

Electric Heater Steam Humidifiers

Series DBV64P - DBV524P

for use with fully demineralised water or purified condensate

Operation and Maintenance Instruction

Part 1: For the User (green)	17 Pages
Part 2: For the Installer (yellow)	11 Pages
Part 3: For the Plumber (blue)	4 Pages
Part 4: For the Electrician (red)	8 Pages
Part 5: Spare Parts List (white)	6 Pages



Attention! All work must be carried out by qualified personnel. All electrical installations and work on electrical components of this unit must be executed by a qualified electrician. Switch power off beforehand!

i 14.2 e 9511

© Copyright HYGROMATIK Lufttechnischer Apparatebau GmbH
1995

Operation and Maintenance Instruction: i 14.2 e 9511
Date: November, 1995

HYGROMATIK Electric Heater Steam Humidifiers for use with fully demineralised water or purified condensate

Series DBV64P - DBV524P

Operation and Maintenance Instruction

Part 1: For the User

1.1	Introduction	2
1.1.1	Operating Directions	2
1.1.2	Typographic Distinctions	2
1.2	Safety Notes	2
1.2.1	General.....	2
1.2.2	Operational Safety Notes	2
1.2.3	Disposal after Dismantling	3
1.3	Transport.....	3
1.3.1	General.....	3
1.3.2	Transport Size and Weight.....	3
1.3.3	Packing.....	3
1.3.4	Interim Storage	3
1.3.5	Check of Completeness and Correctness of Supply	3
1.4	Function and Installation	4
1.4.1	Function.....	4
1.4.2	Installation and Procedures	4
1.4.3	DBV-P Controls	5
1.4.4	Internal Output Adjustment	6
1.5	Technical Data	6
1.6	Commissioning.....	7
1.7	Operation	7
1.8	DBV-P-Control.....	8
1.8.1	The DBV-P Display	8
1.8.2	Service Reports	8
1.8.3	Reading Level.....	8
1.8.4	Electronic Name Plate	8
1.8.5	Programming without Code.....	9
1.8.6	Programming with Code.....	9
1.9	Data Transfer via RS232C.....	10
1.9.1	System Connection in Data Ring.....	10
1.9.2	RS232C Settings	10
1.9.3	Commands	10
1.10	Faults.....	11
1.11	Maintenance.....	14
1.11.1	Maintenance Work.....	14
1.11.2	Cleaning the Steam Cylinder	15
1.11.3	Replacing Heaters and Cut-Outs.....	16
1.11.4	Cleaning the Draining System and Pump.....	16
1.11.5	Cleaning the Solenoid Valve and Strainer	17
1.11.6	Cable Connections, Heater Cables.....	17
1.11.7	Functional Test	17
1.12	Dismantling.....	17

1.1 Introduction

Dear customer,

The HYGROMATIK steam humidifier is our answer to today's technical requirements. It satisfies them by means of its operational safety, its operational comfort and its economic efficiency.

To be sure to expertly and efficiently run your HYGROMATIK steam humidifier, please read this Operation and Maintenance Instruction.

Use the steam humidifier only in good and safe condition, paying attention to all notes in these instructions.

If you still have questions...please turn to us:

Main office, Norderstedt, Germany

Tel.: (+49 40) 52 68 33-0

Tel.: (+49 40) 52 68 33-93 (Technical Hotline)

Fax: (+49 40) 52 68 33-33

1.1.1 Operating Directions

The proven principle of heating water by the use of electric immersion heaters is exploited to generate steam.

The DBV-P range series of HYGROMATIK electric heater steam humidifiers includes 9 basic models with maximum generating capacities from 6 to 52 kg/h.

The humidifiers only work with fully demineralised water or purified condensate. The max. conductivity at the outlet must not exceed 20 µS/cm.



Attention: The HYGROMATIK steam humidifier produces steam at a temperature of 100°C. The steam is not to be used as a direct inhalant.

The correct use of the steam humidifier also includes adherence to our installation, dismantling, refitting, commissioning, operation and maintenance instruction as well as taking correct disposal steps. Only qualified and authorised personnel may operate the unit. Persons transporting or working on the unit, must have read and understood the corresponding parts of the Operation and Maintenance Instruction and especially the chapter „Safety Notes“. Additionally, operating personnel must be informed of any possible dangers.

You should place a copy of the Operation and Maintenance Instruction at the unit's operational location (or near the unit).

1.1.2 Typographic Distinctions

- Enumeration with preceding heading: General enumerations.
- » Enumeration with preceding double chevron: Work or maintenance steps that should or must be followed sequentially.
- Sequential step to be checked.

1.2 Safety Notes

1.2.1 General

By law we must state these safety notes. They serve to protect and prevent accidents.

Warning Notes and Safety Symbols

The following safety symbols shown in the text will warn about dangers and danger sources. Get familiar with these symbols.



Attention: Not observing this warning can lead to injury or danger to your life and/or damage to the unit.



Attention, Voltage: Dangerous electrical current. Not observing this warning can lead to injury or danger to your life.



Note: Materials/operational equipment; must be handled and/or disposed of according to the law.



Note: Further explanation or cross-references to other sections of the text in this Operation and Maintenance Instruction.

1.2.2 Operational Safety Notes

In General

Observe all safety and warning notices which you find about the unit.

If there should be malfunctions, shut down the unit immediately and secure against being restarted. Faults should be removed immediately.

During repair work, guaranty operational safety of the unit by using qualified personnel. Only use original HYGROMATIK spare-parts.

For the effective operation of this unit refer to any national regulations restricting or governing its use.

Accident Prevention Regulations

Observe the accident prevention regulations:

UVV "Electrical installation and electrical equipment" (VBG 4) or equivalent national codes. In this way you can prevent injury to yourself or others.

Operation of the Unit

Do not impair the safety of the unit.

Periodically check all protection and warning devices for proper functioning.

Safety equipment is not to be removed or put out of operation.

Installation, Dismantling, Maintenance and Repair of the Unit.

Turn off power, when doing maintenance work or repairs to the unit.

Extensions to the unit or installation of additional equipment is only allowed after obtaining written approval from the manufacturer.

Electrical Parts

Work on electrical parts must be carried out by qualified electricians.

Turn off the power, when working on electrical parts and secure against restart.

Immediately turn the unit off when faults occur in the electrical energy supply.

Only use original type fuses of correct rating.

Check electrical equipment of the unit periodically.

Defects, like loose connections or burned cables must be removed immediately

Test all installed protective devices after installation or repairs (e.g. grounding).

1.2.3 Disposal after Dismantling



Note: the operator is responsible for the component parts of the unit being disposed of according to the law.

1.3 Transport

1.3.1 General



Note: Carefully transport the steam generator, to prevent damage from careless loading and unloading and unnecessary force.

1.3.2 Transport Size and Weight

Type	Height [cm]	Depth [cm]	Width [cm]	Weight [kg]
DBV 64P	85	43	59	41
DBV 94P	85	43	59	41
DBV 124P	85	43	59	43
DBV 174P	85	43	59	43
DBV 264P	85	43	59	44
DBV 304P	104	40	116	72
DBV 354P	104	40	116	70
DBV 434P	104	40	116	72
DBV 524P	104	40	116	73

1.3.3 Packing



Note: Observe the pictograms displayed on the carton.

1.3.4 Interim Storage

During storage, keep the unit dry and protected from frost.

1.3.5 Check of Completeness and Correctness of Supply

Upon receipt of the unit, make sure that:

- type and serial number on the name plate correspond to the order and supply information,
- equipment is complete and in perfect condition.



Note: Immediately file a written claim with your shipping agent in case of transport damage or missing parts.

Following are typical conditions of notification to transport companies (national variations possible):

Transport Company	After Receipt of Goods
Post	24 hours at the latest
Rail	7 days at the latest
Lorry and railway companies	4 days at the latest
Parcel services	at once

1.4 Function and Installation

1.4.1 Function

The Electric Heater Principle

One, two or three heaters are arranged in a closed cylinder and connected to an AC voltage. The heat generated by the immersion heaters is directly used to boil the water supplied to the cylinder.

The demineralised water supply is almost free of minerals. This ensures long cylinder and heater life. It minimises the need for periodic blow-down of cylinder water as well as the need for maintenance checks.

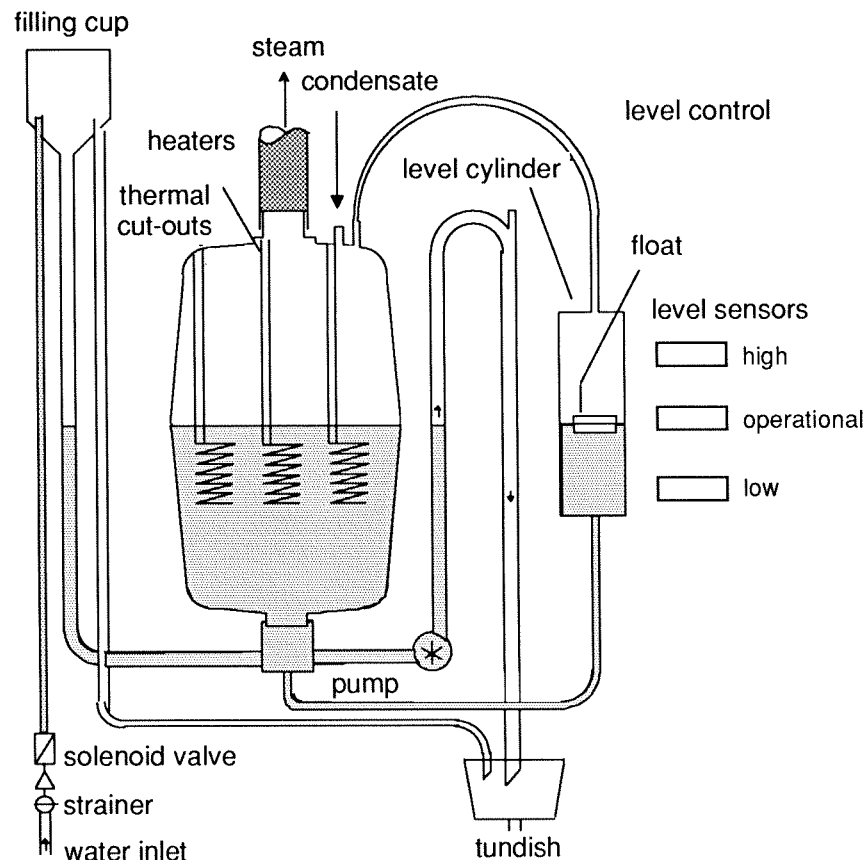
The steam generated is saturated at a temperature of about 100°C and only of low gauge pressure ("non-pressurised steam"). It is demineralised and virtually free from bacteria. Any residual minerals remain in the cylinder.

1.4.2 Installation and Procedures

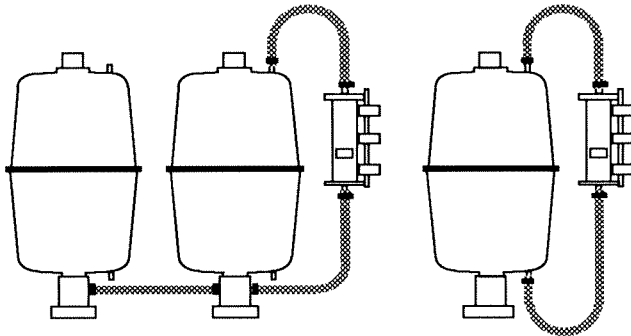
Water is admitted through a direct solenoid valve when the hygrostat or controller calls for humidity. The solenoid valve is reliably functioning at pressures from 0.05 to 3.5 bar. Pilot operated solenoid valves for higher pressures are available upon request.

To provide an air gap water is fed to a filling cup before it flows into the steam cylinder. This ensures no hot cylinder water entering the water supply line in case of feed water shortages.

The water level in the cylinder must be controlled within certain upper and lower limits. A too high water level would permit water to enter the steam hose, whereas too low a level could lead to overheating of the heater elements. Too high or too low level readings cause the humidifier control to switch off the heater power supply.



A water level control controls the water level in the cylinder. The water level control consists of a fully enclosed transparent perspex tube with a stainless steel float engaging heavy duty electronic proximity switches. The tube is pressure equalised to avoid false readings by varying air duct pressures.



The main breakers switch on to supply power to the heaters when the water level leaves the lower level sensor in the level control cylinder. Steam production begins within a few minutes.

The water level in the cylinder is maintained by the middle level sensor. If the water level goes below the sensor "operation" for more than 45 seconds, the solenoid valve opens to replenish any evaporated water.

The humidifier switches to stand-by when after some time sufficient humidity has been produced. The humidifier also switches to stand-by if any safety system is triggered.

The steam cylinder is constructed of two flanged plastic halves bolted together by stainless steel bolts and nuts and sealed by an o-ring. Up to 3 heaters of either 4.5 or 6.5 kW each are installed in the top half. Each heater is thermostatically supervised by its temperature cut-out. The cylinder can easily be opened for inspection. Any necessary replacement of heaters or temperature cut-outs can easily be accomplished.

In case of any malfunction, which could lead to overheating of the heater elements, each element has a mechanical temperature cut-out. This feature leads to a double safety system in case of low water supply.

Although fully demineralised water contains only traces of residual minerals, operating experience has shown periodic full blow-down of the cylinder contents increases the time interval between cylinder inspections and lengthens the life cycle of heater elements. A heavy-duty waste water pump is therefore periodically engaged to flush out any accumulated residual non-volatile matter.

Steam production is therefore interrupted for a few minutes.

The steam is fed into air-conditioning ducts through special steam hoses and dispersion manifolds. Provided only the amount of steam commonly used for normal humidification is generated, this steam virtually does not heat up the air. The condensate formed returns to the steam cylinder by a condensate hose.

Direct humidification of rooms (without ducts) is accomplished by using ventilation units with fans and integrated manifolds. The steam generator is connected to the dispersion manifold or ventilation unit by steam and condensate hoses.

1.4.3 DBV-P Controls

The steam humidifier DBV-P can be programmed for the following controls.



Note: Please turn to HYGROMATIK for reprogramming if necessary.

DBV-P Controls
1step control
Proportional control with external controller*
Proportional control with integrated controller
Proportional control with integrated controller and proportional max. limiter.

* DBV-P incorporates adapters for different control signals.

Control Signals for Proportional Control
0(2) - 10 V DC (min. 0,2 mA)
0(4) - 20 V DC (min. 0,2 mA)
0 - 20 V DC (Phase angle control, Staefa)
0(2) - 10 mA DC (min. 10V)
0(4) - 20 mA DC (min. 10V)

The usable signal range is 20 - 100% with 5% hysteresis for restarting, but can be altered by the factory for special control functions. At the minimum permissible control signal the output of the humidifier is still 10% of the limited maximum capacity. The humidifier switches off if the control signal drops below this level.

When the minimum control signal plus hysteresis is reached the humidifier switches on again.

1.4.4 Internal Output Adjustment

The proportional control of the DBV-P steam humidifier takes place through proportional control of one of the heating elements and stepwise addition of further heating elements. In this way the output of the humidifier can be controlled proportionally over the whole span.

For example:

For a humidifier with two heating elements an internal signal of 60% is realised by switching on the first heating element (50%). The second heating element gets the remaining 10% from a solid state relay.

1.5 Technical Data

Steam Humidifiers DBV64P-DBV524P									
Designation	DBV64	DBV94	DBV124	DBV174	DBV264	DBV304	DBV354	DBV434	DBV524
Steam Capacity [kg/h]	6,0	8,7	12,0	17,3	26,0	30,0	34,7	43,3	52,0
Electrical Connection*	400V/3/N 50,60Hz								
Electrical Power [kW]	4,5	6,5	9,0	13,0	19,5	22,5	26,0	32,5	39,0
Current [A]	11,3	16,3	19,5	28,2	28,2	39,0	44,5	56,4	56,4
External Fuse [A]	3x16	3x20	3x20	3x35	3x35	6x20	6x35	6x35	6x35
Control	P								
No. of Cylinders	1					2			
No. of Heaters	1	1	2	2	3	5	4	5	6
Steam Hose [mm]	1x25			1x40		2x40			
Condensate Hose [mm]	1x12					2x12			
Empty Weight [kg]	30,4	30,4	31,8	31,8	33,2	55,6	54,2	55,6	57,0
Operational Weight [kg]	48,9	48,9	50,3	50,3	51,7	92,6	91,2	92,6	94,0
Dimensions Height [mm]	815					815			
Width [mm]	530					923			
Depth [mm]	315					315			
Water Supply	Fully demineralised water or pure condensate, 0.05-3.5 bar, 12 mm nipple								
Water Drain	From tundish, 1x25 mm					From tundish, 2x25 mm			
Ventilation units, Wallmount.	DVW8	DVW17	DVW17	DVW17	DVW30	DVW30	2xDVW30		
Ventilation units, Integrated	DVA30	DVA30	DVA30	DVA30	DVA30	-	-	-	-

* Other voltages upon request.

1.6 Commissioning



Attention: This unit should only be serviced by qualified personnel.

Switch Off Steam Humidifier

Before the unit is put into operation, it must be clear how it should be switched off.

- » Switch off the control switch.
- » Close the water feed shut-off valve.

Switch On Steam Humidifier

- » Check that all cable fittings, heater cables and connections are firmly grounded.
- » Check seating of cylinder and clamps of steam and condensate hose.
- » Insert main fuses.
- » Turn on the control switch.
- » Open the water feed shutoff valve.
Make sure only fully demineralised water enters the cylinder.
Operating pressure 0.05 to 3.5 bar.
- » Set hygrostat of proportional controller to humidity required.

Then the following functions are taking place:

- The DBV-P display lights up.
- The humidifier opens the solenoid valve to supply water to the steam and level control cylinder.
- When the water level goes above the sensor "Low water level" in the level control cylinder the main breakers are switched on to supply power to the heaters.
- Steam production begins within a few minutes.

Further Checking:

Once the solenoid valve start replenishing the water periodically the steam humidifier operates at constant rated output and the cold start sequence is complete.

- » Observe the steam humidifier after 15 to 30 minutes of operation and check for any leaks.



Attention: Observe safety regulations governing work carried out with live components!

- » Switch the unit off and stop the leaking.

1.7 Operation



Attention: This unit should only be serviced by qualified personnel.

Put the unit into operation doing the following:

- » Turn on water supply.
- » Switch on the control switch in the door of the steam humidifier.





Now the unit proceeds as mentioned under "1.6 Commissioning".

1.8 DBV-P-Control




The display and control unit in the door of the electrical compartment allows local communication with the humidifier.




The display uses modern light emitting diodes, which may be read even under adverse light conditions. Under normal conditions the momentary steam output is displayed continuously.

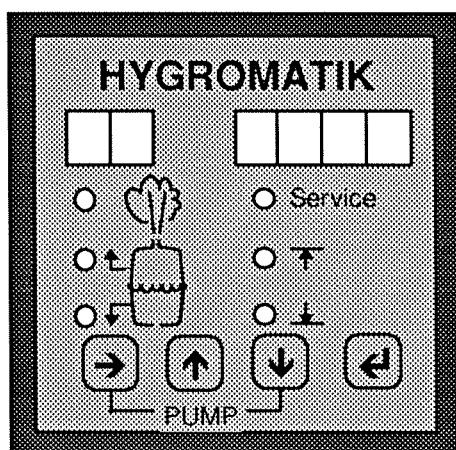
Other displays and functions can be called by pressing the     keys.

Manual Programming	
	Key to save and return
	Key to change a value
	Key to decrease a value
	Key to increase a value

1.8.1 The DBV-P Display

The left numerical LED display lists the parameter which value is shown in the right display. The yellow LEDs on the left side show the present state of the humidifier. I.e.  Humidification,  Filling and  Deconcentration.

The red LEDs on the right are common service reports. I.e.  Service interval expired,  "High water level" and  "Low water level".



The DBV-P display


1.8.2 Service Reports

The system monitors operation of both the blow-down pump and the solenoid valve. If blow-down does not occur, or if the solenoid valve remains open continuously for longer than 30 minutes, the humidifier switches off and the fault is shown on the display.

Service Reports	
F1	Blow-down fault
F3	High water level
F4	Solenoid valve continuously opened
F7	Sensor failure
F9	Internal system fault



1.8.3 Reading Level




By pressing the key  the display will progress to the next higher reading value.



Reading Level (Key )	
L1	Steam per hour [kg/h]
L2	Hours of operation [h]
L3	Setpoint rel. humidity* [%]
L4	Actual rel. humidity* [%r.H] or Ext. control signal [%]
L5	Output limitation [%max. output]
L6	Setpoint max. rel. humidity* [%r.H]
L7	Actual max. rel. humidity* [%r.H]
L8	Internal setpoint [%max. output]
L9	Service interval expired [%]
L0	Total steam produced [t]

* only if software controller is activated!

1.8.4 Electronic Name Plate

By pressing  and  simultaneously, 6 different informative statements may be displayed by the unit.

Key  switches to the next higher. The information level may be left by pressing both  and .

Electronic Name Plate (Keys  + )	
I2	Model
I3	Nominal voltage
I4	Number of phases
I5	Year of production
I6	Serial number
I7	Network address







1.8.5 Programming without Code

The following parameters can be changed without access code.

Parameter	Description
P0	Code input for restricted access
P1	Output limitation [%]
P8*	Setpoint rel. humidity [%r.H]
P9*	Setpoint rel. max. humidity [%r.H]



* only if software controller is activated.

Example: The setpoint for the relative humidity should be changed from 50% r.H. to 70 %r.H.

- » Switch on the humidifier by the control switch. ("L1" lights up).
- » Press  and  simultaneously.
The electronic switches to the programming mode. **P0** 00 appears in the display.
- » Go to the desired parameter by pressing .
(As the setpoint for the rel. humidity has to be changed, **P8** 050 should appear in the display).
- » Press twice the key . The second digit to the right will now be blinking. **P8** 050
- » Press the key  until **P8** 070 appears.
- » Confirm the new programmed parameter with the key .

Now the setpoint for the rel. humidity is programmed to 70 %r.H.

Change the value of other parameters as shown above.

- » Exit the level by pressing the keys  and  simultaneously.

1.8.6 Programming with Code








The DBV-P control system is equipped with a modern microcomputer chip, whose external, programmable, non-volatile data memory basically allows operating parameters to be adapted and changed. However, in the interest of safety and depending on the requirements they can only be accessed by entering a code number into the parameter "P0". The code must only be used by authorised persons.

The access to the following parameters is protected by the code P0=10.

Parameter	Designation
P2	Amount of steam service interval [t]
P3	Reset service interval (=1)
E1*	Gain PI-controller
E2*	Integration PI-controller [min]
E3	External control signal 1=0(2)-10V DC 2=0(4)-20V DC 3=0(2)-10mA DC 4=0(4)-20mA DC 5=No function 6=0-20V phase-angle (Staefa)
E4 E5 E6 E8 E9	No function
E7	Baud rate data transfer RS232C 0=9600 1=4800 2=2400 3=1200 4=600 5=300 6=150 7=75



* only if software controller is activated.

Example: The control signal should be changed from 0-10V to 4-20mA.

- » Switch on the humidifier by the control switch. ("L1" lights up).
- » Press  and  simultaneously.
The electronic switches to the programming mode. **P0** 00 appears in the display.
- » Enter code by pressing the key  until **P0** 10 appears.
- » Go to the desired parameter by pressing .
(As the control signal has to be changed, "E3" should appear in the display).
- » Press the key . The first digit to the right starts blinking. **E3** 1
- » Press the key  until **E3** 4 appears.
- » Confirm the new programmed parameter with the key .

Now the humidifier is programmed for a control signal of 4-20mA.

Change the value of other parameters as shown above.

- » Exit the level by pressing the keys  and  simultaneously.

1.9 Data Transfer via RS232C

The DBV-P control incorporates a standard RS232C serial interface with SubD9 socket for the transmission of all status reports and operational values.

- By this interface all parameters may be put in and modified.
- The unit may remotely be switched on and off.

Build-in socket	SubD9
Pins	2 TxD
	3 RxD
	5 Gnd

1.9.1 System Connection in Data Ring

- TxD is to be connected to the next RxD.
- The last unit in the system will again be connected to the first (the data terminal).
- Double cylinder units count as one unit.
- The maximum number of addresses in the system is 10 (0-9).
- The data terminal is given address number 0.

1.9.2 RS232C Settings

1 Start bit, 8 Data bits, 1 Stop bit, no handshake.

The ASCII standard code is used.

Each telegram transmitted by the terminal is immediately transmitted on by the receiving DBV. Only telegrams having the correct syntax are actually processed.

The telegram uses the following form, whereby the individual elements are joined without blanks in-between; parameters in commands always use two digits, parameter values 4 digits without decimal point but with leading zeroes and possibly a signum:

Address 1-digit
ASCII 40H
Command
CR

1.9.3 Commands

ID: Identifying the DBV
Answer: DBV type

RD: Reading parameter values
Answer: Parameter and value

MO<Parameter><Value>:
Modifying a parameter value
Answer: Parameter and value after execution

ST: Reading of active status reports
Answer: F1 Deconcentration fault
F4 Solenoid valve cont. opened
CF Output fall-off
OP Humidification
LC Locale service operation
SV Service interval exceeded
SB Stand-by

ON: Remote switching on of DBV
Answer: ON

OF: Remote switching off of DBV
Answer: OF



Note:

Remote switching of the DBV can only be done, when the local control switch of the unit has been engaged. A unit remotely switched off can be switched on locally for service reasons by simultaneously pressing the buttons and . To return to the original state switch the local control switch off, wait for 5 seconds and switch on again.

1.10 Faults



Immediately switch off the steam humidifier if a fault occurs. Faults are only to be remedied by qualified personnel following the proper safety instructions.

Fault	Causes	Remedies
High water level ($\odot \uparrow$ lights up)	<ul style="list-style-type: none"> The humidifier is off. Water is continuously discharged from the drain. <ul style="list-style-type: none"> Water continues to flow when main switch is turned off. The solenoid valve remains open. Water stops to flow when the main switch is turned off. The solenoid valve receives a permanent electrical signal. The operating (middle) level sensor might be out of position or not functioning. The humidifier is off. No water is added. <ul style="list-style-type: none"> If fully demineralised water has not been used small particles of scale can block the tube system of the level control. This can lead to surges within the level control cylinder, carrying the float beyond the middle level sensor. At this point, water is fed to the system until it is stopped by the high level sensor and all functions stop. Rapid pressure surges within the air-duct can, in 2-cylinder units, cause momentary imbalances in the level control cylinder forcing the float beyond the middle level sensor. At this point water is fed to the system until it is stopped by the high level sensor and all functions stop. Incorrect installation of condensate return hoses can cause sudden surges of condensate increasing the water level and forcing the float beyond the middle level sensor. At this point water is fed to the system until it is stopped by the high level sensor and all functions stop. 	<p>Clean the solenoid valve.</p> <p>Check for position and operation. Realign or replace.</p> <p>Clean the humidifier and install warning and shut-down system within the water make-up plant.</p> <p>Install pressure equalisation hose just above the humidifier between the two steam hoses. Refer to chapter 2.6.1 "Pressure equalisation".</p> <p>Check condensate return hoses.</p>
Low water level ($\odot \downarrow$ lights up)	<ul style="list-style-type: none"> The water shut-off valve is not open. The solenoid valve is blocked. 	<p>Open the water inlet</p> <p>Clean the solenoid valve.</p>
\odot Service lights up	<ul style="list-style-type: none"> Service interval is exceeded. The steam cylinder has to be serviced. 	<p>Clean the steam cylinder and reset the service interval (Parameter P3 to 1).</p>

Fault	Causes	Remedies
Blow-down fault (Fault F1)	<ul style="list-style-type: none"> • Blow-down pump is blocked by scale preventing operation • Blow-down pump not receiving electrical power <ul style="list-style-type: none"> - Check cable connections. - Check whether relay on the pcb operates (clicks). • Blow-down pump is running, but no water pumped out because the cylinder outlet is blocked. 	<p>Check if fully demineralised water is used.</p> <p>Clean the pump.</p> <p>Eventually change the cables. Change the main pcb.</p> <p>Clean the cylinder and drain hose.</p>
High water level (Fault F3)	<ul style="list-style-type: none"> • As soon as the water level reaches the sensor "High level" the pump runs until the water level get in touch with the sensor "Operation". If the water level touches the sensor "High level" for the fifth time within short time, the failure F3 appears.. 	<p>Refer to "High water level".</p>
Continuous water feed (Fault F4)	<ul style="list-style-type: none"> • After steam generation has commenced, the solenoid valve opens intermittently while water is drained without the pump running. Water level is normal. <ul style="list-style-type: none"> - If part of the steam hose is allowed to sag, a pocket of water may form preventing further passage of steam. The steam then builds up pressure in the cylinder and forces the water out of the overflow. - Water might be discharged from the outlet without the steam hose being blocked if the total pressure on the surface of the water in the cylinder is too high. As the static pressure of the air duct is transmitted through the steam hose into the cylinder, it is added to the steam pressure so that the permissible value might be exceeded. 	<p>Check the steam hoses.</p> <p>Install a special discharge hose.</p>
Continuous water feed (Fault F4)	<ul style="list-style-type: none"> • The water level in the cylinder is low. The humidifier is off. The solenoid valve is continuously open. Water is drained without the pump running. <ul style="list-style-type: none"> - The water supply hose from filling cup to base might be blocked. 	<p>Check and clean.</p>
Sensor failure (Fault F7)	<ul style="list-style-type: none"> • One of the sensors is defect. • 2 or 3 sensors are activated at the same time. • The sequence of the sensors has been changed. 	<p>Check the sensors.</p> <p>Check the water level control.</p> <p>Check.</p>

Fault	Causes	Remedies
Internal system fault (Fault F9)	<ul style="list-style-type: none"> • Transient voltage peaks may hinder programme execution by sensitive micro-computers or even destroy electronic components. The power supply of the main printed circuit board is therefore specially filtered, and an additional electronic "watchdog" normally ensures that the humidifier restarts automatically in the event of the programme crashing. However the watchdog itself can also be put out of action. 	<p>Check the wiring, particularly for the controller signal and the safety interlock system.</p> <p>Investigate external sources of interference.</p> <p>No other loads are allowed to be connected to the supply transformer for the main pcb.</p> <p>Switch the control switch off and after a short delay on again.</p> <p>Possibly change the main pcb.</p>
No steam production, although the unit is switched on	<ul style="list-style-type: none"> • If the humidity exceeds the value set on the hygrostat or controller there is no demand for steam. The humidifier switches off. • The temperature cut-outs have been triggered. Refer to "Low water level". • The safety interlock system has been triggered. • If there is no hygrostat and no safety interlock system the absence of a bridge between the terminals 1 and 2 prevents the humidifier from starting. • Both control switch and humidification light are on. 	<p>Check the setting and if necessary operation of the sensor and controller.</p> <p>Switch off power supply. Press down the rod with a pair of small pliers.</p> <p>Look for failing function and remedy</p> <p>Insert a bridge between terminals 1 and 2.</p> <p>Refer to "Humidity too low".</p>
Humidity too low	<ul style="list-style-type: none"> • Despite full output being attained the humidity cannot be achieved due to incorrect output design parameters. • A long steam hose passing through cold and drafty rooms can lead to increased condensation levels. • Incorrect installation of steam distributors can lead to condensation in the air duct. • If one heater is out of operation the desired output is reduced. 	<p>Check steam output data</p> <p>Reposition humidifier, insulate hose.</p> <p>Check system layout and installation.</p> <p>Check fuses, temperature cut-outs and heaters.</p>
Humidity too high	<ul style="list-style-type: none"> • Steam output is too high leading to poor control characteristics and might even cause condensation in ducts. 	<p>Readjust step controller or reduce steam output by installing step control of proportional control.</p>
Water on base plate	<ul style="list-style-type: none"> • The cylinder is incorrectly inserted into the base and water is leaking at this point. • The cylinder has been reassembled incorrectly after servicing. 	<p>Reinsert by putting O-ring into the base first.</p> <p>The O-ring seal has been damaged or not replaced or the flange itself is damaged.</p>

Fault	Causes	Remedies
Water on base plate	<ul style="list-style-type: none"> Water leaks from the top part of the cylinder. Water flows from the base plate drain hole when the humidifier is being pumped out and the tundish overflows. <p>The drain connection to the tundish has not been installed properly or is blocked or drain pipe is too small or badly routed.</p>	<p>The hose clamps for the steam and condensate hoses are improperly secured.</p> <p>The heaters or temperature cut-outs have been improperly installed.</p> <p>Reposition drain pipe, allowing free flow from tundish into drain system.</p>
Water leaking from tundish	<ul style="list-style-type: none"> Tundish is improperly installed or gasket or flange is damaged. 	Reinstall or replace making sure tundish is properly seated into rear support.

1.11 Maintenance

The HYGROMATIK steam generator is to a great extent maintenance free. Nevertheless, operational faults can occur, which have to do with insufficient or improper maintenance. With proper maintenance the unit will operate longer so regular maintenance is essential.

The work is mainly limited to inspecting all of the components including the interior of the steam cylinder and test-running the unit.



Attention: Observe upon maintenance:

- Only qualified and informed personnel should work on unit.
- Pay attention to safety regulations.
- Take unit out of operation for maintenance work and secure against restarting.
- After maintenance work the unit should be re-checked by qualified personnel for operational safety.

The operating characteristics and maintenance intervals of the steam generator are mainly dependent on the existing water quality and the amount of steam generated since the last maintenance. Different qualities can lengthen or shorten the period. The residues found in the steam cylinder provide an indication of future maintenance intervals. The latest point in time at which a cylinder may be cleaned is:

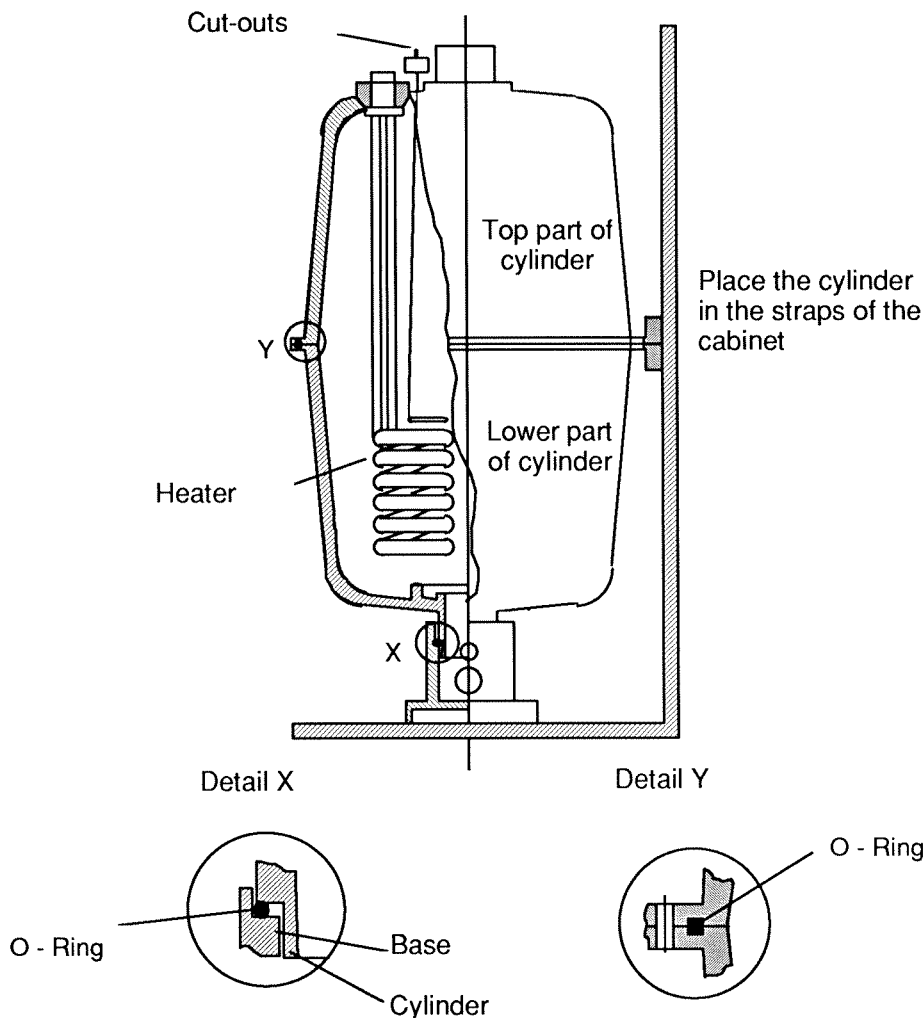
- After a lengthy period of operation indicated by "Service interval exceeded" on the display.
- Or by the "Collective Fault"- relay, if fitted.

1.11.1 Maintenance Work

Use only fully demineralised water or pure condensate with a max. conductivity of 20 µS/cm.

Any information concerning cleaning and maintenance periods is only based on typical data found empirically.

Cycle	Maintenance Work
4 weeks after commissioning	<ul style="list-style-type: none"> Visual inspection of the electrical and mechanical components, cables, connections, etc. Visual inspection of the water level control. Visual inspection of the interior of the steam cylinder.
Once a year	<ul style="list-style-type: none"> Visual inspection of the electrical and mechanical components, cables, connections, etc. Visual inspection of the water level control. Visual inspection of the interior of the steam cylinder.



1.11.2 Cleaning the Steam Cylinder

For units with integral fan unit the cabinet of the fan unit has to be removed as well as the four screws from the steam manifold. Now the cylinder can be removed from the humidifier.

Disassembly

- » Switch the humidifier on with the control switch.
- » Drain the water in the cylinder by pressing the keys → and ↓.
- » Turn off the power and secure against restart. Remove safety fuse F1.
- » Remove power supply cables to the temperature cut-outs.
- » Disconnect steam and condensate hoses.
- » Disconnect connection hoses to the water level control.
- » Lift steam cylinder off its base and remove from humidifier.
- » Remove all cylinder bolts and open the cylinder.

Cleaning



Note: When cleaning do not use acids or other chemicals.

- » Remove all deposits. Small amounts of scale on the heaters are acceptable.

Reassembly

- » Replace the flange O-ring with original HYGROMATIK solvent-free O-ring.



Note: When joining the cylinder the upper and lower parts must fit firmly on top of one another.

- » Connect upper and lower parts with bolts.
- » Remove the O-ring (17) from the cylinder.
- » Insert a new solvent-free HYGROMATIK O-ring into the cylinder base.
- » Insert the cylinder into the cylinder base.

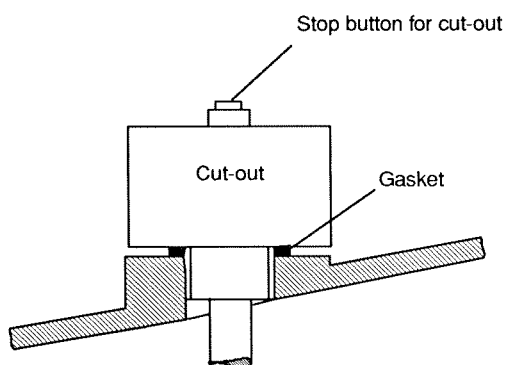
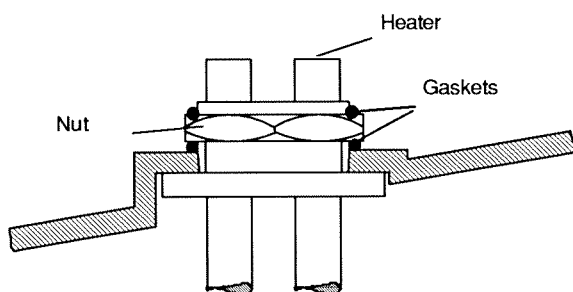
- » Refit the cylinder into the steam humidifier (the condensate connection must be in front).
- » Connect the steam and condensate hoses as well as the connection hoses to the water level control.
- » Connect the power supply cables to the temperature cut-outs.
- » Push in the safety fuse F1.

Switch on the unit and operate for 15 to 30 minutes. Check for any leaks.

1.11.3 Replacing Heaters and Cut-Outs.

Disassembly

- » Disassemble the cylinder and open, as written in chapter 1.11.2 "Maintenance, Cleaning the Steam Cylinder".
- » Remove wires between heaters and cut-outs. Remove cut-out actuator wires from heaters.
- » Remove heaters and cut-outs.



Attention: Do not bend the capillary tube of the cut-outs!

Reassembly

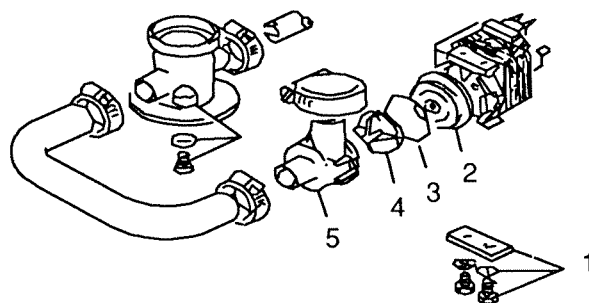
- » Reassemble heaters and cut-outs. Do not overtighten nuts.

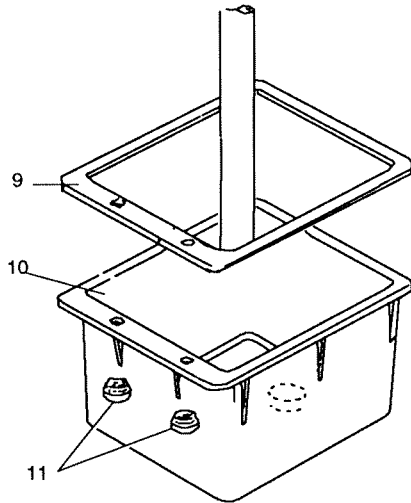
- » Reassemble the steam cylinder and fit in the steam humidifier as described in chapter, "Maintenance, Cleaning the Steam Cylinder".
- » Connect the wires between heaters and cut-outs.
- » Push in the safety fuse F1.
- » Switch on the unit and operate for 15 to 30 minutes. Check for any leaks.

If there is a leakage, switch off the power and observe safety regulations governing work carried out with live components.

1.11.4 Cleaning the Draining System and Pump

- » Disassemble the cylinder and open, as written in chapter 1.11.2 "Maintenance, Cleaning the Steam Cylinder".
- » Remove the electric cable from the pump.
- » Remove the screws (11). Disconnect tundish (10) and clean.
- » Disconnect the hoses to the pump.
- » Remove the screws (1) and the pump.
- » Open the pump (bayonet joint).
- » Remove residues from discharge hoses and pump. Replace pump impeller (4), O-ring (3), shaft seal (2) or body (5) as necessary, if any of these parts are no longer in perfect condition.
- » Reassemble the pump.
- » Insert the pump into the unit and tighten with screws (1).
- » Connect the hoses to the pump.
- » Connect the electric cable to the pump.
- » Fit in the steam humidifier as described in chapter, "Maintenance, Cleaning the Steam Cylinder".
- » Insert the tundish, checking that the gasket (9) is seated properly and replace if necessary.
- » Check for any leaks.





1.11.5 Cleaning the Solenoid Valve and Strainer

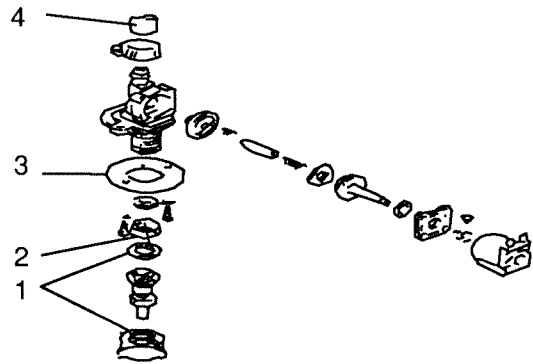
Disassembly

- » Drain the cylinder by pressing the keys ⬇ and ➡
- » Switch off the unit and secure against restart.
- » Pull out the safety fuse F1.
- » Turn off the water supply and turn loose the nut to the fresh water connection (1).
- » Disassemble the cylinder, as written in chapter 1.11.2 "Maintenance, Cleaning the Steam Cylinder".
- » Release the connecting hose (6) to the filling cup.
- » Pull out the cable plugs.
- » Remove the fitting screws (3) from the solenoid valve.
- » Remove the solenoid valve.
- » Remove strainer (2) in the supply and clean.

Assembly

- » Insert the strainer (2).
- » Insert the solenoid valve and seal into the unit.
- » Firmly tighten the solenoid valve with the screws.
- » Connect the water supply.
- » Connect the electric cable to the solenoid valve.
- » Connect the connection hose to the filling cup.
- » Fit in the cylinder into the humidifier as described in chapter "Maintenance, Cleaning the cylinder".
- » Open the water supply.
- » Push in the safety fuse F1.

- » Switch on the unit and operate for 15 to 30 minutes. Check for any leaks.



1.11.6 Cable Connections, Heater Cables

- » Check all connections to be firmly tightened.

Loose cable connections lead to excessive contact resistance and overheating of the contact surface.

1.11.7 Functional Test

- » Start the humidifier and operate for a few minutes at maximum output if possible.
- » Check safety devices.
- » Check hose connections for any leaks.
- » Check temperature cut-out function:

Shut off water supply. Engage the middle level sensor by inserting thin metal strip between sensor and level cylinder.

After approx. 60 sec. cut-outs should trip. A small rod on top of the cut-outs appears.

Open the water supply and refill with water. Switch off the power supply. Press down on rod with a pair of small pliers to reengage contacts.

1.12 Dismantling

Removing the steam generator follows the same sequence as installing, only in reverse order.



Attention: The dismantling of the unit should only be carried out by qualified personnel. The electrical supply should only be disconnected by a qualified electrician.

Pay attention to the "Safety Notes" chapter 1.2, particularly to those referring to disposal regulations.

HYGROMATIK Electric Heater Steam Humidifiers for use with fully demineralised water or purified condensate

Series DBV64P - DBV524P

Operation and Maintenance Instruction

Part 2: For the Installer

2.	Installation	2
2.1	Steam Humidifier	2
2.1.1	Equipment Dimensions DBV64 - DBV264	3
2.1.2	Equipment Dimensions DBV304 - DBV524	4
2.2	Fan Unit (option).....	5
2.2.1	Fan Unit Type DVW.....	5
2.2.2	Fan Unit Type DVA17, 30	5
2.3	Steam Manifolds	6
2.3.1	Installation	6
2.4	Steam Hose	7
2.4.1	Pressure Equalisation	8
2.5	Condensate Hose.....	8
2.6	Installation Examples	8
2.7	Steam Solenoid Valves.....	9
2.8	Checking	9
2.9	Drill Pattern	10

2. Installation



Attention: Installing this unit should only be carried out by qualified personnel. We accept no liability for damages caused by faulty installation.

Observe all safety and warning notices you find on the unit.

Do not connect the unit to electrical power before final installation.

Additional equipment may not be installed inside the unit without prior written consent by HYGROMATIK.

2.1 Steam Humidifier

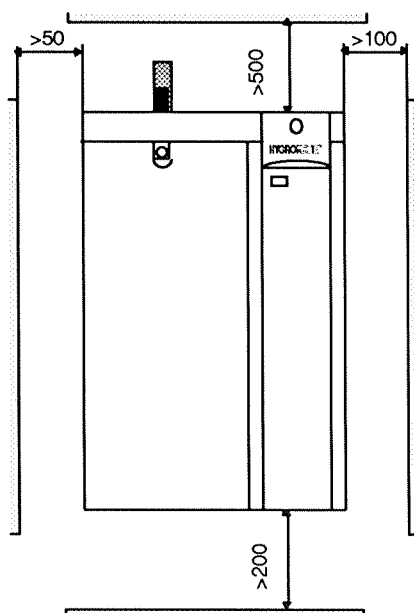


Note: Be aware of the following when selecting the installation location of the steam humidifier:

- Ambient temperature 5 to 40 °C.
- Relative humidity below 80 %r.H.
- Distances to the walls in compliance with those quoted in the diagrams.
- The steam manifold should be joined to the steam humidifier using the shortest possible lengths of steam and condensate hoses. Only then can the optimum efficiency be achieved.

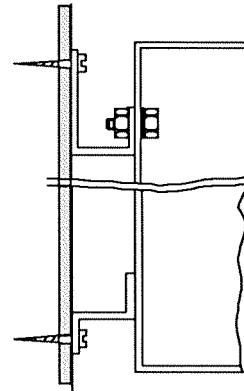
Wall Distances

- The hoses must be without sags and kinks and be laid with a continuous slope of 5-10% (otherwise sags will be formed).



Note: It is often advantageous to take into account existing water connections (feed and drain) when selecting the location of the steam humidifier.

Wall Mounting



Note: To function properly the steam humidifier must be vertically installed.

- » Position the mounting bracket of the humidifier in the planned location, adjust with spirit level and fasten.
- » Hang the unit onto the bolts of the mounting bracket, tighten bolts and fix the lower mounting bracket to the wall.
- » After finishing the mounting remove all transport safety packaging.

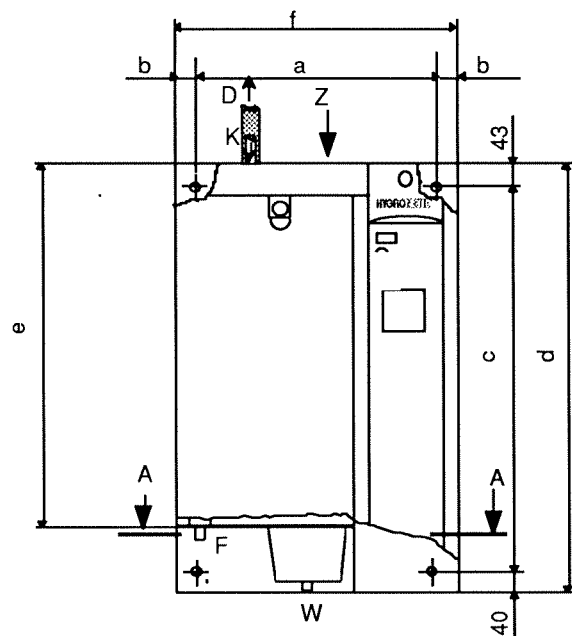
If there is no suitable wall, it is recommended that the equipment is installed on brackets which can be embedded in the floor.

2.1.1 Equipment Dimensions DBV64 - DBV264

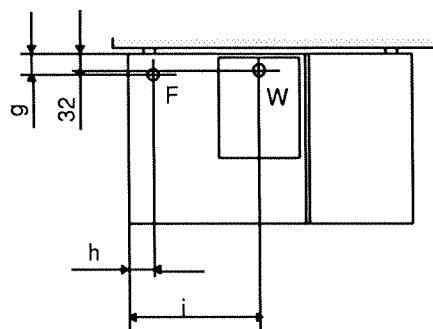
	DBV64 - DBV264
a	450
b	40
c	732
d	815
e	690
f	530
g	41
h	48
i	244
m	155
n	315
o	159,5
t	250,5
Dimensions in mm	

- D = Steam output
- K = Condensate inlet
- W = Water drain
- F = Water feed
- E1 = Cable entry PG 29
- E2 = Cable entry PG 21
- E3 = Cable entry PG 16
- E4 = Cable entry PG 13
- E5 = Cable entry PG 9

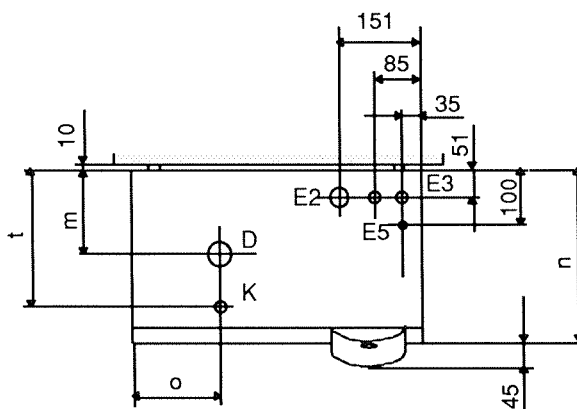
Front Views



Sections A-A

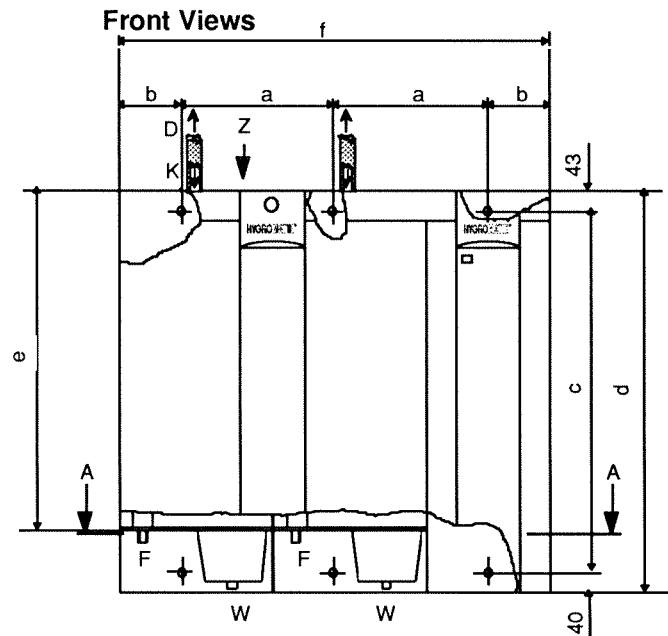


Plan View



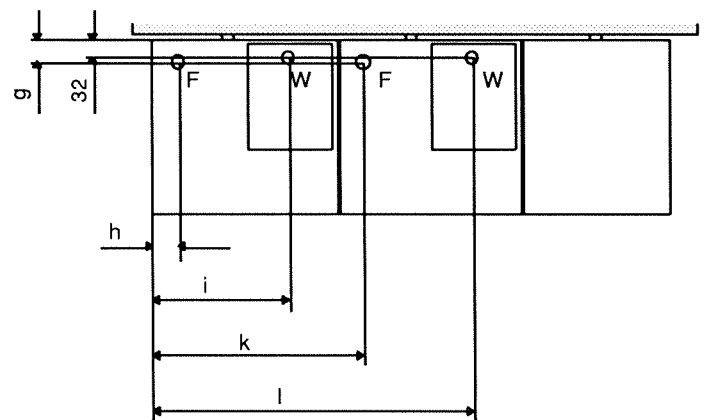
2.1.2 Equipment Dimensions DBV304 - DBV524

	DBV304 - DBV524
a	329
b	132,5
c	732
d	815
e	690
f	923
g	41
h	48
i	244
k	378
l	573
m	155
n	315
o	159,5
p	488,5
t	250,5
Dimensions in mm	

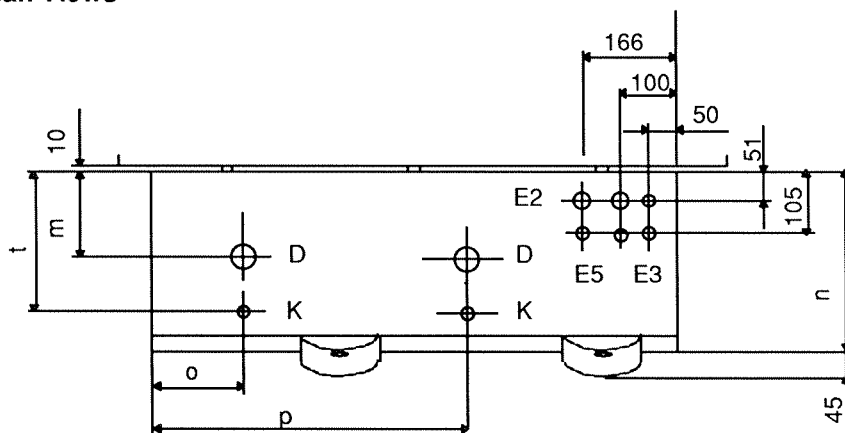


- D = Steam output
- K = Condensate inlet
- W = Water drain
- F = Water feed
- E1 = Cable entry PG 29
- E2 = Cable entry PG 21
- E3 = Cable entry PG 16
- E4 = Cable entry PG 13
- E5 = Cable entry PG 9

Sections A-A



Plan Views



2.2 Fan Unit (option)



Note: The fan unit should be positioned such that draught effects are avoided. A minimum height of 2 m is generally sufficient.

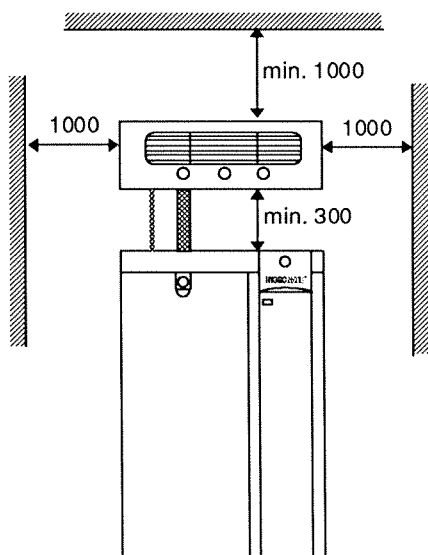
- The fan unit can either be used for integral mounting or for separate wall mounting.

Fan Unit*	Type
Integral mounting	DVA 17, 30
Wall mounting	DVW 08, 17, 30

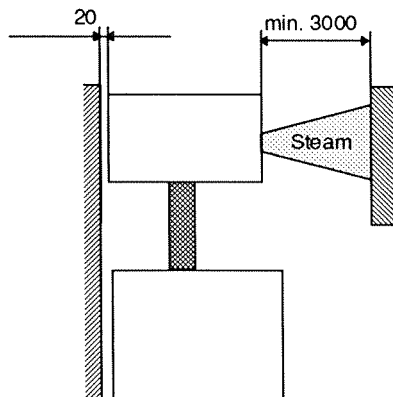
* See also chapter 1.5 "Technical Data".

2.2.1 Fan Unit Type DVW

- The fan unit is mounted above the steam humidifier.
- When using a number of fan units simultaneously a maximum distance of 5 m from the steam humidifier should not be exceeded.
- The distances to the walls have to comply with the figures quoted in the diagrams.



Fan unit, wall mounted



Side view, wall mounted fan unit

2.2.2 Fan Unit Type DVA17, 30

The fan units DVA 17 and 30 are delivered separately with the steam humidifier.

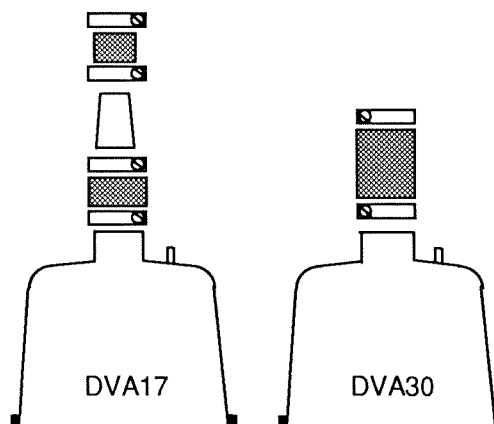
For the installation of the fan units the necessary installation material is enclosed:

- | | |
|---|-----------------------------------|
| 1 | Cable entry fitting |
| 2 | Blind plugs |
| 1 | Hose clamp for condensate hose |
| 2 | Hose clamps DN 40 |
| 2 | Hose clamps DN 25 (DVA17) |
| 1 | Reducing piece (DVA17) |
| 1 | Piece of steam hose DN 25 (DVA17) |
| 1 | Piece of steam hose DN 40 |
| 7 | Connecting crews compl. |

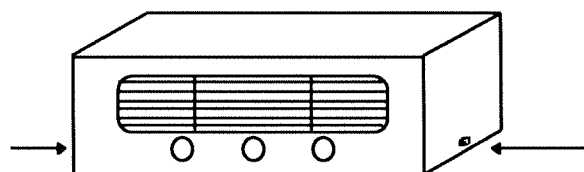
Please pay attention to the wall distances in chapter 2.4.1.

How to Install the Fan Units DVA17, 30

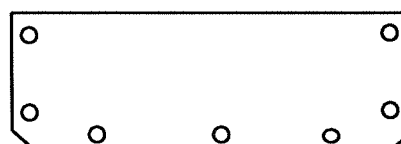
- » Connect the steam hose to the cylinder outlet with the clamps. For the DVA17 a reducing piece has to be installed.



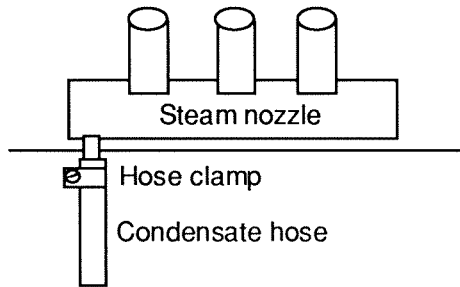
- » Remove the cover of the fan unit by loosening the two connecting screws.



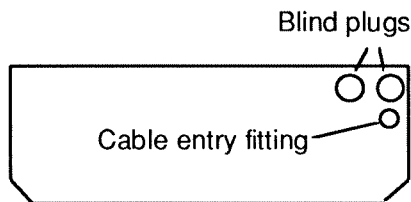
- » Install the fan unit on top of the steam humidifier with the 7 connecting screws enclosed.



- » Connect the condensate hose with the hose clamp DN12. **Do not bend the hose!**



- » Lead the condensate hose with a slope to the tundish. Do not connect the condensate hose to the cylinder as this could cause spitting from the steam nozzle!



- » Install the cable entry fitting and blind plugs and put the connecting cable through the cable entry fitting.
- » Connect the fan unit according to the wiring diagram chapter 4.3 "Fan Unit".
- » Connect the cover to the fan unit.

2.3 Steam Manifolds

- Install steam manifolds close to the steam humidifier.
- Position control sensors and limiting devices appropriately away from the last manifold, taking into account the complete steam diffusion section.

The quantity and size of available steam manifolds and the nominal diameter of the relevant steam and condensate hoses, together with the recommended duct widths can be taken from the table.

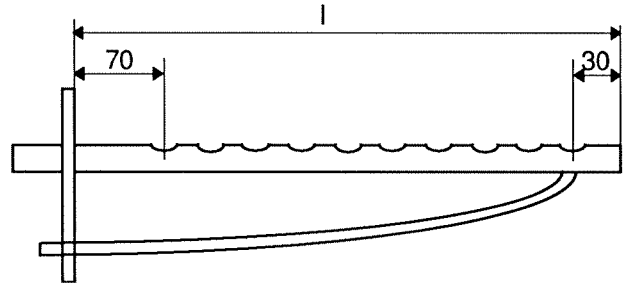
DBV	64-124	174-264	304-524
Steam manifold	1x25	1x40	2x40
Steam hose	DN25	DN40	2xDN40
Condensate hose	DN12	DN12	2xDN12



Note: Along with the units DBV 64 - 124 an adapter 40/25, a piece of steam hose DN40 and two hose clamps are delivered to reduce the steam outlet from DN40 to DN25.

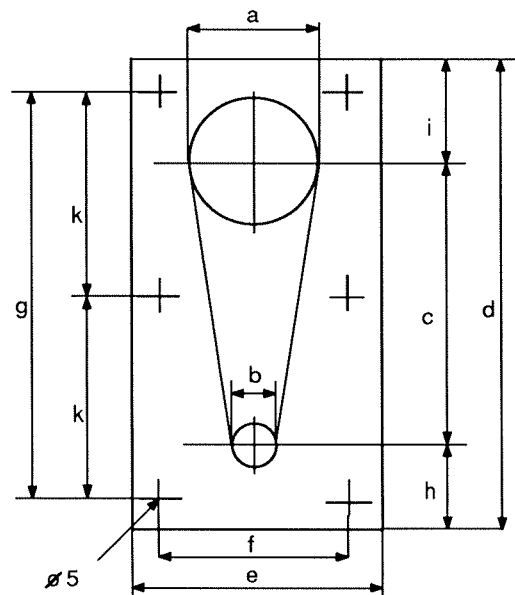
Steam Manifold Lengths [mm]

l	240	300	400	500	700	900	1000	1300
DN25	x		x		x		x	x
DN40		x		x	x	x		x



Dimensions of Boreholes and Flange [mm]

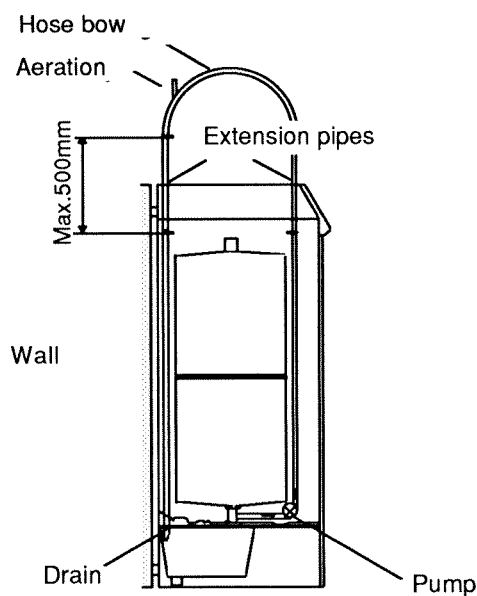
	a	b	c	d	e	f	g	h	i	k
DN25	25	12	90	130	60	42	114	15	25	-
DN40	40	12	90	150	80	60	131	20	40	65,5



2.3.1 Installation

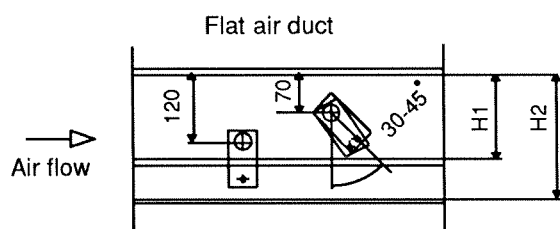
- Steam manifolds should preferably be fitted on the fan discharge side in an air duct with pressure up to 1200 Pa max.
- If fitted on the fan suction side a maximum pressure of -500 Pa is permitted.

In case of high pressure systems extensions should be made to the feed and drain hoses depending on the actual total pressure. Detailed information is available on request.



When installing the steam manifolds, please pay attention to the following:

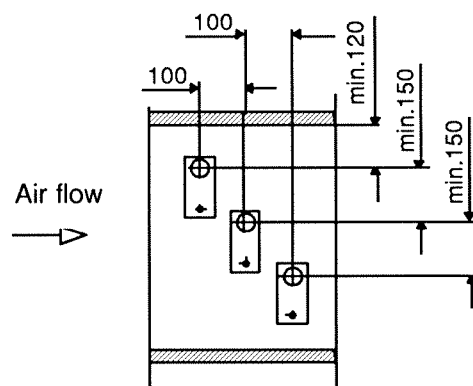
- Steam manifolds are always installed horizontally in the side wall of the duct.
- The air flow may come from all directions.
- A minimum distance of 120 mm to the top of the air duct should be observed.
- The minimum distance may be reduced to 70 mm if the steam manifold is turned to an angle of 30 - 45° to the direction of the air flow.



	H1 [mm]		H2 [mm]
	30°	45°	
DN25	182	168	225
DN40	193	179	230

- Ensure uniform steam distribution in the air duct.

Air Duct	Installation Point
Flat	Different lengths, next to one another
Narrow, high	Equal lengths, above one another. Displaced sideways if possible
Square-shaped	Equal lengths, displaced in height and sideways
Flat, very wide	Opposite one another



If the installation situation is unfavourable always carefully check the conditions of air flow, in particular for possible risks of condensation in the air duct.

2.4 Steam Hose



Note: By installing the steam hose, please pay attention to the following:

- The diameter of the steam hose must not be smaller than the steam outlet of the HYGROMATIK steam humidifier (do not restrict the cross-section otherwise the back pressure will increase unnecessarily).
- The steam hose must be without sags and kinks and be laid with a continuous slope of 5-10% (otherwise sags will be formed).
- The steam hose should be as short as possible. In case of lengths of over 5 m the hose should be insulated to excess condensation.
- Depending on how the hose is laid, hose clips should be set at intervals of approx. 500 mm.
- Allow to access to the steam hose, so that it can be inspected later.
- In case of straight lengths of several meters, it is recommended to place the steam hose in temperature resistant plastic pipe (40 mm dia for hose DN25; 60 mm dia for hose DN40) or to use copper pipe.
- Only genuine quality HYGROMATIK hoses are capable of withstanding the operating conditions.
- Allow for minimum bending radii:

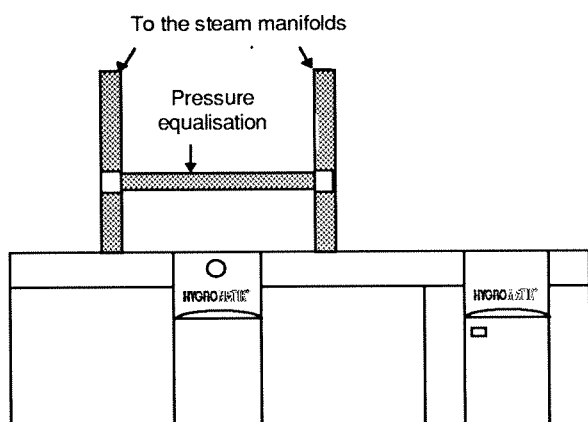
Steam hose DN 25: Rmin = 200 mm
Steam hose DN 40: Rmin = 400 mm

2.4.1 Pressure Equalisation

Rapid pressure surges within the air-duct can, in 2-cylinder units, cause momentary imbalances in the level control cylinder forcing the float beyond the middle level sensor. At this point water is fed to the system until it is stopped by the high level sensor and all functions stop.

We therefore recommend to install a pressure equalisation hose above the humidifier between the two steam hoses.

- » Install the pressure equalisation hose just above the humidifier between the two steam hoses.



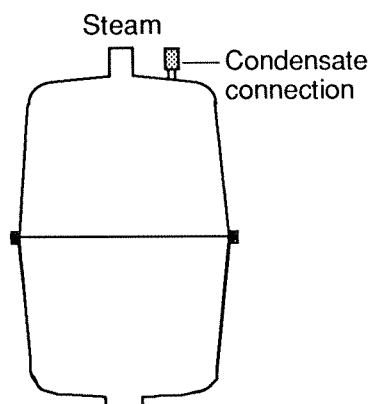
2.5 Condensate Hose



Note: When installing the condensate hose, please pay attention to the following:

The steam manifold is positioned more than 200 mm above the steam humidifier.

- » Remove the condensate plug from the connection on the cylinder.



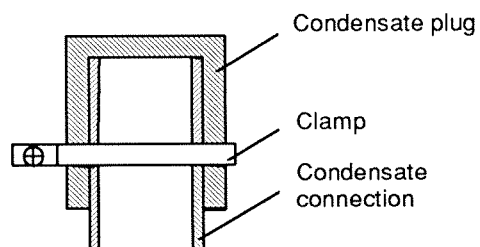
- » Lay the condensate hose with a slope of 5-10% to the steam cylinder so that condensate can flow back unrestricted.



Note: It is recommended to form a loop of 200 mm diameter as a vapour trap provided there is enough space. Possible operating noises coming from the steam humidifier can be reduced in this manner.

Steam manifold is positioned less than 200 mm above the steam humidifier.

- » Let the condensate flow into the drain.
- » In order to avoid steam losses, a loop of at least 200 mm diameter should be formed.
- » Position the loop in the condensate hose some distance away from the steam manifold connection.
- » Ensure that the condensate connection on the steam cylinder is closed with a plug.

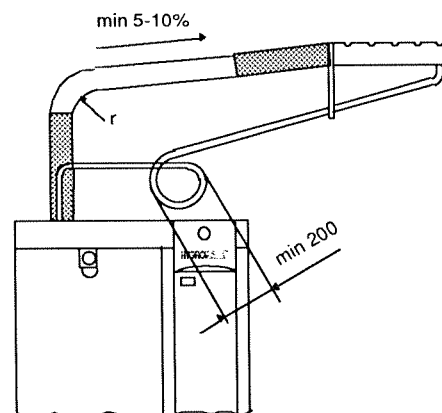


- » Use hose clips at intervals of approx. 500 mm depending on the type of hose.

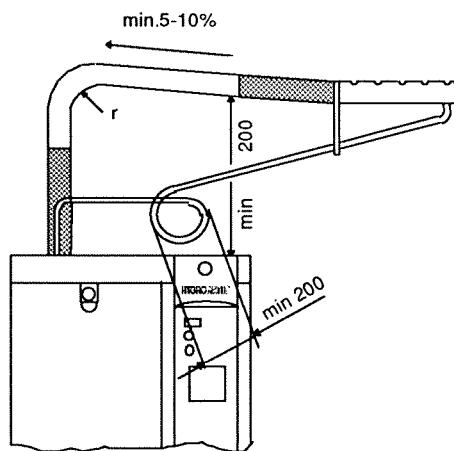
2.6 Installation Examples

Steam manifold is positioned more than 200 mm above the steam humidifier.

- » Lay the steam hose at a height of at least 400 mm and then connect to the steam manifold with a constant rise of fall.
- » Lay the condensate hose with a slope to the steam cylinder.



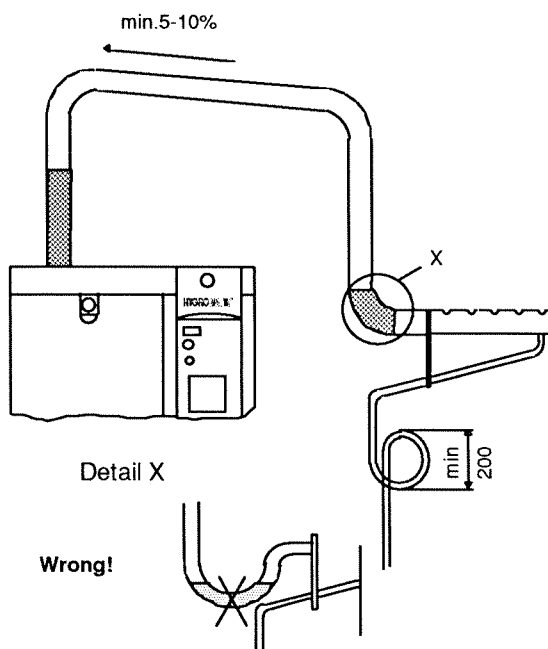
Steam hose with rising slope



Steam hose with falling slope

Steam manifold is positioned below the steam humidifier.

- » Lay the steam hose at a height of at least 600 mm and then connect to the steam manifold with a constant fall.
- » Lay the condensate hose with a loop of 200 mm diameter to the drain.

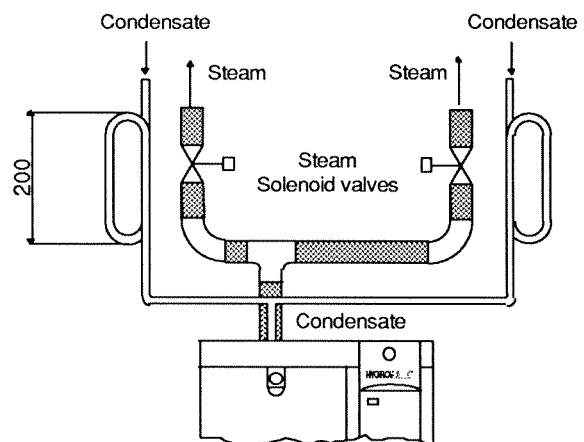


2.7 Steam Solenoid Valves

When humidifying a number of loads, which are to be controlled separately, using a single steam humidifier, steam solenoid valves must be included in the steam hoses.

- Install in the vertical risers with the flow from the bottom to the top.
- The best position is just above the steam humidifier.

Hose nozzles are included with the steam solenoid valves for easing installation in the steam hose. The condensate hose must normally be laid with a loop (at least 200 mm) to the steam humidifier or drain.



2.8 Checking



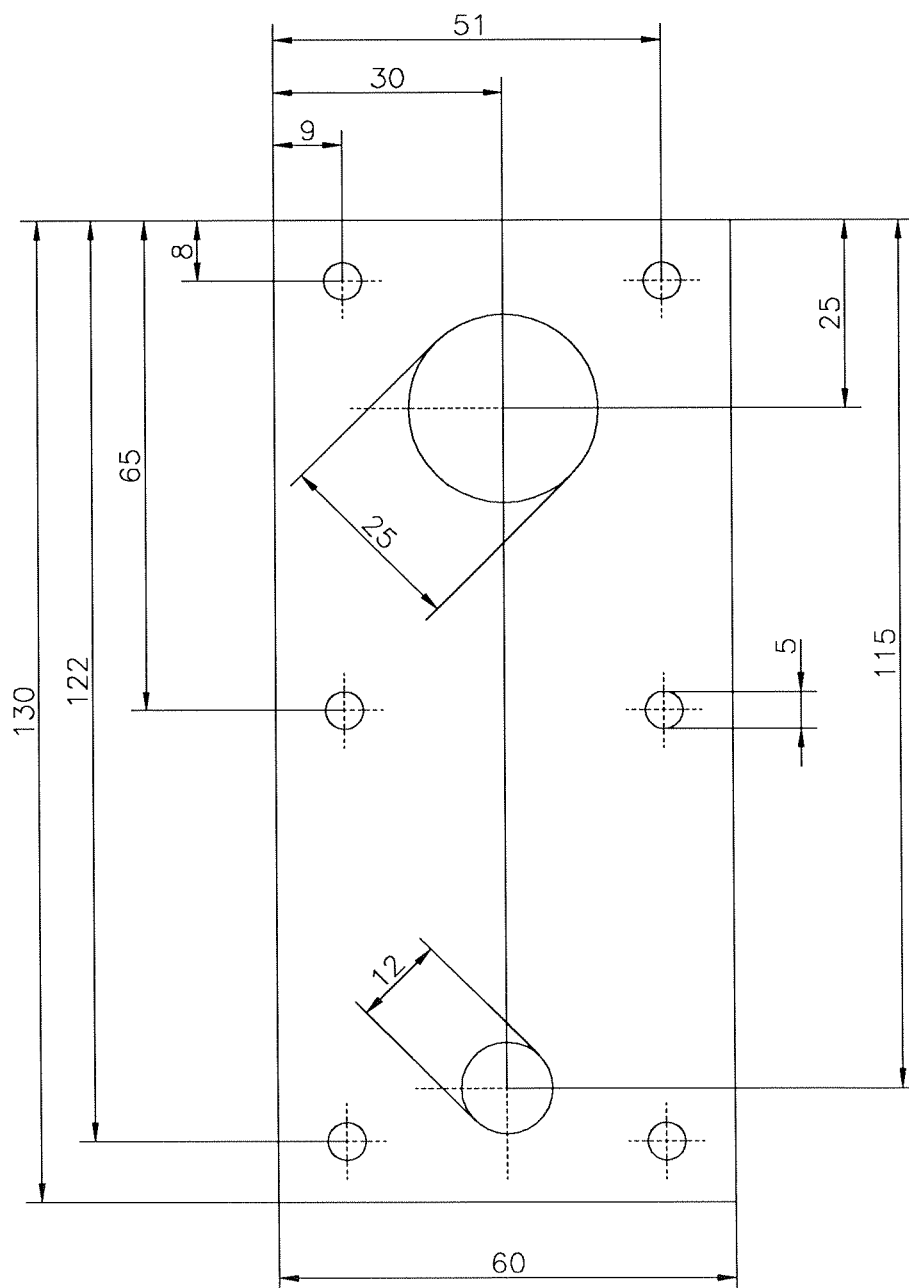
Attention: This unit should only be operated by qualified and properly instructed personnel.

Please check the installation using the following list:

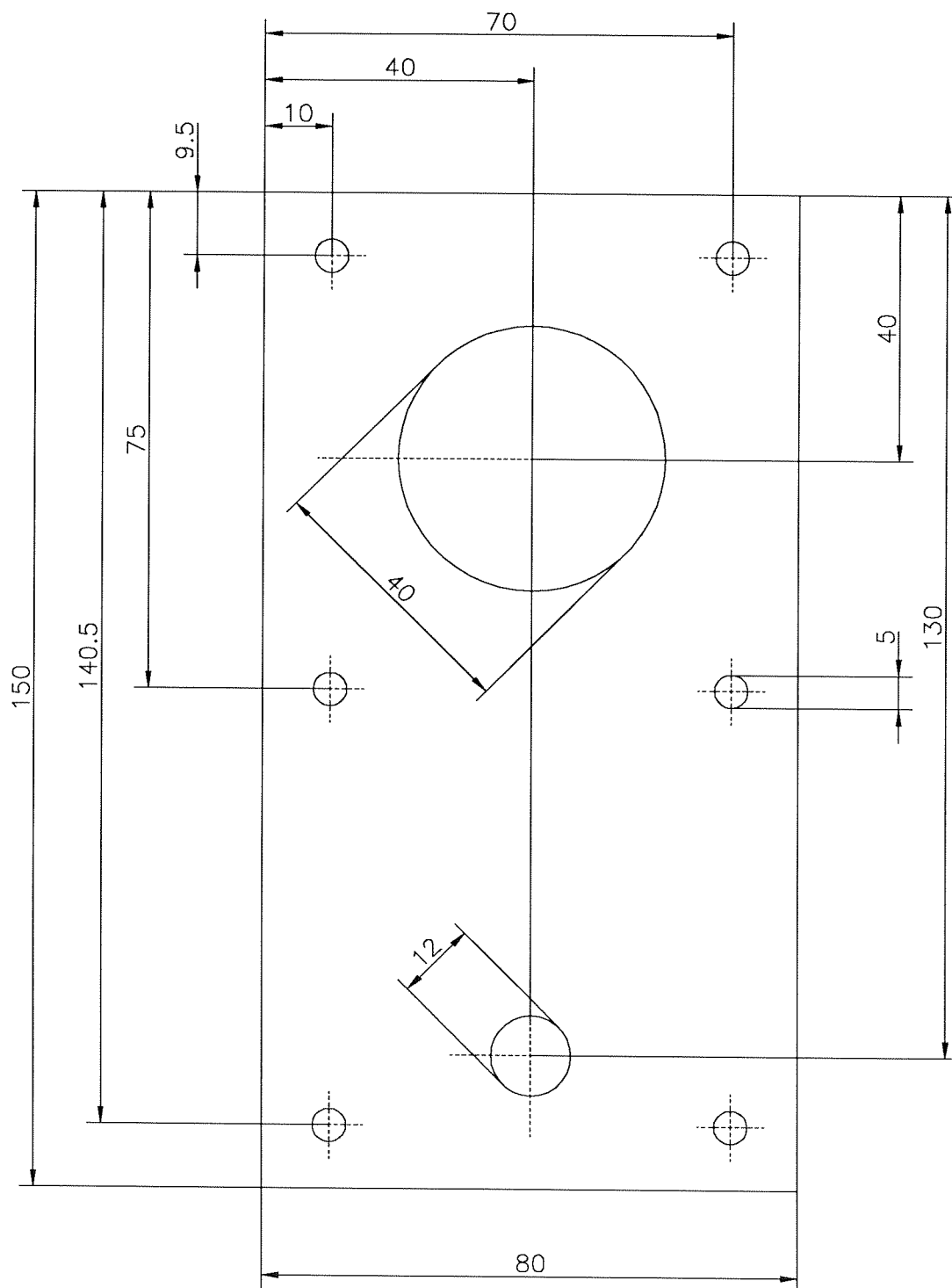
- ☐ Does the unit hang vertically?
- ☐ Are the distances to the unit within the range?
- ☐ Does the steam hose have a slope of 5-10%?
- ☐ Is the condensate hose installed with a slope of min. 200 mm?
- ☐ Is the steam manifold positioned correctly?
- ☐ Are all bolts and clamps tightened?

2.9 Drill Pattern

DN 25



DN 40



HYGROMATIK Electric Heater Steam Humidifiers for use with fully demineralised water or purified condensate

Series DBV64P - DBV524P

Operation and Maintenance Instruction

Part 3: For the Plumber

3.	Water Installation	2
3.1	Water Treatment.....	2
3.2	Water Inlet	2
3.2.1	Water from the Supply Tank	3
3.3	Water Discharge.....	3
3.4	Filling Cup.....	3
3.5	Checking	4

3. Water Installation



Attention: During installation please observe:

- All work must be carried out by qualified personnel.
- Switch off the unit beforehand.
- Observe local regulations of water works or municipalities.
- Only use demineralised water or condensate. The max. conductivity must not exceed 20 µS/cm.
- Do not use copper or brass fixtures for the inlet to the steam humidifier as these materials can be corroded by demineralised water. Adequate materials are high-grade steel or plastic-pipes.
- The inlet water temperature may be up to 40 °C.
- Water inlet pressure: 0.05 - 3.5 bar. Optionally the steam humidifier can be fitted to an inlet pressure of 1 - 10 bar.
- The supply line shall have a minimum diameter of DN 12.
- The discharge shall flow freely into the drain.
- In accordance with DIN 1988, part 1 each DBV humidifier has a standard filling cup
- Depending on local regulations a pipe bow extending 300 mm above the cabinet (with automatic vacuum breaker and non-return valve) should be installed.
- Hygienic generation of steam can only be guaranteed if no (chemical) additives are added to the water.

3.1 Water Treatment

Use the following table for the dimensions of the water treatment system and the supply tank.

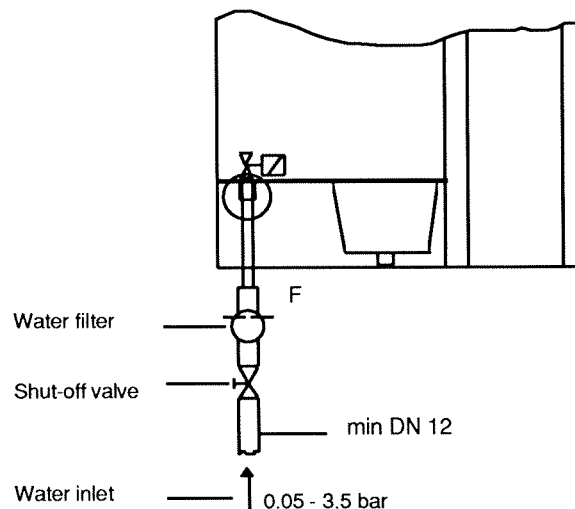
The figures are based on:

- The humidifier runs for 24 hours with a performance of 100%.
- It takes 1 hour for the water treatment system to replenish the water and 1 hour to fill the supply tank.

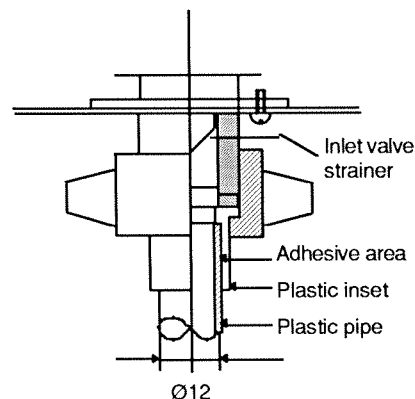
DBV	Water Consumption within 24 Std [l]	Water Treatment System [l]	Supply Tank [l]
64	162	243	30,2
94	234	351	36,2
124	306	459	42,2
174	426	639	52,2
264	642	963	70,2
304	738	1107	96,2
354	858	1287	106,2
434	1050	1575	122,2
524	1256	1899	140,2

3.2 Water Inlet

- » Install a shut-off valve (8) in the supply hose
- » Install a water filter (9) if the water quality requires it.



The inlet connection of the water solenoid valve extends through the bottom tray.



- » Screw on fitting using plastic nut (3). Tighten by hand.



Note: Tightening too much will destroy the fitting. The strainer must be in the solenoid valve.

» Insert pipe with 12 mm outside diameter into fitting until it stops and fasten with suitable adhesive.

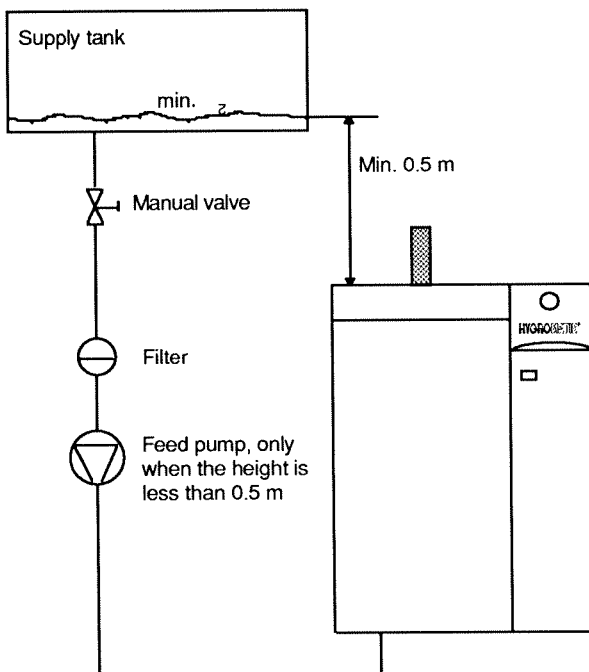


Attention: Please observe that no adhesive gets into the solenoid valve!

3.2.1 Water from the Supply Tank

The solenoid valve 0.05 - 3.5 bar can be used for feed height of min. 0.5 m from the top of the humidifier to the min. water level in the supply tank.

If the feed height is lower than 0.5 m a feed pump should be installed or the humidifier lowered.



3.3 Water Discharge

For the water drain, we recommend to use a discharge hose.



Attention:

- Do not bend, shorten or lengthen the discharge hose.
- The water drain shall withstand temperatures up to 95°C.

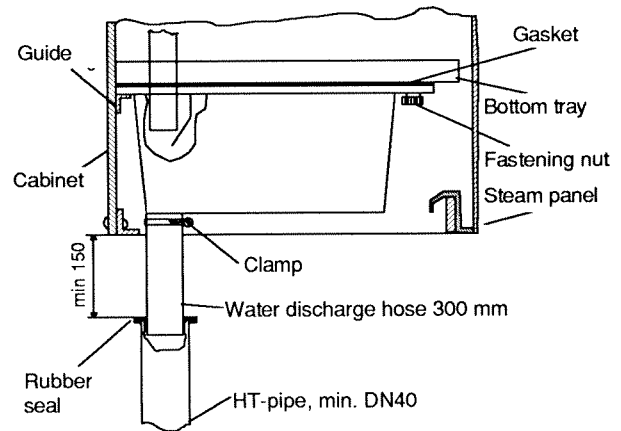
Install the water drain system as follows:

- Discharge hose DN 1" extending appr. 300 mm from the outlet of the housing, so that the discharge can flow freely into a pipe having a

minimum inside diameter of 40 mm. Place a rubber seal between pipe and hose.

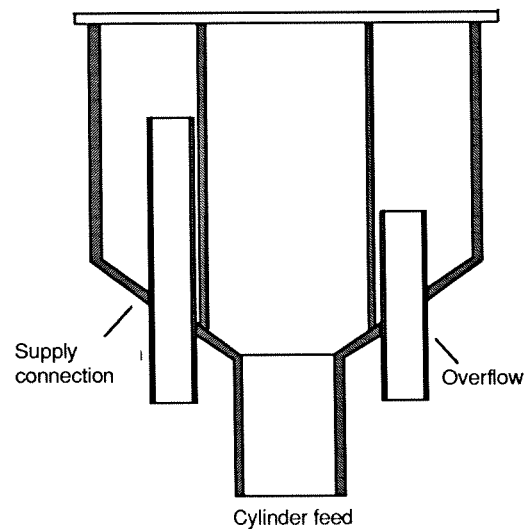
Type	Discharge Hose
DBV64 - 264	1 x DN 1"
DBV304 - 524	2 x DN 1"

- Connect the discharge hose to the outlet of the tundish using the supplied clamps.



Discharged water must flow freely!

3.4 Filling Cup



A filling cup made of recyclable plastic is installed in the DBV. The functions of the filling cup are:

- Supply of water into the cylinder
- Positive air gap between feed water supply line and cylinder intake, according to DIN-DVGW 689
- Overflow if cylinder intake connection is blocked
- Condensate return to the cylinder (optional)

Supply of Water into the Cylinder

Upon opening of the solenoid valve water flows through the filling cup into the cylinder. The cylinder is filled by the static pressure of the water.

If the water level in the filling cup gets too high, the water will flow into the draining side.

Overflow

If the cylinder intake connection is blocked, the surplus of water will flow into the drain.

Condensate Return to the Cylinder

In the cover of the filling cup there are two inlets for condensate return, which can be opened on demand.



Attention: Do not leave removed plastic plates in the filling cup.

3.5 Checking

Please check the installation according to the following:

- ☐ Are the screws and clamps tightened?
- ☐ Is the water supply connection correctly installed and the water discharge can flow freely?
- ☐ Are the water supply and discharge hoses free from any leakage?

HYGROMATIK Electric Heater Steam Humidifiers for use with fully demineralised water or purified condensate

Series DBV64P - DBV524P

Operation and Maintenance Instruction

Part 4: For the Electrician

4.	Electrical Installation	2
4.1	Installation	2
4.2	Safety Switch	2
4.3	Fan Unit	2
4.4	Safety Interlock	2
4.5	Control.....	3
4.5.1	1step Control	3
4.5.2	Proportional Control with External Controller.....	3
4.5.3	Proportional Control with Integral Controller	3
4.5.4	Proportional Control with Integral Controller and Proportional Max. Limiter	4
4.6	Floating Signal Outputs (optional)	4
4.6.1	Collective Fault.....	4
4.6.2	Humidification.....	4
4.7	Checking	4
4.8	Illustrations DBV-P	4
4.9	Wiring Diagrams	5



ATTENTION: All work must be executed by qualified personnel.

All electrical installations and work on electrical components of this unit must be carried out by a qualified electrician.

Switch power off beforehand!

4. Electrical Installation



Attention: Upon installation, please pay attention to the following:

- All electrical installation and work on electrical components of this unit must be carried out by qualified electricians.
- Observe local regulations governing the installation of electrical appliances or equipment.
- Switch power off beforehand.
- The electrical connections must be made professionally.
- The electrical connections shall correspond to the wiring diagrams.
- The internal power supply transformer may not be used for other purposes (controller).
- If rated capacities are above e.g. 3.3 kW only permanent connections at fixed installations are allowed.

4.1 Installation

- » The safety fuses require a contact aperture of min. 3 mm. per pole.
- » Each steam cylinder requires its own main power connection including fuses, main breaker, etc.
- » The potential equalisation is to be connected to the threaded bolt M6 outside the cabinet.
- » Main power supply as follows:

Type	Main Power Supply
DBV64-264	1 x 400V/3Phases/N
DBV304-524	2 x 400V/3Phases/N

Other voltages are available upon request.

Select fuses with quick or medium blow characteristics (applicable only for the above voltage).

Fuse protection:

Type	Nominal Current	Fuses
DBV 64	11,3 A	3x16 A
DBV 94	16,3 A	3x20 A
DBV 124	19,5 A	3x20 A
DBV 174	28,2 A	3x35 A
DBV 264	28,2 A	3x35 A
DBV 304	39,0 A	6x20 A
DBV 354	44,5 A	6x35 A
DBV 434	56,4 A	6x35 A
DBV 524	56,4 A	6x35 A

4.2 Safety Switch

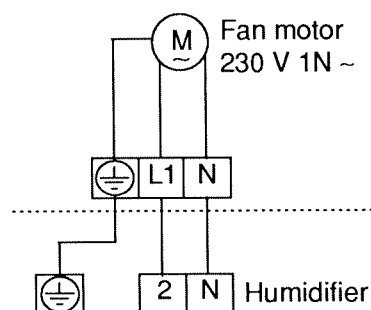
After removal of the steam panel the unit is switched off by the microswitch, which is placed in the top of the partition.



Attention: The safety switch is not to be taken out of operation.

4.3 Fan Unit

- » Connect the fan unit according to the wiring diagram.



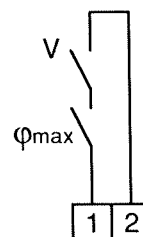
The operation of the fan unit is parallel to humidification demand. The power supply on/off is controlled by the safety interlock system.

4.4 Safety Interlock

Floating interlock contacts of a safety chain, such as maximum hygrostat, flow control switch, pressure switch etc. are to be installed in series between terminals 1 and 2.



Attention: The terminals 1 and 2 require potentialfree contacts. No power is to be supplied to 1+2.



4.5 Control



Attention: The unit shall be controlled such that it will not operate the breaker more than 4 times per minute (this will otherwise lead to destruction of the breaker).

The steam humidifier DBV-P can be programmed for the following controls.

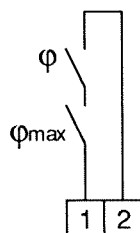
DBV-P Controls
1step Control
Proportional Control with External Controller
Proportional Control with Integral Controller
Proportional Control with Integral Controller and Proportional Max. Limiter



Note: Please turn to HYGROMATIK for reprogramming if necessary.

4.5.1 1step Control

The hygrostat should be installed in series with the terminals of the safety chain between 1 and 2.



4.5.2 Proportional Control with External Controller



Attention! The internal power supply transformer may not be used for other purposes (controller).



Note: If the control signal wires pick up stray induction signals from surrounding power cables the humidifier might operate erratically. It is therefore recommended to use shielded control wiring with the shielding grounded at the controller.

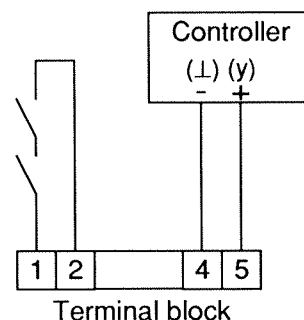
The parameter E3 has to be set according to chapter 1.8.6 "Programming with Code" to match the humidifier to the control signal.

E3	External Control Signals
1	0(2) - 10 V DC (min. 0,2 mA)
2	0(4) - 20 V DC (min. 0,2 mA)
3	0(2) - 10 mA DC (min. 10V)
4	0(4) - 20 mA DC (min. 10V)
6	0 - 20 V DC (Phase angle control, Staefa)

The standard setting is 0(2)..10 VDC.

The humidifier switches off at 2 V and on at 2,5 V.

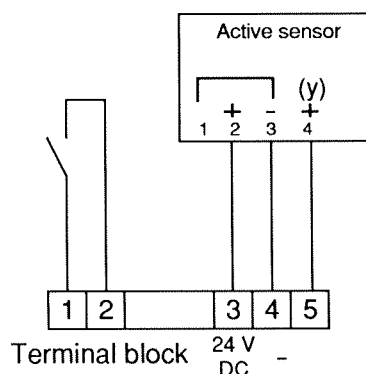
Connect to the terminal block according to the diagram:



External control signal

4.5.3 Proportional Control with Integral Controller

The sensor supplied upon request to operate the internal software PI controller has an output signal of 0 - 10 V. A signal of 0 V demands 100 % output from the humidifier.



Active sensor - voltage output



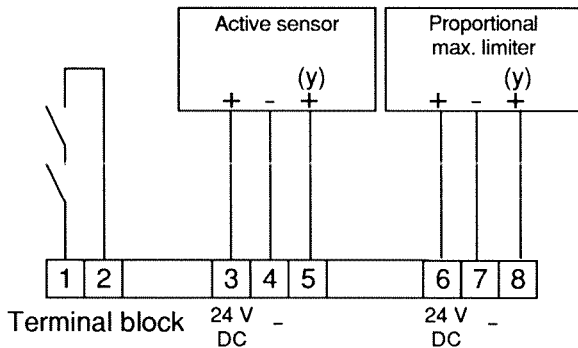
Note: Up to four one-cylinder units can be controlled with one single HYGROMATIK active sensor.

If other sensors are used it is necessary to adjust parameter E3 accordingly.

E3	Control Signals for Active Sensor
1	0(2) - 10 V DC
2	0(4) - 20 V DC
3	0(2) - 10 mA DC
4	0(4) - 20 mA DC
6	0 - 20 V DC (Phase angle control, Staefa)

4.5.4 Proportional Control with Integral Controller and Proportional Max. Limiter

Connect the active sensor and the proportional max. limiter according to the diagrams:



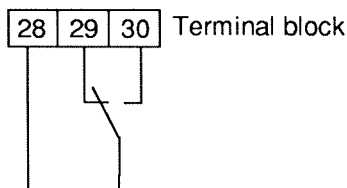
4.6 Floating Signal Outputs (optional)

The maximum contact load is 250V/5A.

4.6.1 Collective Fault

The DBV-P humidifier is as standard equipped with terminals for collective fault.

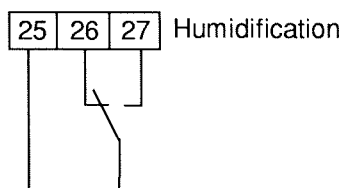
The "blow-down" fault and the "high water level" fault are reported via the collective fault.



Collective fault

4.6.2 Humidification

The DBV-P humidifier is equipped with terminals for "Humidification".



Humidification

4.7 Checking

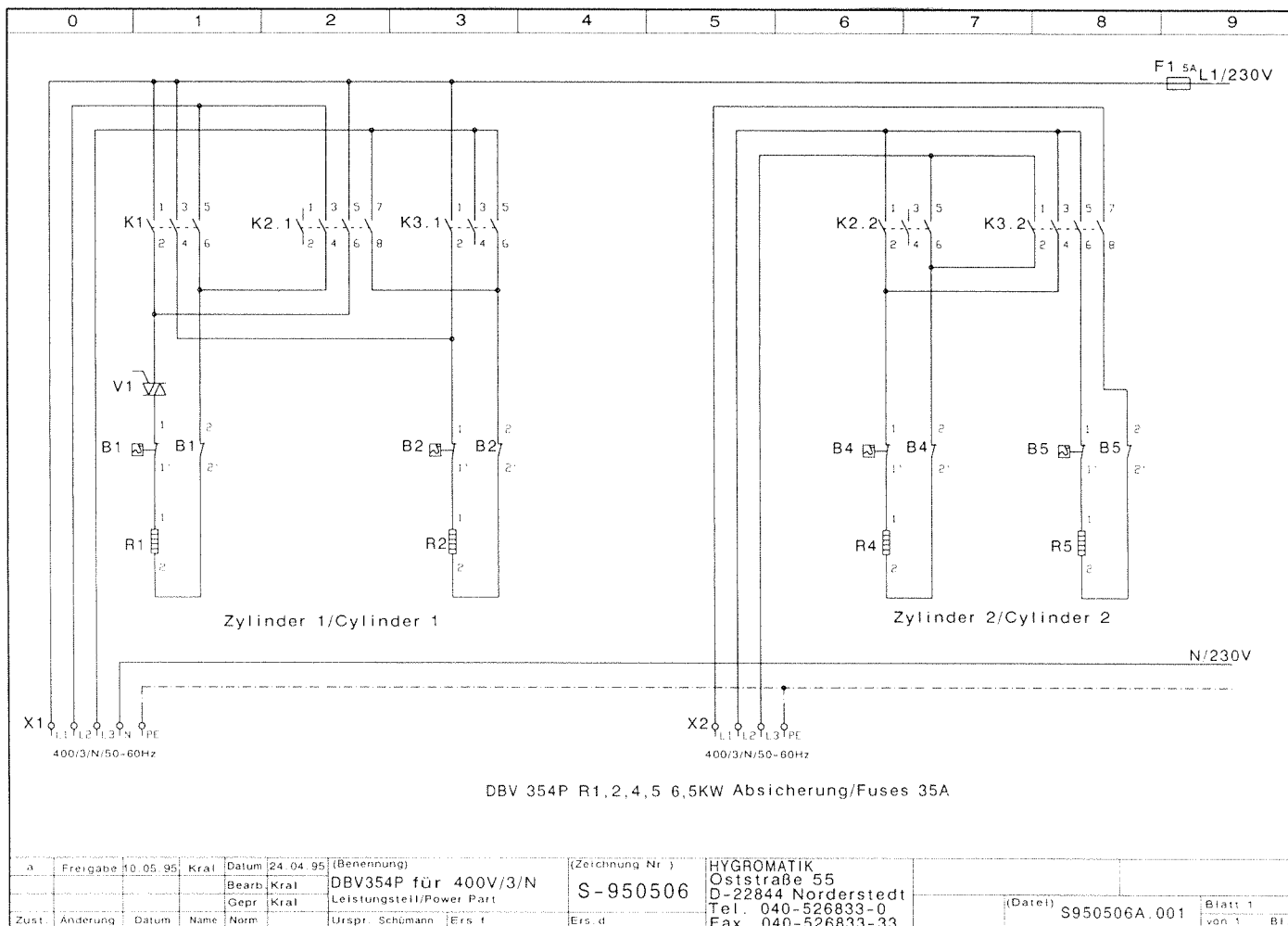
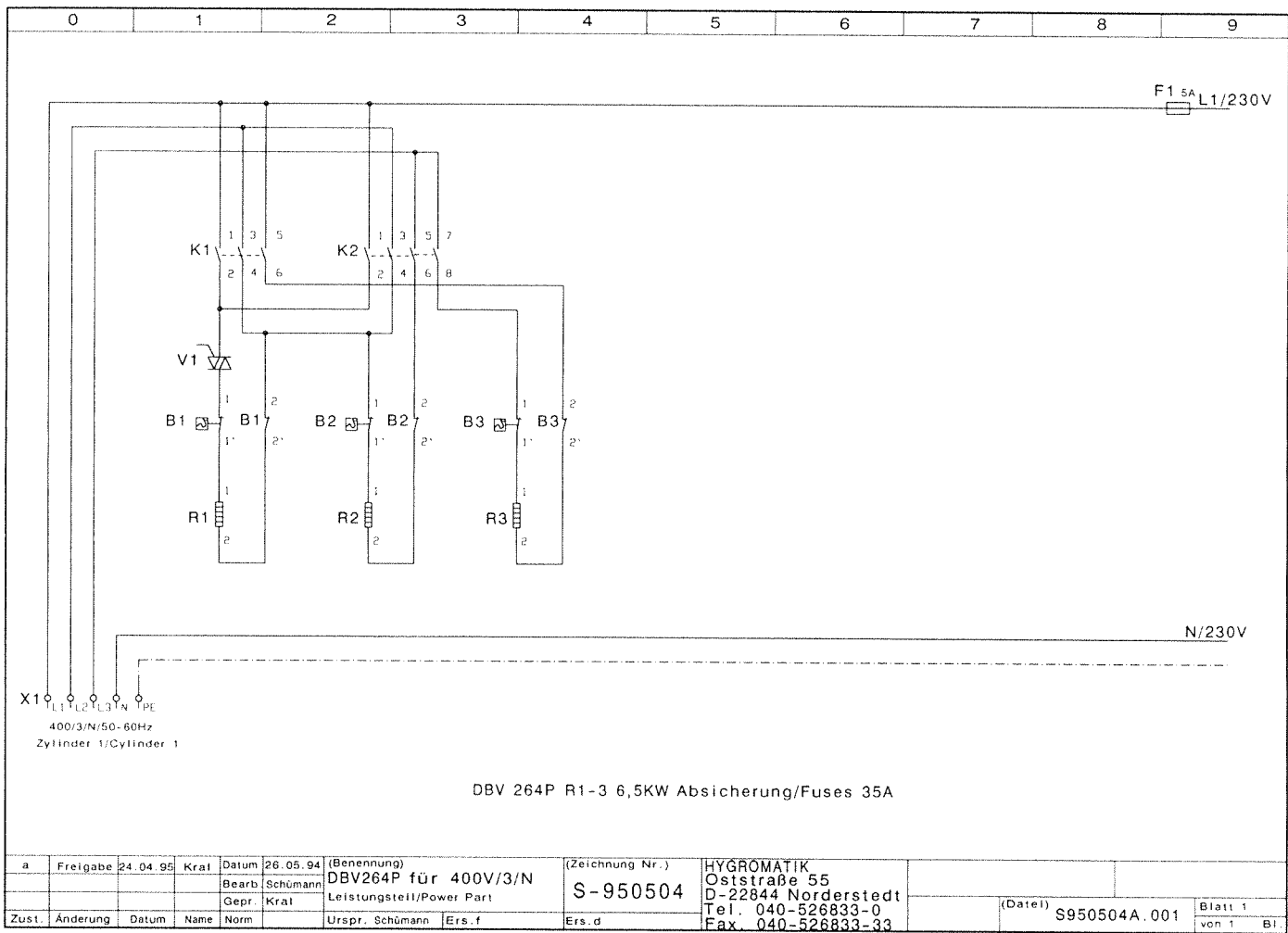
All work - especially electrical - must be carried out by properly qualified personnel in accordance with the safety regulations.

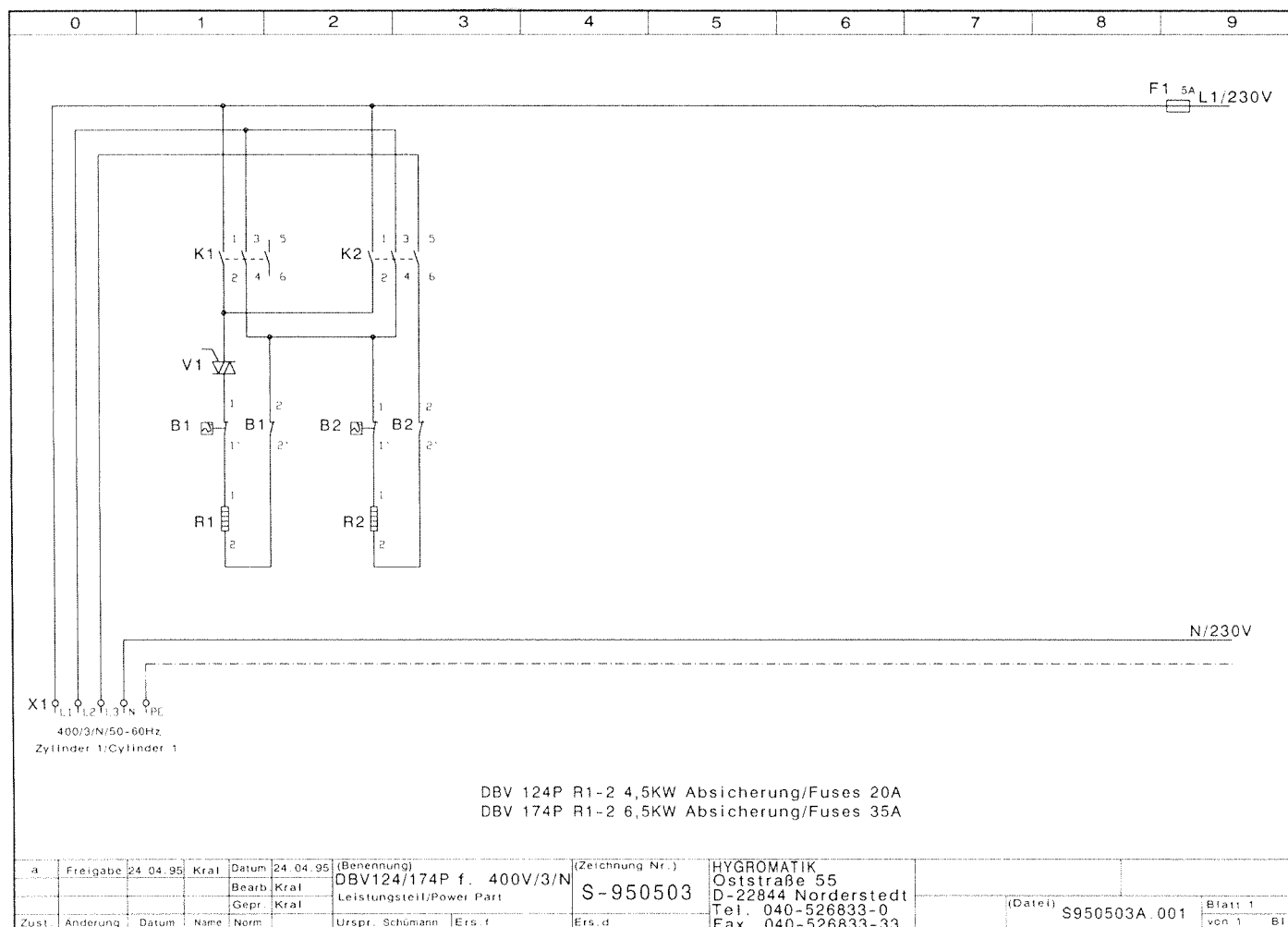
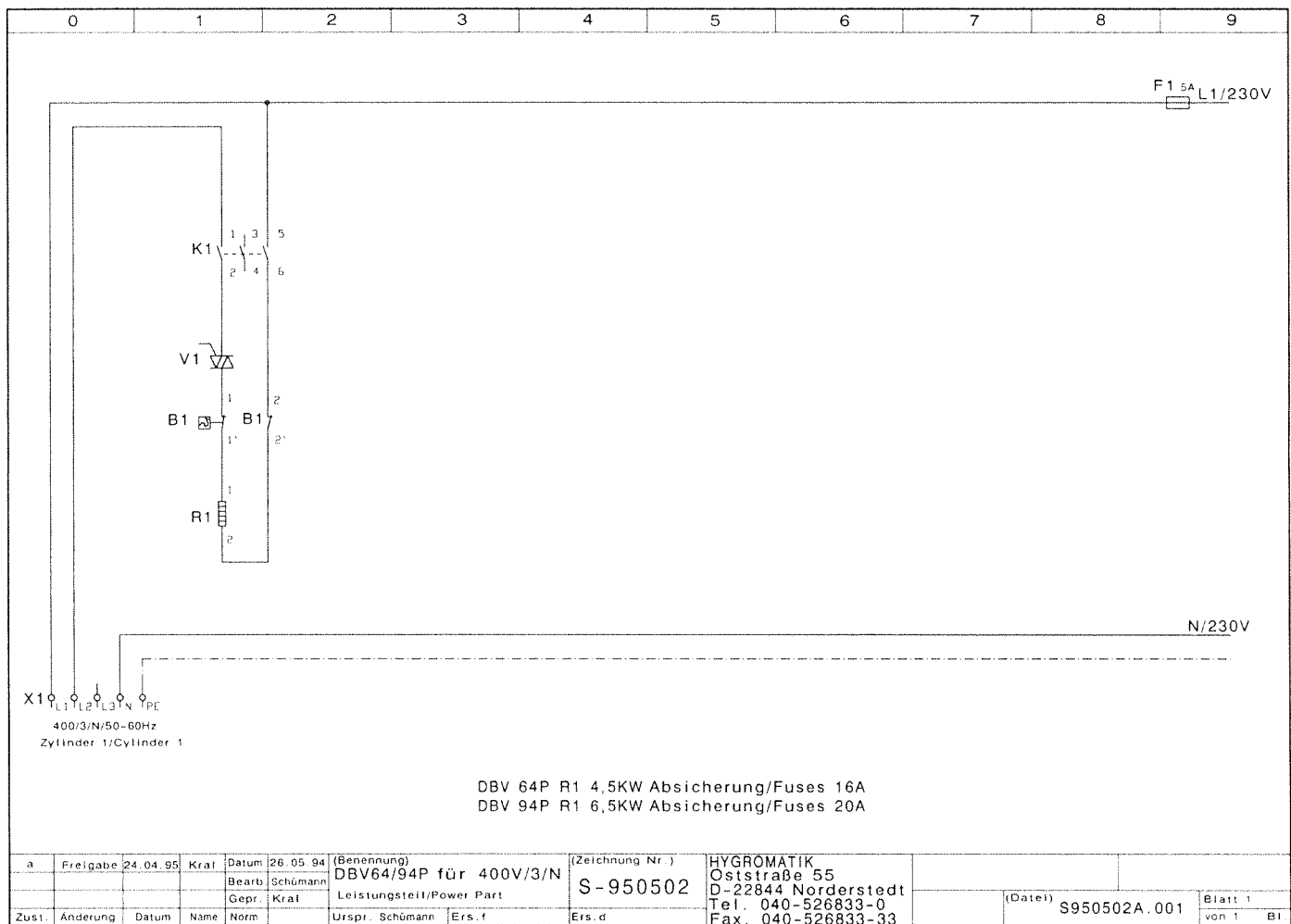
- ☐ The supply voltage must correspond to the specified voltage on the name plate.
- ☐ All electrical connections must correspond to the wiring diagrams.
- ☐ Cable connections as well as plugs and their connections must be tightened.
- ☐ The unit must be connected to ground.

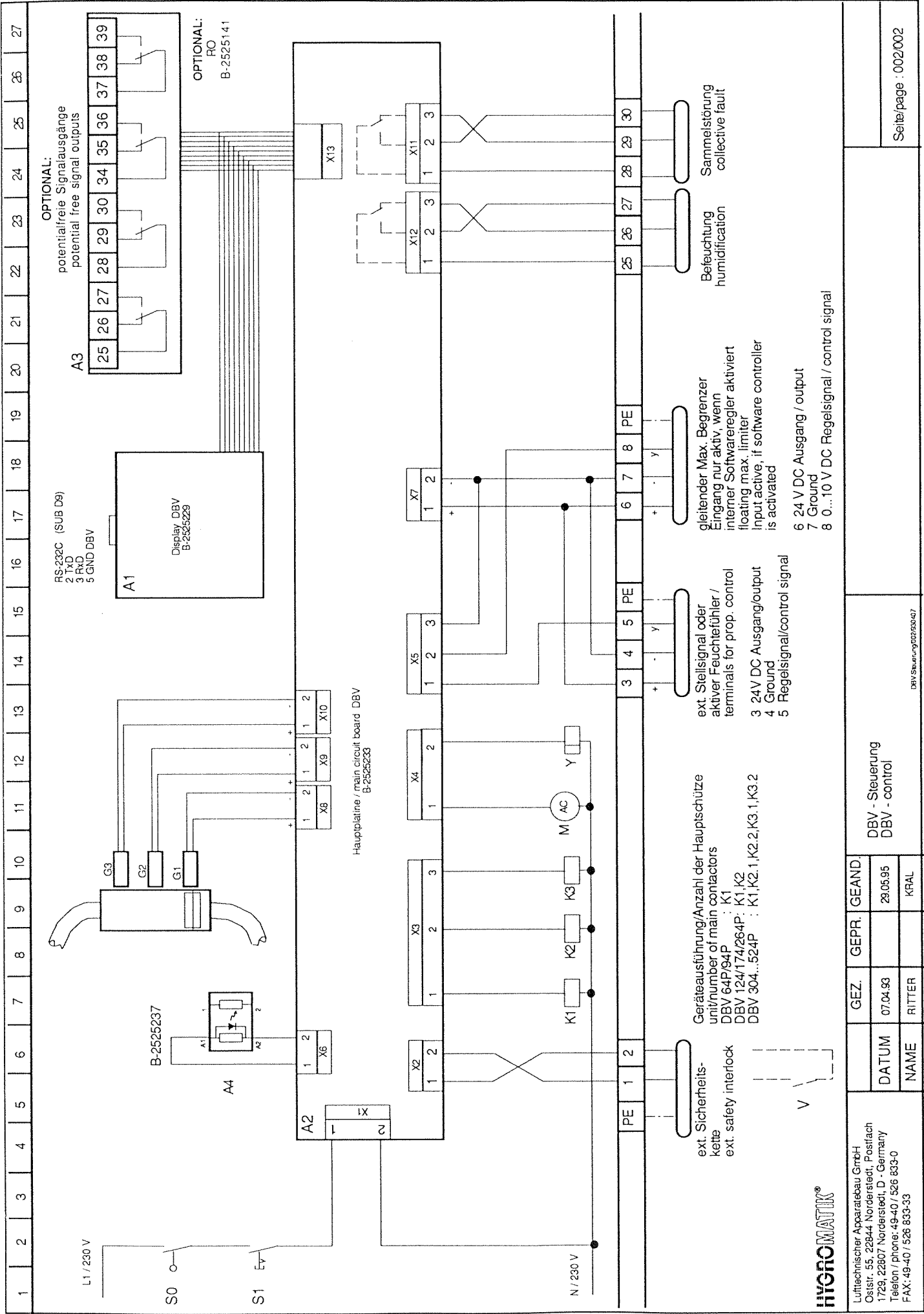
You can now switch on the steam humidifier.

4.8 Illustrations DBV-P

A1	Display DBV-P
A2	Main pcb
A3	RO-card, optional
A4	Solid state relay
B1-B6	Thermal monitor
F1	Control fuse 5A
G1	Sensor "Dry-running"
G2	Sensor "Operation"
G3	Sensor "High water level"
K1-K3.2	Main contactors
M	Blow-down pump 230 V
R1-R6	Heater
S0	Safety switch
S1	Control switch ON/OFF
X1	Plug "Power supply"
X2	Plug "Safety interlock"
X3	Plug "Main contactors K1-K3"
X4	Plug "Solenoid valve and pump"
X5	Plug "Control signal"
X6	Plug "Solid state relay"
X7	Plug "Proportional max. limiter"
X8	Plug "Sensor G1"
X9	Plug "Sensor G2"
X10	Plug "Sensor G3"
X11	Plug "Collective fault"
X12	Plug "Humidification"
X13	Plug "RO-card and display"
Y	Solenoid valve 230 V







HYGROMATIK®

Lufttechnischer Apparatebau GmbH
Oststr. 55, 22844 Norderstedt, Postfach
1729, 22807 Norderstedt, D - Germany
Telefon / phone: 49-40 / 526 833-0
FAX: 49-40 / 526 833-33

DBV - Steuerung
DBV - control

GEZ.	GEPR.	GEAND.
07.04.93		28.05.95
NAME	RITTER	KRAL

DATUM	NAME

DBV Steuerung 029/526/427



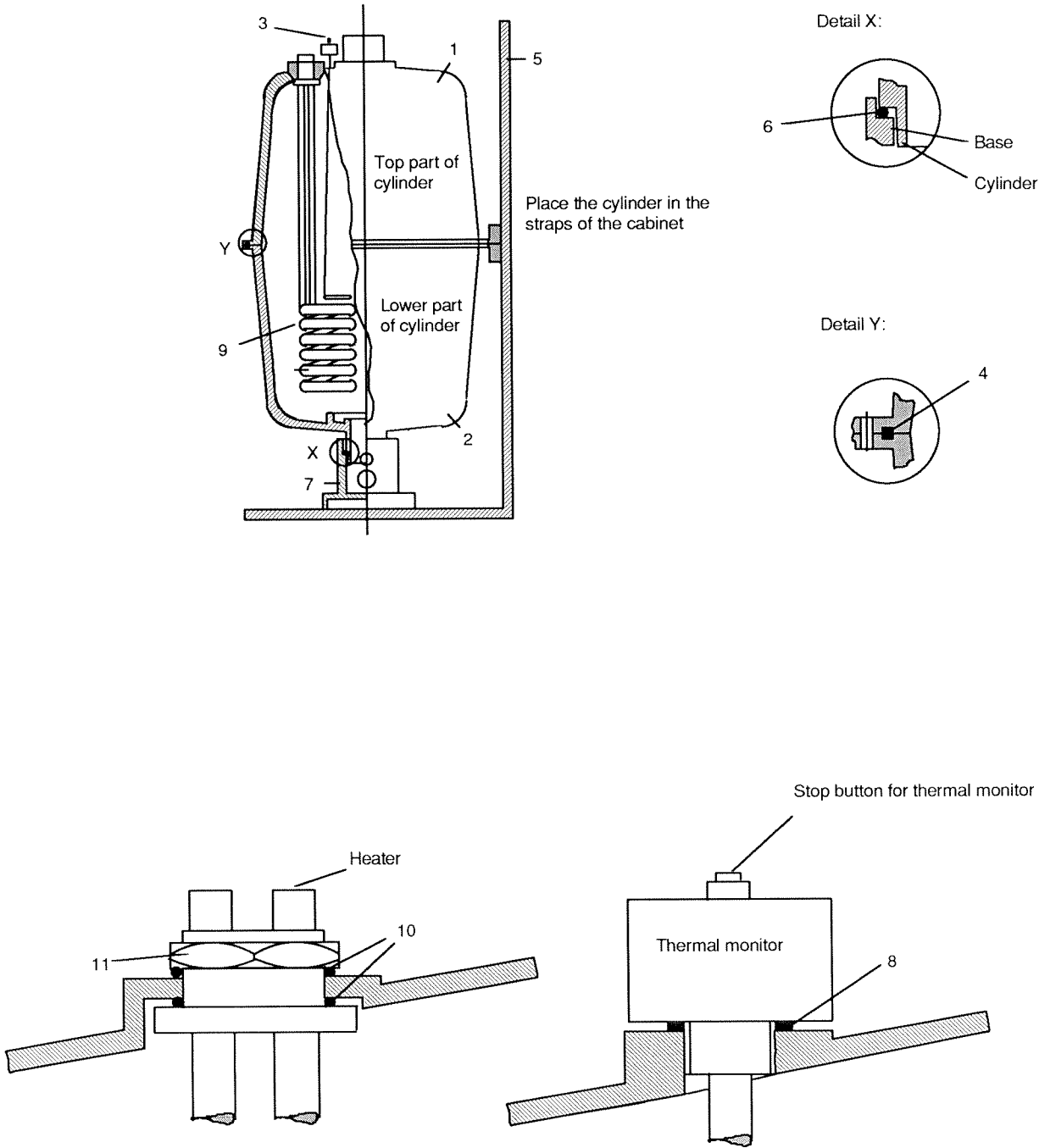
HYGROMATIK Electric Heater Steam Humidifiers
for use with fully demineralised water or purified condensate

Series DBV64P - DBV524P

Operation and Maintenance Instruction

Part 5: Spare Parts List

5	Spare Parts List	2
5.1	DBV	2
5.2	Spare Parts	4



Spare Parts List DBV 64 - DBV 524

*	DBV									Art. No.	Description
	64	94	124	174	264	304	354	434	524		
Cabinet											
5	1	1	1	1	1					B-2120503	Cabinet excl. electric blind, beige/green, empty
5						1	1	1	1	B-2120802	Cabinet excl. electric blind, beige/green, empty
	1	1	1	1	1					E-2120519	Front panel for steam section
						1	1	1	1	E-2120819	Front panel for steam section
	1	1	1	1	1					E-2120520	Front panel for electric section, excl. electric blind
						1	1	1	1	E-2120820	Front panel for electric section, excl. electric blind
	1	1	1	1	1	2	2	2	2	E-2124014	Safety lock for electric and steam panel DBV 304-524
	1	1	1	1						E-2124016	Safety lock for steam panel DBV 64-264
										E-2124015	Key for safety lock (set=2pc)
	1	1	1	1	1	2	2	2	2	E-2120102	Grip for electric and steam panel DBV304-524, green, without lock
	1	1	1	1	1					E-2120101	Grip for steam panel DBV64-264, green, without lock
	1	1	1	1	1					B-2125016	Complete set of cable entry fittings for connecting cable
						1	1	1	1	B-2123017	Complete set of cable entry fittings for connecting cable
	1	1	1	1	1	1	1	1	1	E-2120506	Blind electric panel, L-electronic
	1	1	1	1	1	1	1	1	1	E-2120522	Blind electric panel, P-electronic
						1	1	1	1	E-2120810	Blind steam panel
	3	3	3	3	3	6	6	6	6	E-2120001	Screw M4 for mounting grip E-2120102
	5	5	5	5	5	10	10	10	10	E-2505123	Plastic cap nut M3 for mounting electric and steam blind
Steam Generation											
	1									B-2205035	DBV cylinder compl. with 1 heater 4.5 kW and 1 thermal monitor
			1			1				B-2205036	DBV cylinder compl. with 2 heaters 4.5 kW and 2 thermal monitors
						1				B-2205037	DBV cylinder compl. with 3 heaters 4.5 kW and 3 thermal monitors
		1								B-2205040	DBV cylinder compl. with 1 heater 6.5 kW and 1 thermal monitor
				1			2	1		B-2205041	DBV cylinder compl. with 2 heaters 6.5 kW and 2 thermal monitors
					1			1	2	B-2205042	DBV cylinder compl. with 3 heaters 6.5 kW and 3 thermal monitors
9		1		2	3		4	5	6	E-2204003	Heater 400V / 6,5 kW
9	1		2			5				E-2204004	Heater 400V / 4,5 kW
1	1	1								B-2205101	Top part of DBV cylinder, empty, for 1 heater and 1 thermal monitor
1			1	1		1	2	1		B-2205102	Top part of DBV cylinder, empty, for 2 heaters and 2 thermal monitors
1					1	1		1	2	B-2205103	Top part of DBV cylinder, empty, for 3 heaters and 3 thermal monitors
2	1	1	1	1	1	2	2	2	2	E-2204036	Lower part of DBV cylinder
10	2	2	4	4	6	10	8	10	12	E-2204006	Gasket for heater
11	1	1	2	2	3	5	4	5	6	E-2204007	Mounting nut for heater
	18	18	18	18	18	36	36	36	36	E-2204040	Screws for cylinder flange M6x20
	18	18	18	18	18	36	36	36	36	E-2204041	U-washer for cylinder flange Ø6,2
	18	18	18	18	18	36	36	36	36	E-2204042	Nut for cylinder flange M6
	1	1	1	1	1	2	2	2	2	E-2204009	Connecting piece 1/4" for level control cylinder, steamside
4	1	1	1	1	1	2	2	2	2	E-2204019	O-ring seal for cylinder flange
6	1	1	1	1	1	2	2	2	2	E-2204022	O-ring seal for cylinder base
7	1	1	1	1	1	1	1	1	1	E-2206089	Cylinder base
						1	1	1	1	E-2206052	Cylinder base for doublecylinder units
	2	2	2	2	2	4	4	4	4	E-2204034	Plastic cyp-nut M6 for mounting cylinder base
	1	1	1	1	1	2	2	2	2	E-2205026	Mounting kit for heater incl. clamps and nuts
3	1	1	2	2	3	5	4	5	6	E-2205027	Thermal monitor incl. clamps and nuts
	1	1	2	2	3	5	4	5	6	E-2205028	Clamps for thermal monitor (5pc)
8	1	1	2	2	3	5	4	5	6	E-2205030	Gasket for thermal monitor (5pc)
	1	1	1	1	1	2	2	2	2	E-2204035	Condensate plug
										E-2604031	Reducing piece DN40/DN25

*Pos.-Nr. Diagram 5.1

Spare Parts List DBV 64 - DBV 524

*	DBV									Art. No.	Description
	64	94	124	174	264	304	354	434	524		
Water Feed											
										E-2304015	Clamp for connecting hose solenoid valve-cylinder base, d=12mm
12	1	1	1	1	1	2	2	1	1	B-2325016	Connecting hose, filling cup - solenoid valve
13	1	1	1	1	1	1	1	1	1	B-2325040	Connecting hose, filling cup - cylinder base
14										B-2325016	Connecting hose, filling cup - tundish
15	1	1	1	1	1	1	1	1	1	B-2304105	Solenoid valve, direct controlled, straight type, 0.05-3.5 bar
	1	1	1	1	1	1	1	1	1	B-2304106	Inlet fitting for solenoid valve
15										B-2307001	Solenoid valve, servo controlled, straight type, 0.2-10 bar, 2.5 l/min
16	1	1	1	1	1	1	1	1	1	E-2304029	Fine filter in the inlet of solenoid valve
17										E-3320400	Flow rate controller 2,5 l/min
17										E-2321100	Flow rate controller 3,5 l/min
	1	1	1	1	1	1	1	1	1	E-2304036	Rubber seal solenoid valve - cabinet
										E-2304031	Servo controlled membrane for solenoid valve
18	1	1	1	1	1	1	1	1	1	E-2301016	Connecting hose, cylinder 1 - control cylinder, waterside
19	1	1	1	1	1	1	1	1	1	E-2302019	Connecting hose, cylinder 1 - control cylinder, steamside
	9	9	9	9	9	9	9	9	9	E-2304015	Clamp for water feed hose
22+23	1	1	1	1	1	1	1	1	1	B-2504124	Water level control cylinder, compl. with 3 sensors
22										B-2504123	Water level control cylinder, without sensors
23										E-2504110	Sensor for Operation (normally closed)
23										E-2504110	Sensor for High water level (normally closed)
23										E-2504111	Sensor for Dry-running (normally opened)
	1	1	1	1	1	1	1	1	1	E-2504112	Float for level control cylinder
21	1	1	1	1	1	1	1	1	1	B-2325000	Filling cup
20						1	1	1	1	B-2325050	Connecting hose, cylinder base - cylinder base, incl. T-piece
Water Drain											
	5	5	5	5	5	2	2	2	2	E-2404004	Clamp for drain hose, cylinder base - drain pump
24	1	1	1	1	1	1	1	1	1	E-2404002	Drain hose, cylinder base - drain pump
25	1	1	1	1	1	1	1	1	1	B-2404005	Drain pump without mounting set
	1	1	1	1	1	1	1	1	1	B-2424014	Mounting set for drain pump
	1	1	1	1	1	1	1	1	1	E-2404008	Drain pump body
	1	1	1	1	1	1	1	1	1	E-2404009	Impeller for drain pump
	1	1	1	1	1	1	1	1	1	E-2404006	O-ring seal for drain pump
	1	1	1	1	1	1	1	1	1	E-2404007	Corrugated seal for drain pump
	1	1	1	1	1	1	1	1	1	E-3416003	Fastening clamp for drain hose
26	1	1	1	1	1	1	1	1	1	E-2424003	Drain hose, DN20
	1	1	1	1	1	1	1	1	1	E-2420426	Gasket for tundish
27	1	1	1	1	1	1	1	1	1	B-2420421	Tundish, complete with gasket
	4	4	4	4	4	4	4	4	4	E-2420427	Nut M4 for mounting tundish
	1	1	1	1	1	1	1	1	1	E-2404004	Clamp for tundish hose
28										E-2420425	Drain hose for tundish, DN1", per m
Electronic											
	1	1	1	1	1	1	1	1	1	B-2504101	Control switch with green indicator lamp, incl. protecting cap
	1	1	1	1	1	1	1	1	1	B-2502400	Control switch, single-pole, for P-electronic
	1	1	2	2	3	5	4	5	6	E-2501006	Main contactor 24A, 230V
										E-2505007	Main contactor 40A, 230V
	1	1	1	1	1	1	1	1	1	E-2504039	Control fuse 5A, 5x20 mm
	1	1	2	2	3	3	2	3	3	E-2504033	Connecting cables thermal monitor - relay, cylinder 1
						2	2	2	3	E-2505034	Connecting cables thermal monitor - relay, cylinder 2
	1	1	2	2	3	5	4	5	6	E-2505036	Connecting cables thermal monitor - heater

*Pos.-Nr. Diagram 5.1

28.11.1995 5.5

Spare Parts List DBV 64 - DBV 524

*	DBV									Art. No	Description
	64	94	124	174	264	304	354	434	524		
29 29 30 <											

*Pos.-Nr. Diagram 5.1