so that a steam velocity of **25 m/s** is not exceeded.

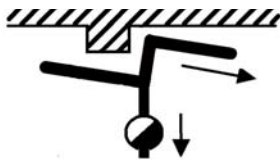
HygroMatik recommends the installation of a shut-off valve in front of the steam injection system in order to facilitate any necessary maintenance work.

### Installing the steam pipes

Steam piping must be installed using state-of-the-art methods.

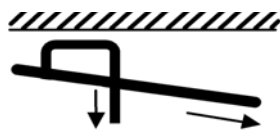


Steam piping must be installed inclined. They must be fitted using a suitable pitch and suitable materials. The piping holders must allow for lateral movement. In more lengthy installations expansion fittings must be used to avoid expansion stresses.



**Warning:** Water hammers are dangerous and can cause bodily harm.

It is necessary to drain off any low angles in order to ensure that condensate is not drawn along and to avoid water hammers. Very long steam piping systems must also be drained regularly.



Steam connections must be fitted to the piping upper surface in order that condensate is not drawn into the piping system.

The HYGROMATIK steam injection system must have a filter installed in front of the system. This is delivered with the system or is already installed on-site.

## 15.2 Electrical Installation

If control valve and actuator are included in the delivery, then operating and installation instructions are provided.

If control units from other manufacturers are used then the customer must check their compatibility to the steam injection system.



**Warning:** Please observe local regulations .

Electrical installation of the actuator may only be done by qualified electrical personnel.

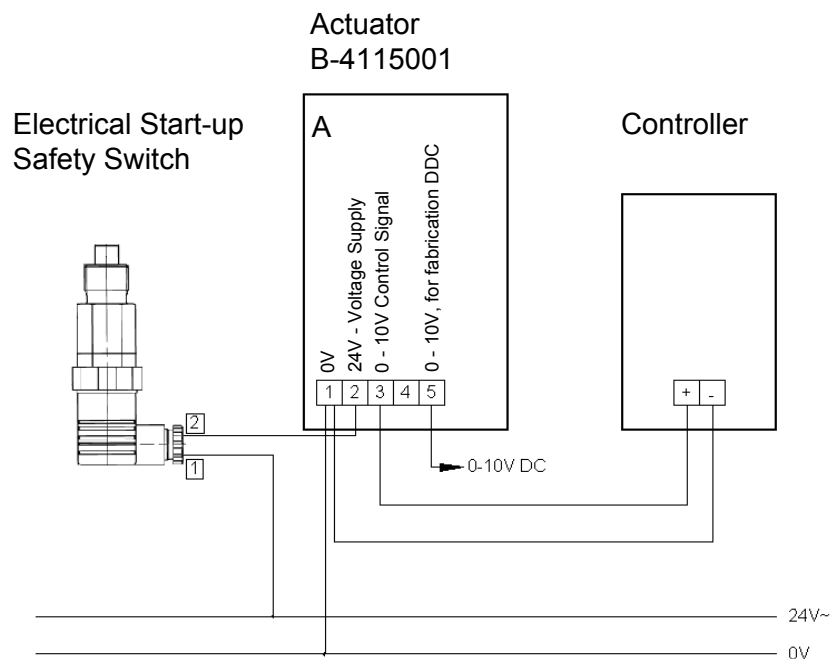
Connect electrical connections according to the wiring diagrams.

A humification control is required for the operation of the humidifier. This is to be installed according to the manufacturers instructions.

We recommend the use of a Max-Hygrostat in the safety chain. The Max-Hygrostat serves as a safety element in the case of a malfunction of the humidity sensor. Install the Hygrostat approx. 2 - 3 m behind the humidifier in the ducting.

Install a pressure sensor in the ducting and integrate this into the safety chain. The pressure sensor prevents an over-humidification of the ducting in the case of a malfunctioning fan.

HygroMatik Actuator wiring diagram



Circuitry for alternative actuators are to be found in the relevant installations documents.



### 15.3 Separators



**Warning:** Before installation, check out the steam supply piping. It must be established that the steam humidifier is supplied with as dry a steam as possible (steam with as little condensate as possible).

Steam pressure at the separator entry point must not exceed 4 bar.

Steam humidifier operating pressure must be kept at a constant level. It is possible that in order to generate constant pressure, pressure reduction stations may be required.

It must be guaranteed the steam supplying the steam humidifier is as dry as possible. Check that the steam supply lines are equipped with the necessary condensate drains.

The supply line for the steam humidifier must be taken from the highest point in the main supply line.

Install a filter in the steam supply line directly in front of every humidifier. This is the only way to ensure that no foreign objects can find their way into the humidification unit.

Keep the piping connections as short as possible. In this way the energy losses are reduced, the system can heat up quicker, condensates are minimised and the system overall efficiency is increased.

## 15.4 Control Valve and Actuator

If the valve is on site then the necessary connections between valve and separator are fitted. All other parts are delivered separately (e.g. connection bolts and flange seals).

Only actuators which are suitable and certified for steam regulation may be used.

Actuators must have a fail-safe function in order to prevent an uncontrolled over-humidification in the case of a power failure.

Dirt between the valve face and cone prevent proper closing. Therefore install a filter directly in front of the separator.

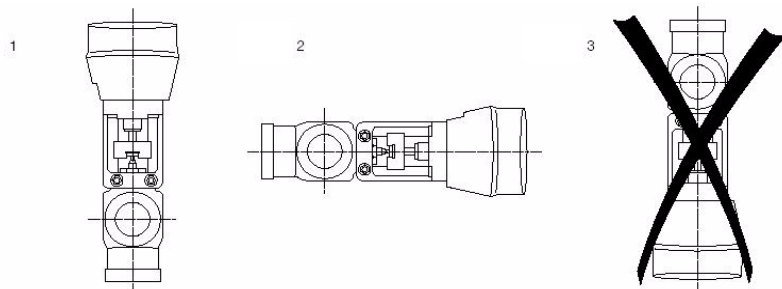


**Warning:** Control air for pneumatic actuators must be free from oil and humidity.

If control valves and actuators are part of the delivery then operating and installation instructions are present.

Customer is responsible for checking steam injection humidifier compatibility if control units from other manufacturers are used.

Actuator and valve installation positioning



## 15.5 Pneumatic Start-up safety feature



**Note:** Pneumatic start-up safety is set at 96°C. This value can be altered only by the manufacturer.

First install a T-piece with a 1/2" exit in the condensate piping in front of the condensate drain.

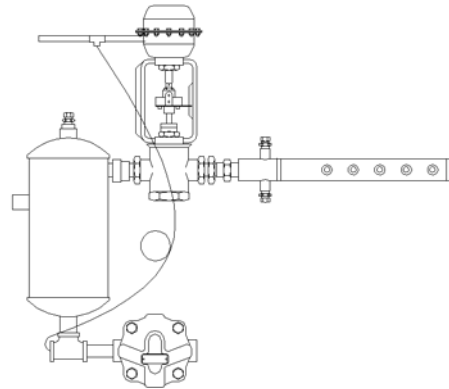
A T-piece with a 1/8" exit is also installed in the control air piping.

A temperature sensor is screwed into the T-piece in the condensate piping.

The 1/8" drain valve is installed in the air control piping in the T-piece.



**Warning:** Take great care not to damage the capillary by bending.



## 15.6 Steam Lances

With single lance systems the lance is fitted directly onto the valve exit using the delivered fittings.

If multiple lances are necessary to distribute steam in the ducting, then there is a complete assembled steam lance piping in the delivery. Angle pieces for installation of humidifier/valve unit parallel to ducting walls are available from HygroMatik.

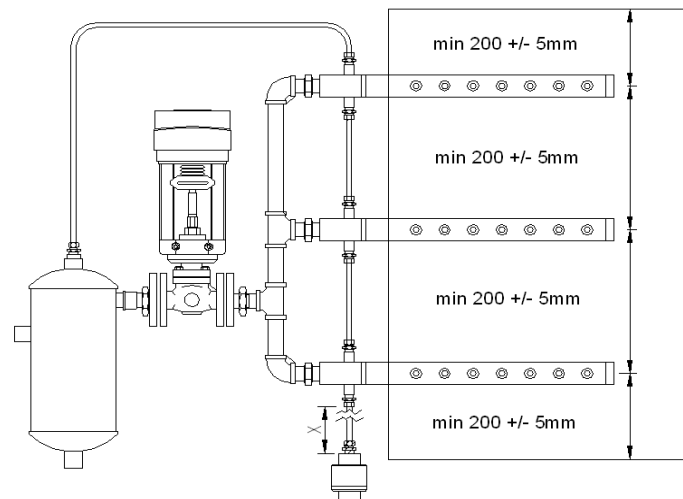
In order to reduce the absorption distance the steam from the lance should be directed opposed to the air direction in the ducting.

All piping seals should be done with temperature resistant (>150°C) sealing tape.

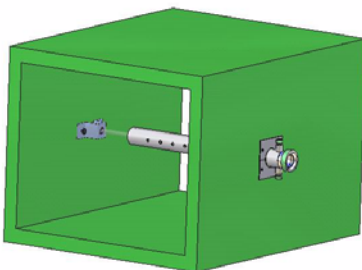
If only one lance is required for even steam distribution install this at duct half-height.

With a multiple lance system position the lances so that there is an even steam distribution over the duct cross section and ensuring that the necessary duct wall distance is guaranteed.

HygroMatik can supply stainless steel standard modules for lance pitches of 300 und 450 mm.



\*X- Pipe length min. 1m (see Section Steam lance heating system)



The distance between lance and duct ceiling or floor should be a minimum of 200 mm.

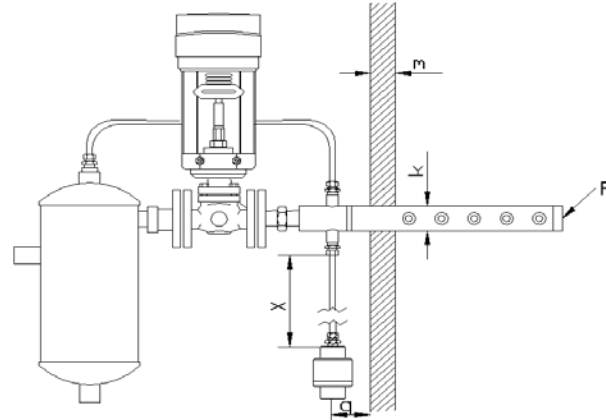
Before the lance is installed in the duct check that the correct lance is present. The steam lance should be utilised over the entire duct width (Please observe the lance codes).

Steam lances are pressed into the appropriate holes.

Steam lance nozzles should be positioned opposed to the air flow.



**Note:** at 0.5 bar to 2.0 bar steam pressure there is a minimum distance of 200 to 300 mm to existing elements which must be kept to. Higher pressures and/or sensitive elements need 500 mm.



In order to prevent steam condensing on the duct inner walls the lances should be installed according to the following dimensions:

Dimension [mm]	F	k	m	q
Type DDS 20	M10	38	30	20-80
Type DDS 40	M10	54	30	20-80

\*„k“ is the necessary drill diameter in the duct wall

A duct wall thickness of 30mm is assumed. If „m“ is larger than 30mm, then the distance „q“, is to be reduced by the difference **m-30mm**.

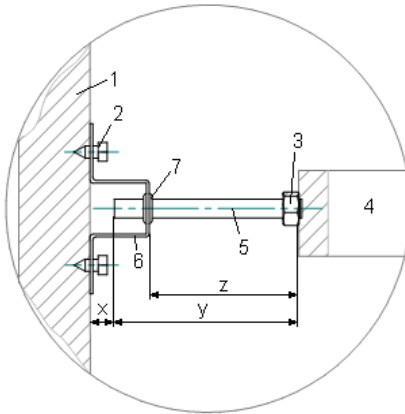
After the lance is positioned, an angle is positioned on the opposite duct wall side at the same height. The screws are self tapping. Then the necessary threaded bar length „y“ is measured.

$$\mathbf{y = z + 20mm}$$

**Warning:** a gap **x**“ between bar end and duct inner wall must be present in order to accomodate a lance lateral expansion.



**Warning:** Steam lances from code 2 on must be supported at the end.



Number	Description
1	Duct wall
2*	Screw M6x35
3*	Nut M10
4	Steam Lance
5*	Threaded bar M10 & M8 x 250
6*	Angle
7*	anti-vibration collar

\* In installation set B-4600100.

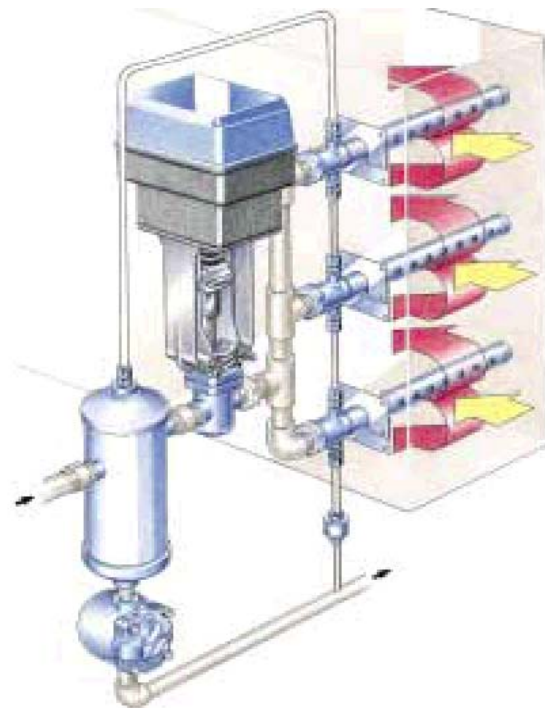
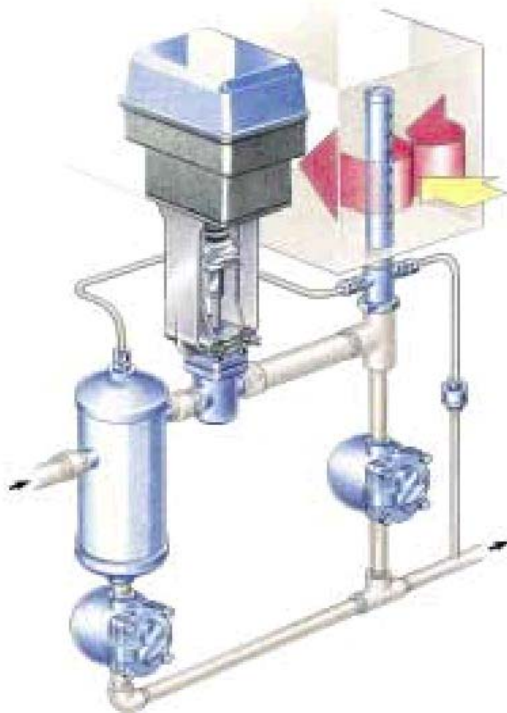
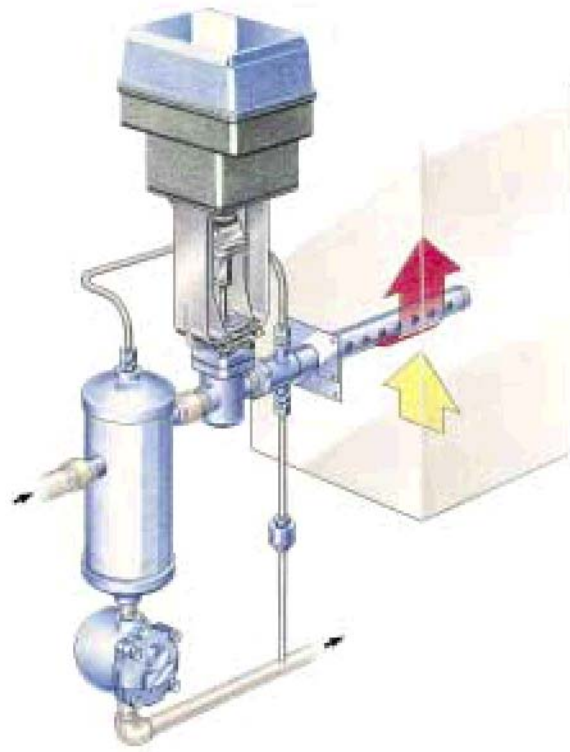
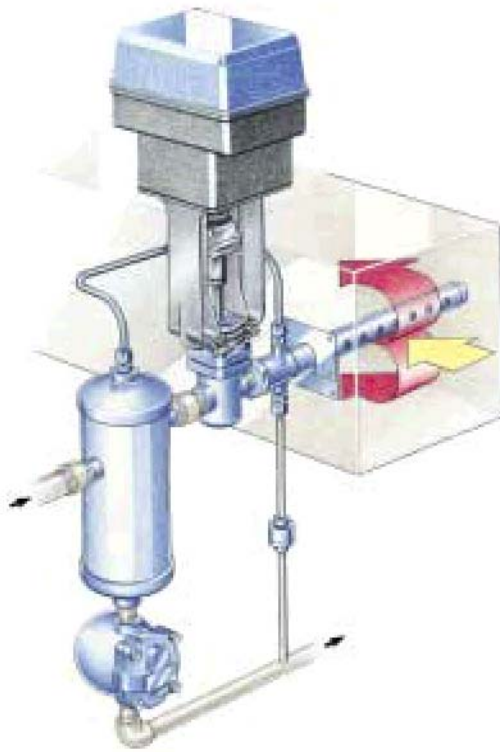
**Lance guide is installed in the following manner:**

- feed bar through hole in angle .
- Screw M10 bar end in the steam lance.
- use nut to lock to lance.

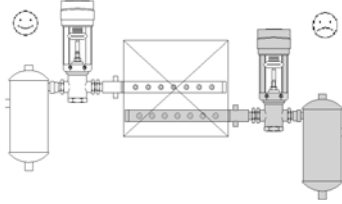

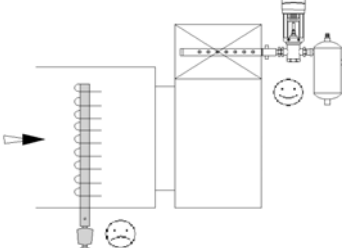
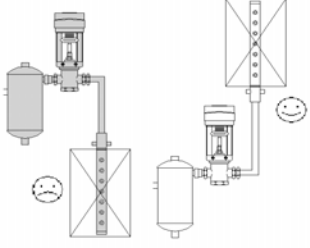
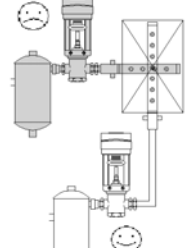
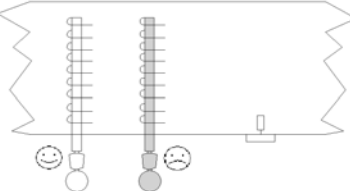
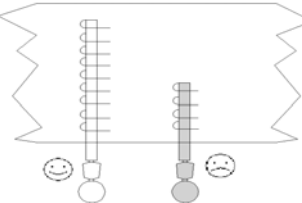
Alternatively, the lance can be installed from the duct ceiling with a threaded bar or held in a U pipe. The necessary parts thereto are to be supplied on site.

After the lance has been installed the gap between duct outer wall and lance is closed using the two cover plates as supplied with the steam lances. The cover plates are attached using two self tapping panel screws. The sealing between cover and duct wall should be done with silicone or a rubber sealant.

## 15.7 Installation Examples



**Note:** If lances are positioned vertically then the steam supply piping should have an additional float controlled condensate drain.

	<p>Position lances in the duct centre if possible.</p>
	<p>If the humidifier blows into a compact multi-zone unit then it should be installed directly in the air flow and as close as possible to the fan.</p>
	<p>The bifurcated pipe should never be installed less than one meter in front of the fan suction side. In this case the correct installation is behind the fan.</p>
	<p>Never install the lances pointing vertically downwards. This would cause condensate to collect in the steam lance heating system. On the other hand a vertical installation pointing upwards is possible.</p>
	<p>If the ducting is taller than it is wide, install the steam lance vertically. If this is not possible then a second lance must be installed in order to ensure an even steam distribution.</p>
	<p>Lances should have a minimum distance of 5x the absorption distance to the duct humidity controller.</p>
	<p>When selecting the lance choose a size sufficient for the entire duct width or height.</p>



## 15.8 Steam Lance Heating System



**Warning:** the line to the heating system must be able to tolerate pressures of up to maximum 8 bar.



**Note:** the pipe is easy to bend with a suitable tool. The customer must adjust the pipe in accordance the conditions on site. Take care not to kink the pipe when bending.

Observe minimum bend radius of 1,5 x diameter

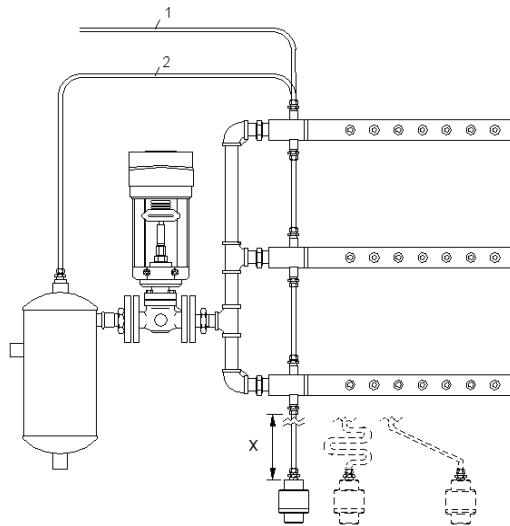
(here: 1,5 x 8mm = 12mm)

**Note:** Alternatively it is possible to close off the connection to the separator and feed the steam lance heating system from another separate steam reservoir with a maximum pressure of 4 bar. Higher steam lance heating temperatures result from higher pressure and cause an even better heating heating effect.

Installation of the steam lance heating system follows the installation of the steam injection system including steam lances. In accordance with the dimensions of the humidifier unit a pipe with an external dimension of 8mm is bent to shape and installed with the help of the supplied pipe fittings.

\*1 - Heating piping using a separate dry steam reservoir

\*2 - Connecting pipes between separator and steam lance



Pipe length „X“ must be at least **1 Meter** to ensure effective functioning of the capsule condensate drain. There are various installation possibilities, also where there is little room. Important here is to ensure the optimum vertical positioning of the capsule condensate drain. Pressure in the condensate piping must not exceed half the pressure in the heating piping. Piping must always be installed properly inclined.

## 15.9 Check List



**Warning:** The steam injection humidifier may only be operated by qualified and authorised personnel.

Before switching on the steam injection humidifier please check for correct installation by going through the following check list:

- Have the steam supply lines been flushed out?
- Are the steam supply and condensate lines properly connected and secure?
- Has the entire steam supply line up to the control valve been checked for leaks?
- Is the specified system pressure present?
- Is there a proper filter fitted before the separator ? (normally part of the system delivery)
- Is the operating pressure at least 0,5 bar and maximum 4 bar?

Electrical installation checks must be carried out in accordance with customer requirements and public power utility regulations. All electrical connections must be according to the circuit wiring diagrams.

## 16. Initial Operation



**Warning:** the steam injection humidifier may only be operated by qualified personnel.



**Warning:** for actuator initial operation please refer to the instructions of the regulator and/or installations company. Initial operation should only be done by a trained expert or service technician.



**Warning:** Follow the instructions below to ensure correct operation of your steam injection humidifier.



**Note:** during most installations dirt will have managed to enter the steam supply. Therefore it is advisable to flush out the piping before initial operation.

### Turning off the steam injection humidifier

Before starting up the steam injection humidifier it is essential to know how to switch it off.

Close shut-off valve on the steam supply to the separator .

If applicable, also close the shut-off valve to the separate steam supply to the steam lance heating heating system.

### Turning the steam injection humidifier on



**Warning:** If the actuator is not a controlled actuator then verify that the control valve is in the closed position.

Slowly open the separator shut-off valve and, if there is one present, the shut-off valve to the steam lance heating system.

Check the entire steam supply up to the control valve for leaks.

Repair leaks as necessary.

Check specified system pressure using the pressure gauge.

Wait 10 - 15 minutes so that the steam injection humidifier can warm up. The pipes between the separator and the steam trap should be about the same temperature.

Set the Max. Hygostat to the desired value. Set the humidity sensor to the desired value and activate the actuator.



**Note:** Periodic filter cleaning is recommended in order to prevent the control valve from excessive wear. Before cleaning the filter always shut off the steam supply and allow the system to cool down.

**The following operations are active:**

- Accumulated condensate in the steam supply is forced into the separator where it is fed into the condensate network via the ball float steam trap.
- Some of the dry steam in the top top part of the separator supplies the steam lance heating system and heats the steam lances.
- As soon as the actuator indicates that steam is required the control valve opens and sends steam into the steam lances.



**Note:** for units with a start-up safety switch the control valve is released only when the piping between separator and ball float steam trap has reached its designated temperature.

## 17. Maintenance

The HygroMatik steam injection humidifier is easy to maintain. However, inadequate or improper maintenance can lead to operational malfunctions. Regular maintenance is essential so that your steam injection humidifier achieves a long, trouble free life span.



**Warning:** when performing maintenance work please note:

- The steam injection humidifier is only to be serviced by qualified and authorised personnel.
- Follow safety instructions.
- Switch off the humidifier and protect against re-start. Allow the humidifier to cool down.
- After performing maintenance work have the steam injection humidifier checked for safe operation by qualified personnel.

The steam injection humidifier's performance and maintenance intervals depend primarily upon the steam quality and the humidification volume since the last maintenance. Different steam quality can shorten or lengthen maintenance intervals.

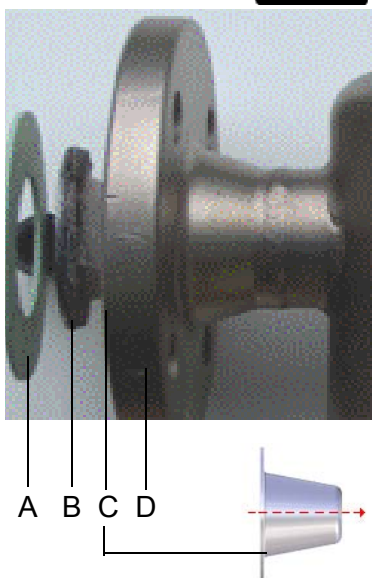
### 17.1 Maintenance work

recommendations on maintenance intervals are based exclusively upon typical, empirically established values.

### 17.2 Strainer



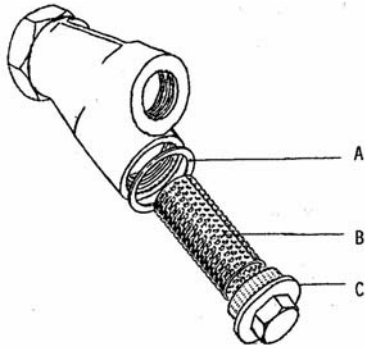
**Warning:** before beginning any maintenance procedure make sure that the feed and drain are shut off and that the unit is cool and not under pressure.



#### Maintenance „DDS Type A“

- » Loosen the screws (M12/M16) on the flange connection (D) at the steam entry point. **Warning:** steam supply and DDSsystem should be fixed according to the assembly instructions
- » Steam supply pipes should be pulled free of the entry flange if possible.
- » If there is not enough room to exchange the filter then de-install the separator.
- » Exchange filter (C) and seal (B).
- » Re-connect the flange with seal to the steam entry point.
- » Check the flange for leakage after re-starting the system.

*See next section for maintenance materials*



### Maintenance „DDS Type C“

- » Unscrew filter holder (C) , (SW27 or SW50).
- » Extract filter (B) and clean or replace.
- » Replace seal (A).
- » Re-position filter.
- » Screw filter holder in.
- » Check for leakage by re-start

### 17.3 Ball float condensate drain



**Warning:** Before beginning any maintenance work please check that supply and drainage are shut off and that the unit is pressure free and cool.

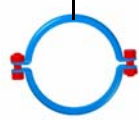
### Maintenance „DDS Type A“



D E F C



A B



- » Release condensate drain from separator.
- » Loosen both Allen screws (size 6/8) of the lower separator screw clamp and remove clamp (A).
- » Release lower separator part (B)
- » Remove C clamp (C).
- » Release cone (D) with seal (E)
- » Loosen seal screw and replace seal if necessary.
- » Tighten seal screw a little and lock down with nut without damaging the seal.
- » Re-fit cone and seal and fix at the separator base using C clamp.
- » Position new flange seal (F) at the bottom and fix with screw clamp to the separator.
- » Screw down both Allen screws simultaneously.
- » Check for leakages by re-start.



*Use only original HygroMatik parts.*

*Maintenance set for DDS 20 Type A: B-4111917*

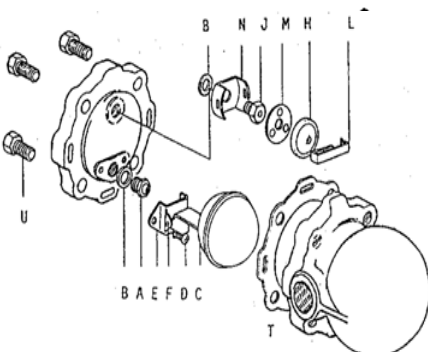
*Maintenance set for DDS 40 Type A: B-4111919*

*The maintenance sets include 1x sieve filter, flange seal, steam supply entry seal, and seals for the ball float and drain.*

### Maintenance „DDS Type C“

**Warning:** when re-assembling please check that all sealing faces are clean and have a thin coat of sealing paste.

### Exchanging main valve



- » Loosen cover screws (U), (SW17), and lift cover.
- » Loosen both valve screws (D) and remove complete float unit (E-C).
- » Screw out main valve (A), (SW17) and remove seal (B).
- » Replace seal (B) and fit in new main valve.

- » Screw down new complete float unit (E-C) with valve screws (D) .
- » Screw down cover with new seal (T).



Use HygroMatik spare parts number E-4111834

#### Exchanging air vent

- » Loosen C spring clamp (L).
- » Remove capsule element (H) and spacer (M).
- » Unscrew valve seat (J) (SW17).
- » Screw down valve holder (N), new seal (B), with new valve seat (J).
- » Fit in spacer (M) and capsule unit (H).
- » Fit spring clamp (L).

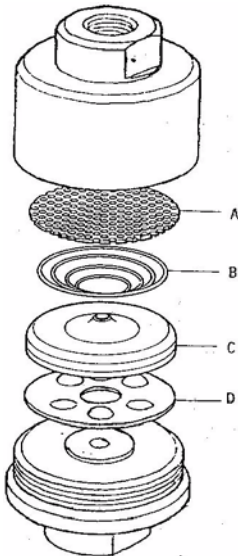


Use HygroMatik part number E-4111836

### 17.4 Thermostatic Capsule Steam trap type MST21



**Warning:** Before beginning any maintenance operation make sure that the feed and drain are shut off and that the unit is cool under not under pressure.



#### Replacing Capsule Element Set

- » When the unit is cold, unscrew cover using a SW 22 or SW 32 wrench.
- » Remove strainer (A), spring (B), capsule (C) and spacer (D).
- » Apply a light coating of sealing paste to the cap threads.
- » Assemble new capsule element set in the proper sequence.
- » Note: cap torque specifications: 110 Nm.
- » Check steam injection unit for correct functioning.
- » Start up unit and operate for 15 minutes ideally at maximum output.
- » Check safety features.
- » Check pipe connections for possible leakage.



Use HygroMatik part number E-4111828.

## 18. Malfunctions

Problem	Possible Cause	to do
No steam is coming out of steam lance	<ul style="list-style-type: none"> <li>• Defective Hygrostat or humidity sensor</li> <li>• Defective Control Valve</li> <li>• Defective Actuator</li> <li>• Inaccurate or defective control</li> <li>• Fouled or blocked coarse strainer in the filter before separator</li> <li>• Shut-off valve in steam supply line is closed.</li> <li>• Pressure reduction valve, if installed, is out of order.</li> <li>• Foreign objects between valve cone and face prevent valve from closing properly.</li> </ul>	<ul style="list-style-type: none"> <li>• Check Hygrostaten and/or humidity sensor and repair or replace as necessary.</li> <li>• Check valve and clean it or replace as necessary.</li> <li>• Measure control signal. Check, repair or replace as necessary.</li> <li>• Check actuator, reset, repair or replace.</li> <li>• Remove coarse strainer and clean or replace.</li> <li>• Open shut-off valve</li> <li>• Clean pressure reduction valve, possibly reset operational pressure.</li> <li>• Check and clean valve valve .</li> </ul>
Steam is coming out of steam lance although desired humidity value is reached.	<ul style="list-style-type: none"> <li>• Defective or falsely set Hygrostat or humidity sensor .</li> <li>• Actuator does not close properly.</li> <li>• Residual condensate evaporates in the steam lance and exits the lance as pressureless steam (re-evaporation effect) This process can take up to 20 minutes.</li> </ul>	<ul style="list-style-type: none"> <li>• Check humidity or Hygrostat and re-set or repair.</li> <li>• Re-adjust actuator to control valve.</li> <li>• Check out steam supply pressure for the steam lance heating system. Supply steam lance heating system from a separate dry steam steam reservoir (max. 4 bar).</li> </ul>
Condensate is coming out of steam lance	<ul style="list-style-type: none"> <li>• Improper steam supply installation to the humidifier.</li> <li>• Defective or fouled steam trap either for separator or steam lance heating system.</li> <li>• Back pressure from condensate network is higher than the operating steam injection humidifier pressure.</li> </ul>	<ul style="list-style-type: none"> <li>• Check Installation.</li> <li>• Clean or replace steam trap.</li> <li>• Reduce pressure in the condensate return line.</li> <li>• If this is not possible, connect steam trap to separate return line.</li> </ul>



Problem	Possible Cause	to do
<p>Condensate is coming out of steam lance.</p>	<ul style="list-style-type: none"> <li>• Steam trap drain is considerably higher than the DDSystem.</li> <li>• Start-up safety feature does not work properly.</li> <li>• Defective or unsuitable thermostatic capsule condensate drain attached to steam lance heating system.</li> <li>• Steam heating for steam lance heating system insufficient.</li> </ul>	<ul style="list-style-type: none"> <li>• Install condensate drain beneath the humidifier level and pump out the resultant condensate to a suitable place.</li> <li>• Check wiring and function of start-up safety feature.</li> <li>• Check out condensate drain and integrated elements. Type E must be used. Clean condensate drain.</li> <li>• Optimum heating effect occurs from pressure over 1 bar. Less pressure can lead to lengthier pre-heating times.</li> </ul>



**Warning:** The unit must be switched off immediately if it is malfunctioning. Malfunctions may only be repaired by qualified personnel under observation of all safety instructions.

## 19. Dismantling

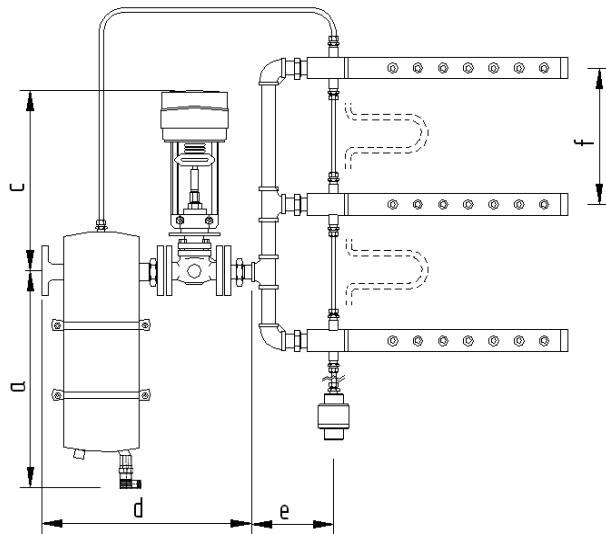
After the steam injection humidifier is no longer in use it must be dismantled (scrapped and disposed of) following the installation procedures in reverse order.



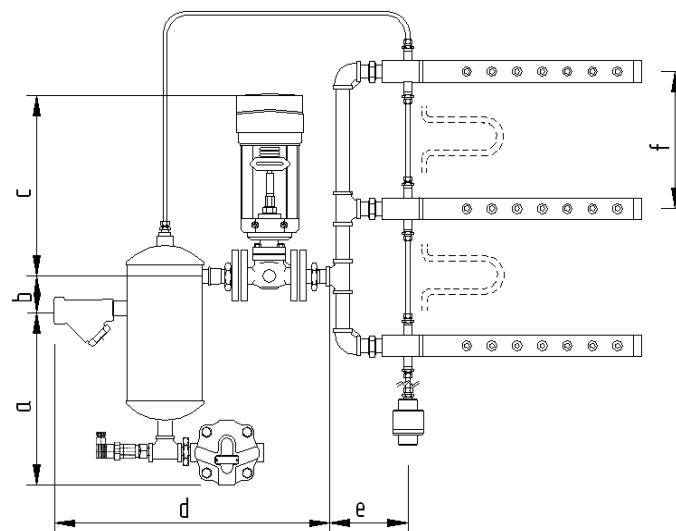
**Warning:** Dismantling the unit may only be done by trained and qualified personnel, the electrical dismantling by trained electro-personnel.

The information in section "Safety Instructions" especially the disposal regulations are to be observed.

## 20. Steam Injection System dimensions and Installation Schematic.



\* Steam injection system Type A (stainless steel)



\*Steam Injection system Type C (Mixed materials)

	Variante A							Variante C					
	Typ 20			Typ 40				Typ 20		Typ 40			
Kvs	0,2 - 4,0	6,3	10	6,3	10	16	25	0,2 - 4,0	6,3	6,3	10	16	25
a	305	305	305	420	420	420	420	270	270	340	340	340	340
b	0	0	0	0	0	0	0	40	40	70	70	70	70
c	380	380	380	380	380	410	410	380	380	380	380	410	410
d	400	430	440	475	485	500	533	480	500	670	680	680	720
e	120	120	120	150	150	150	150	120	120	150	150	150	150
f	Standard dimensions 300 and 500; other graduations possible on request												

\*all dimensions in mm!

## 21. Spare Parts

Version A		Version C		Article Number	Description
type		type			
20	40	20	40		
X		X	X	E-4111090 E-4111092 B-4500001	<b>Separators</b> Separator, without additions Separator, without additions Separator DDS20 incl. ball float steam trap and dirt trap
	X			B-4500003	Separator DDS40 incl. ball float steam trap and dirt trap
X				B-4111917	maintenance set DDS20 Version A (encloses: seals, dirt trap)
	X			B-4111919	maintenance set DDS40 Version A (encloses: seals, dirt trap)
		X		B-4111105	<b>Separator with flange connection</b> Separator with flange connection DN 15, PN 16
		X		B-4111107	Separator with flange connection DN 20, PN 16
		X		B-4111127	Separator with flange connection DN 25, PN 16
			X	B-4111117	Separator with flange connection DN 20, PN 16
			X	B-4111119	Separator with flange connection DN 25, P N 16
			X	B-4111121	Separator with flange connection DN 32, PN 16
			X	B-4111123	Separator with flange connection DN 40, P N 16
				E-4111878	<b>Dirt trap</b> dirt trap type 16 connection 3/4", stainless steel
				E-4111880	dirt trap type 16 connection 1 1/2", stainless steel
		X		E-4111874	dirt trap 12.1, 3/4", cast iron
			X	E-4111866	dirt trap 12.1, 1 1/2", cast iron
		X		E-4111884	seal, graphite, for dirt trap
			X	E-4111882	seal, graphite, for dirt trap
X	X	X	X	E-4111822	<b>Steam trap</b> thermostatic capsule steam trap type MST 21 -G, 1/4" -female thread
X	X	X	X	E-4111828	repair kit, inner parts for MST 21
		X	X	E-4111800	ball float-steam trap FT14-4,5TV, female thread 1/2", cast iron
				E-4111794	ball float-steam trap FTS14-4,5TV, female thread 1/2", stainless steel
		X	X	E-4111804	seal, graphite, for ball float steam trap
		X	X	E-4111834	main valve set, ball float steam trap FT 14-4.5TV
		X	X	E-4111836	ventilator set, for ball float steam trap FT14-4,5TV
X	X	X	X	E-4111952	<b>Start-up safety switch</b> start-up safety switch, electrical, switching temperature 80°C, with plug
X	X	X	X	E-4111954	start-up safety switch, pneumatic
					<b>Valve Spirax Sarco</b> cast iron type
		X		E-4115120	valve LE33, Kvs 0,2, DN15PN16
		X		E-4115122	valve LE33, Kvs 0,4, DN15PN16
		X		E-4115124	valve LE33, Kvs 0,5, DN15PN16
		X		E-4115126	valve LE33, Kvs 1,0, DN15PN16
		X		E-4115128	valve LE33, Kvs 1,6, DN15PN16
		X		E-4115130	valve LE33, Kvs 2,5, DN15PN16
		X		E-4115132	valve LE33, Kvs 4,0, DN15PN16
		X	X	E-4115134	valve LE33, Kvs 6,3, DN20PN16
			X	E-4115136	valve LE33, Kvs 10,0, DN25PN16
			X	E-4115138	valve LE33, Kvs 16,0, DN32PN16
			X	E-4115140	valve LE33, Kvs 25,0, DN40PN16
					stainless steel type
X				E-4511770	valve KE63, Kvs 0,2, DN15PN40
X				E-4511772	valve KE63, Kvs 0,4, DN15PN40
X				E-4511774	valve KE63, Kvs 0,5, DN15PN40
X				E-4511776	valve KE63, Kvs 1,0, DN15PN40
X				E-4511778	valve KE63, Kvs 1,6, DN15PN40
X				E-4511780	valve KE63, Kvs 2,5, DN15PN40
X				E-4511782	valve KE63, Kvs 4,0, DN15PN40
X	X			E-4511784	valve KE63, Kvs 6,3, DN20PN40
X	X			E-4511786	valve KE63, Kvs 10,0, DN25PN40
	X			E-4511788	valve KE63, Kvs 16,0, DN32PN40
	X			E-4511790	valve KE63, Kvs 25,0, DN40PN40

Version A		Version C		Article Number	Description
type		type			
20	40	20	40		
<b>Steam lance</b>					
X		X		E-4111000	steam lance 20, Code 1, 218 mm fitting length
x		X		E4111002	steam lance 20, Code 1.5, 393 mm fitting length
X		X		E-4111004	steam lance 20, Code 2, 568 mm fitting length
X		X		E-4111006	steam lance 20, Code 3, 838 mm fitting length
X		X		E-4111008	steam lance 20, Code 4, 1148 mm fitting length
X		X		E-4111010	steam lance 20, Code 5, 1408 mm fitting length
X		X		E-4111012	steam lance 20, Code 6, 1718 mm fitting length
X		X		E-4111014	steam lance 20, Code 7, 2018 mm fitting length
X		X		E-4111016	steam lance 20, Code 8, 2318 mm fitting length
X		X		E-4111018	steam lance 20, Code 9, 2628 mm fitting length
X		X		E-4111020	steam lance 20, Code 10, 2938 mm fitting length
X		X		E-4111022	steam lance 20, Code 11, 3238 mm fitting length
X		X		E-4111024	steam lance 20, Code 12, 3548 mm fitting length
	X		X	E-4111050	steam lance 40, Code 1, 217 mm fitting length
	X		X	E-4111052	steam lance 40, Code 1.5, 392 mm fitting length
	X		X	E-4111054	steam lance 40, Code 2, 567 mm fitting length
	X		X	E-4111056	steam lance 40, Code 3, 837 mm fitting length
	X		X	E-4111058	steam lance 40, Code 4, 1147 mm fitting length
	X		X	E-4111060	steam lance 40, Code 5, 1407 mm fitting length
	X		X	E-4111062	steam lance 40, Code 6, 1717 mm fitting length
	X		X	E-4111064	steam lance 40, Code 7, 2017 mm fitting length
	X		X	E-4111066	steam lance 40, Code 8, 2317 mm fitting length
	X		X	E-4111068	steam lance 40, Code 9, 2627 mm fitting length
	X		X	E-4111070	steam lance 40, Code 10, 2937 mm fitting length
	X		X	E-4111072	steam lance 40, Code 11, 3237 mm fitting length
	X		X	E-4111074	steam lance 40, Code 12, 3547 mm fitting length
<b>Piping</b>					
X	X	X	X	E-4111980	Pipe 8x1mm, for pre heating system
		X	X	E-4111984	Connecting screw, for lance heating, steel zinc plated
X	X			E-4112984	Connecting screw, for lance heating, stainless steel
X		X		B-4111981	steam lance piping in center for 2 lances, type 20, 300 mm fitting length
X		X		B-4111983	steam lance piping in center for 2 lances, type 20, 450 mm fitting length
	X		X	B-4111989	steam lance piping in center for 2 lances, type 40, 300 mm fitting length
	X		X	B-4111991	steam lance piping in center for 2 lances, type 40, 450 mm fitting length
X		X		B-4111935	connection for another steam lance, type 20, 300 mm length
X		X		B-4111937	connection for another steam lance, type 20, 450 mm length
	X		X	B-4111943	connection for another steam lance, type 40, 300 mm length
	X		X	B-4111946	connection for another steam lance, type 40, 450 mm length
<b>Actuator and accessories</b>					
X	X	X	X	B-4115001	actuator, electrical, 24V/0-10V or 4-20mA control signal
X	X	X	X	E-4115082	actuator pneumatic, PN9220E, control signal 0,2 - 1 bar proportional, without accessories
				E-4111662	EP5 positioner, electropneumatic
				E-4111666	PP5 positioner, pneumatic, control signal 0,2 - 1,0 bar
				E-4111668	gauge block for PP5, complete with 1 x 2barg and 1 x 7barg







**HYGROMATIK®**

**AIRTREND Limited**

Predstavništvo u Beogradu

Kumanovska 14, 11000 Beograd

Tel: 011 383 68 86, 308 57 40

Faks: 011 344 41 13

e-mail: [gobrid@eunet.rs](mailto:gobrid@eunet.rs)

web: [www.airtrend.rs](http://www.airtrend.rs)