

Electrical steam humidifiers

Models DB/E el, DBK/E el, DBM/E el
for operation with tap water

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NEW:
First steam humidifier
with electronic
deconcentration supervision

NB: All work is to be carried out by suitably qualified personnel. Disconnect equipment from the power supply before commencing.

1.1. DESCRIPTION OF SYSTEM HYGROMATIK STEAM AIR HUMIDIFIERS

Tested for compliance with VDE regulations and interference suppression standard N Models DB/E el, DBK/E el, DBM/E el

Overview and technical data:

The HYGROMATIK system offers the planner, plant constructor and operator maximum flexibility.

16 models in cabinet or kit form with steam outputs between 0.2 – 90 kg/h. Fully automatic, programmable "Energie-Minimatik" control for minimum deconcentration losses relative to the volume of steam produced and the conductivity of the feedwater. In addition to controlling vaporisation in accordance with the process the "Energie-Minimatik" monitors the current consumption and limits it to a maximum of 30% above the rating by immediately draining off some of the water or reducing the electrode area immersed.

The **operating states** are shown by indicator LEDs:

Humidification – Filling – Deconcentration – Cylinder level – Deconcentration fault. The output is indicated by an ammeter.

DBM el / DBK el – only **Humidification – Cylinder level**, no ammeter. DBK el for prop. regulation with ammeter.

A **potentiometer** is used to limit the steam output to between 10 and 100% of the rating for the unit.

Standard control 1 level (ON-OFF), 2 levels (50/100%) for outputs over 16 kg/h, floating in each case.

Optional controllers:

2 steps	50/100% to 16 kg/h	for floating
3 steps	33/66/100%	control in
4 steps	25/50/75/100%	each case.

Proportional regulation 10 to 100% of the rated output of the unit using an **universal adapter** for the following DC controller signals, (2 – 4 steps, prop. regul. not available for DBM):

2 – 10 V	with integral residual
4 – 20 V	humidification contact,
2 – 10 mA	ie automatic transfer
4 – 20 mA	to 2-point control if the signal
30 – 140 ohms	drops below the minimum values.

Control characteristics:

Increase in output – control signal sequence immediate.
Small decrease in output – vaporisation.
Sudden drop in output – partial draining with vaporisation of residue.

Additional signal contacts

Remote indication relays with floating changeover contacts can be supplied on request for the following signals:

Ready – Operating – Cylinder level – Collective fault (cyl. max. level resp. deconcentration fault) 600 s delay.

Special features of the 2-cylinder HYGROMATIK models DB el 562 / 890 EM

Each steam cylinder is controlled by means of a **separate "Energie-Minimatik"** unit. Consequently, there are also **2 sets of control switches, LEDs, ammeters and limiting potentiometers.** The steam output of each cylinder can be limited to between 10 and 100% of the cylinder rating.

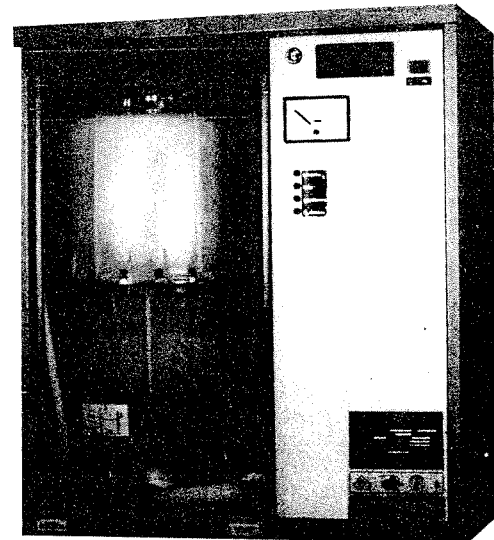
For proportional regulation only one common uni-adapters is added per humidifier – the cylinders operate in parallel.

For sequential regulation 2 uni-adapters can also be installed on request – each cylinder operates separately in this case.

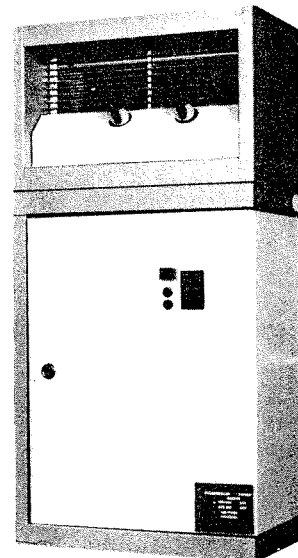
Operating principle of the HYGROMATIK electrodes

Any tap water has a certain electrical conductivity which can be used to generate steam.

In the HYGROMATIK steam cylinder several flat electrodes are arranged in a ring. They are connected to an AC voltage.



Front of
models DB el 62 – 282 EM, 845 EM



DBK el 25 – 40 KV,
with mounted fan unit DV 120

The electrical energy supplied is converted directly into heat in the water without any losses being incurred.

Altering the depth to which the electrodes are immersed gives good continuous control of the system using the fully automatic, programmable "Energie-Minimatik" control unit.

This system has significant advantages over radiators:

The design of the electrical heating as a bare resistor is as simple as possible.

Rapid starting characteristics! Full steam output is achieved within a few minutes.

The V2A HYGROMATIK electrodes are **replaceable** and have a long life.

Operation is still safe when water is low and scaling occurs. Current only flows if the electrodes are immersed in water. No protection against running dry is therefore required.

HYGROMATIK steam cylinder

This is equipped with a cleaning flange for periodic removal of the hardness-causing salts accumulated. The flange is made from a re-useable, high-grade plastic. Since the salts do not adhere easily to the smooth surface of the plastic, cleaning is easy.

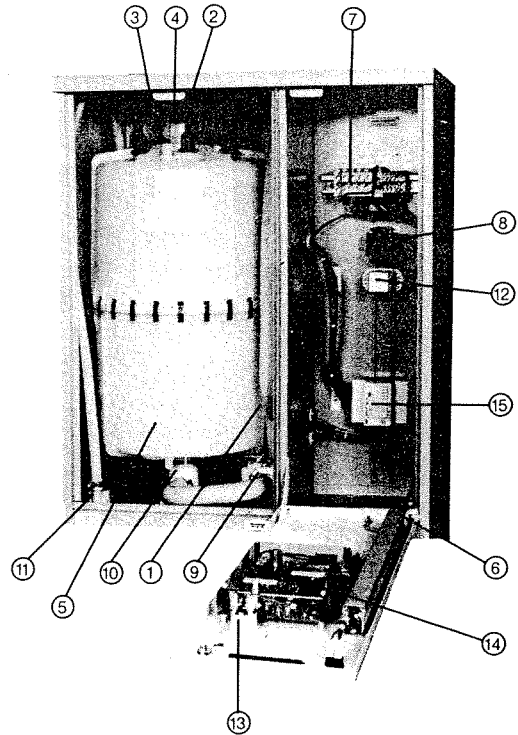
Cylinder level is indicated by a red LED.

20, 25 or 40 dia. steam outlet
9 or 12 dia. condensate return
15 or 25 dia. overflow.

"Energie-Minimatik" – standard electronic for all "DBK/E el.. EM" and "DB/E el.. EM". The "Energie-Minimatik" is a fully automatic, programmable, electronic control unit which adapts automatically to suit the local water quality, even when this varies. Taking into account the volume of steam generated, conductivity characteristics and other process factors that can be used in minimising energy consumption, the systems always operates with minimum deconcentration losses; amounting to about 7 to 15% of the volume of steam generated for water of normal quality. The "Energie-Minimatik" indicates the operating sequences by means of LEDs for humidification – filling – deconcentration – cylinder max. level – deconcentration fault, and the output by means of an ammeter.

"Kompakt-Elektronik" – standard electronic for all "DBM/E el.. K/KV and DBK/E el.. K/KV"

Same Function as "Energie-Minimatik" but only for 1-step regulation (on/off) and LED indication only for – humidification and cylinder max. level.



- | | |
|-------------------------------------|--------------------------------------|
| 1 = Drain hose | 9 = Deconcentration pump |
| 2 = Plug-in electrode contact | 10 = Base to support cylinder |
| 3 = Condensate inlet | 11 = Steam outlet |
| 4 = Steam inlet | 12 = Solenoid valve |
| 5 = Steam cylinder | 13 = Ammeter |
| 6 = Toroidal instrument transformer | 14 = "Energie-Minimatik" electronics |
| 7 = Terminal block | 15 = Main contactor |
| 8 = Transformer | |

– Now with electronic deconcentration supervision this means that in case of any drain system or deconcentration fault the humidifier is switched off automatically and the red LED will start flashing, to call operator's attention.

HYGROMATIK-pumped deconcentration

The drain pump is positioned in the overflow hose and has many advantages over a solenoid valve for deconcentration.

– Does not form a seal; the HYGROMATIK cannot turn into a water heater.

– Resistant to sludge and smaller particles causing hardness. The filter in the cylinder is particularly coarse to facilitate removal of the salts causing hardness.

– This coarse filter does not clog as easily. It offers a high degree of self-cleaning, due to the counter-flow water feed.

– There is no significant interruption in continuous steam generation.

1.2.

HYGROMATIK: the tailor-made program

Model HYGROMATIK el.	DBM 10	DBM 15	DBM 16	DBM-KV 10-16	DBK 25	DBK 26	DBK 40	DB 62	DB 42	DB 82	DB 132	DB 182	DB 282	DB 845	DB 562	DB 890		
Steam quant. cont. var., kg/h	0,2-1,25	0,2-2	0,2-2,3	0,2-2,3	0,5-2,5	0,5-2,7	0,5-5,5	1-6	1-7,5	1,3-13	1,6-16,5	2-23	3-30	5-45	6-60	9-90		
Number of steam cylinders/nozzles	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/2	2/2	2/4		
Req. steps standard	1	1	1	1	1*	1*	1*	1*	1*	1*	1*	2*	2*	2*	2*	2*		
Nom. curr., A max.	5	8	3	8	10	3,7	6,25	20	8,5	14,7	17,5	25	32	48	2 x 32	2 x 48		
Nom. power KW max.	1,1	1,8	2	2	2,2	2,4	4,25	4,4	5,8	10	11,9	17	21,7	32,5	2 x 21,7	2 x 32,5		
Main fuse A	1 x 10	1 x 16	3 x 6	1/3 x 16	1 x 16	3 x 6	3 x 10	1 x 25	3 x 16	3 x 20	3 x 25	3 x 25	3 x 35	3 x 63	6 x 35	6 x 63		
Heating voltage**	220 V 1 N ~		380V 3N ~	220/380 ~	220V 1N ~	380V 3N ~	380V 3N ~	220V 1N ~	380 V 3 N ~								Special voltage on request	
Width mm	305			305	325			548			568		660	945	1135			
Height mm	388			518	450			630			688		790	688	790			
Depth mm	160			160	198			280			320		390	320	390			
Weight, net kg	10	10	10	13	12	12	12	25	25	27	27	30	30	42	50	70		
Operating weight, max. kg	13	13	13	16	15	15	15	37	37	39	39	42	42	92	75	170		
Water supply 1 to 10 bar	Fitting 10 dia.														2 x 10 dia.	2 x 10 dia.		
Drain	3/4" drain hose into hopper														2 x 3/4"	2 x 3/4"		
Associated fan unit HYGROMATIK mod.	DV 120		integratet	DV 120			DV 132			DV 133			DV 134	2 x DV 133	2 x DV 134	4 x DV 133		
Circulation m ³ /h	125		75	125			185			350			700	2 x 350	2 x 700	4 x 350		
Nom. power	30 Watt, 220 V 1 N ~		-	30 Watt, 220 V 1 N ~			50 Watt, 220 V 1 N ~			100 Watt, 220 V 1 N ~			200 W	200 W	400 W	400 W		
Width mm	325		-	325			370			595			1190	595	1190	595		
Height mm	213		-	213			280			280			280	280	280	280		
Depth mm	198		-	198			180			180			180	180	180	180		
Weight kg	6		-	6			6			10			20	2 x 10	2 x 20	4 x 10		

* Capacity regulation for all models can be increased to 4 steps. Proportional regulation 10-100% of nominal capacity by optional adapter for all common control signals (DBM/E el-models are only 1-stepped available). Colour: cabinet beige RAL 1019, front panels light beige RAL 1013. ** Control voltage for all types 220 V ~ 50 Hz.

1.3. Operational sequence

When the hygrostat or controller calls for moisture the heating is switched on and water fed into the steam cylinder. The current begins to flow as soon as the electrodes are immersed. The "Energie-Minimatik" switches the solenoid valve off and interrupts the water supply when the preselected amperage is reached (between 10 and 100% of the rating of the unit).

After a short heat-up period vaporisation and automatic topping up of the volume of water vaporised begins. The steam generation is at a temperature of about 100 to 102° C and does not heat the air to be humidified significantly (not measurable).

The steam is fed into air-conditioning ducts through duct nozzles, which are available in different standard lengths for optimum distribution.

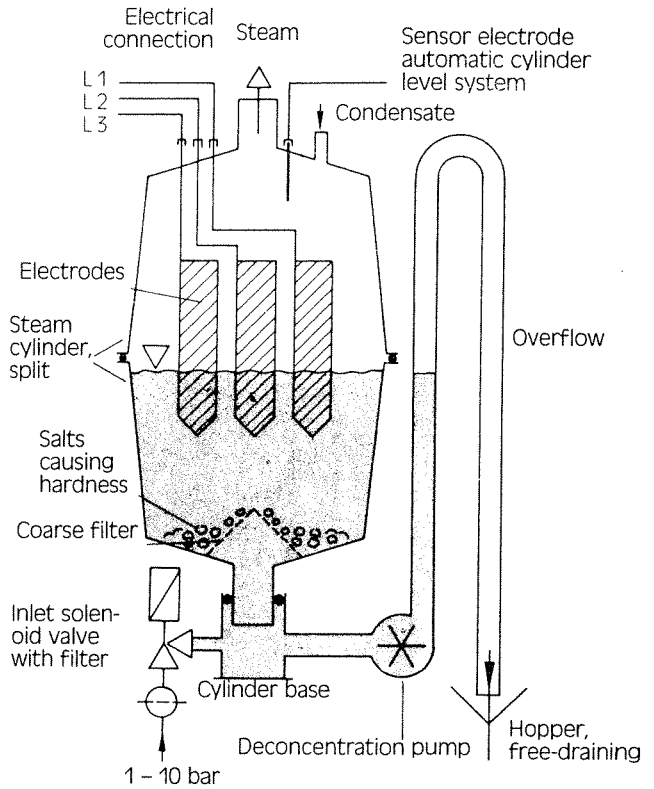
Rooms can be humidified directly (without ducts) using fan units (with fan and nozzle).

The steam generator and duct nozzle or fan unit are connected by steam and condensation hoses.

With continuing vaporisation the conductivity of the water in the cylinder increase continuously. The "Energie-Minimatik" keeps the permissible conductivity in the steam cylinder in balance by draining off some of the water periodically and replenishing it with fresh water. Deconcentration losses for water of normal quality are between 7 and 15% of the volume of steam produced per hour. Depending on the water quality a **complete drainage** of the cylinder water takes place approx. once a week (3 – 8 days).

The salts causing hardness collect in the space under the electrodes and are removed during regular maintenance. Some of the smaller particles, granular material or sludge are sucked out by the drain pump.

The power electronics limit the amperage in accordance with the depth to which the electrodes are immersed. This effect is used to control the output. This applies to both stepped switching and proportional control. It is achieved by increasing the level rapidly when the output increases, vaporisation when



the output decreases slightly and draining off some of the water and vaporisation of the residue when the output decreases suddenly. The HYGROMATIK therefore follows all the controller signals without delay.

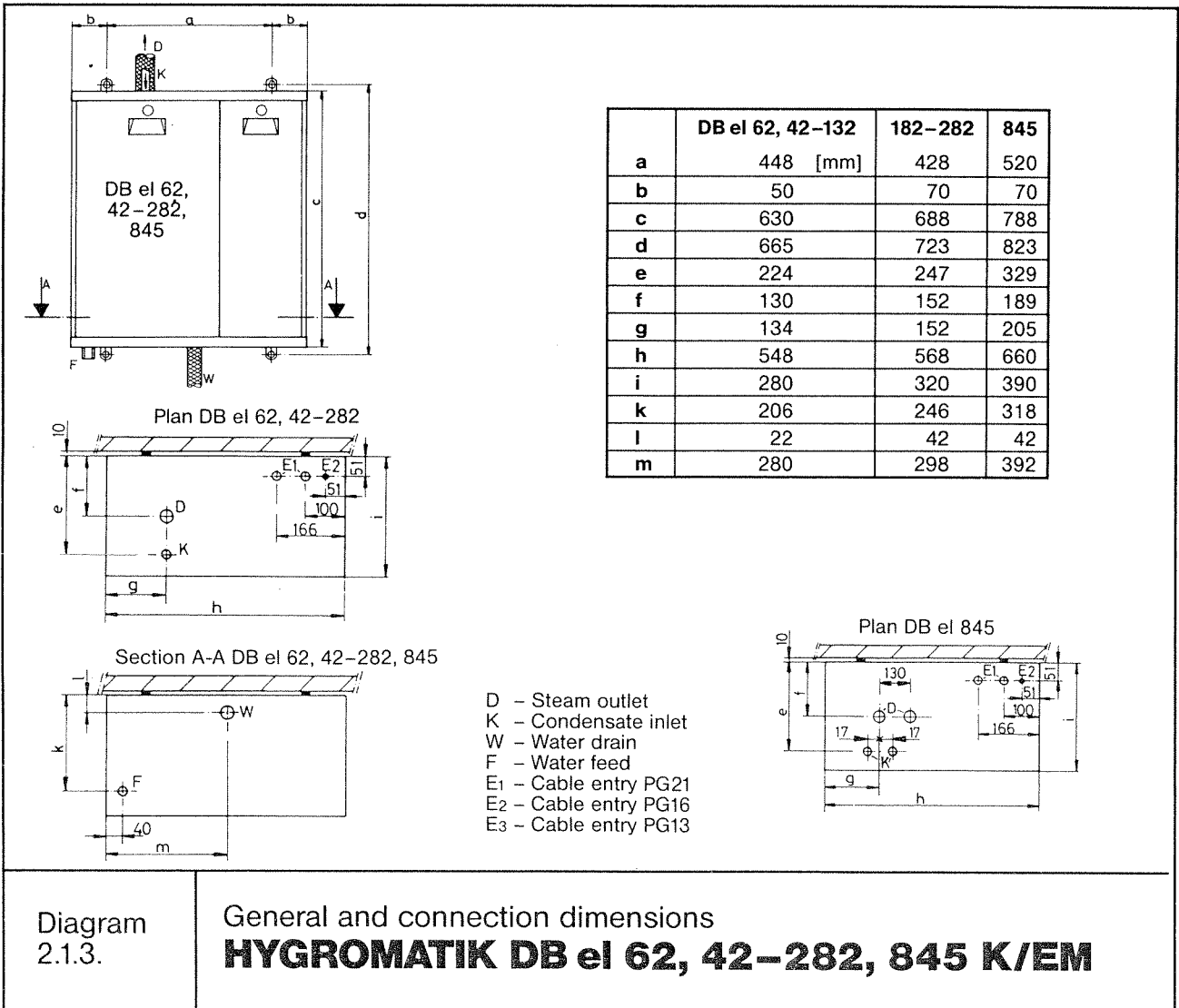


Diagram 2.1.3.

General and connection dimensions
HYGROMATIK DB el 62, 42-282, 845 K/EM

2. Installation

2.1. Position of cabinet

The steam generator and duct nozzle/fan unit are to be connected with the shortest possible steam and condensate hoses since this is the only way of achieving optimum efficiency. The installation position of the steam distributor is determined by the duct runs and the design of the air-conditioning system.

For these reasons it is worth mounting the steam generator as close as possible to the steam distributor (duct nozzle, fan unit). If there is no suitable wall available it is recommended that the unit be mounted on a freestanding frame, possibly anchored to the floor.

As far as fan units are concerned it is often worth taking into account the position of existing water connections (feed and drain).

The clearance to walls given in diagram 2.1.1. are to be maintained otherwise cabinet ventilation will be insufficient.

A clear space is required in front of the steam generator for opening the door of the electrical compartment. The cabinet is to be levelled with a spirit level! (Diagram 2.1.2.)

Ambient temperature: 5 to 40°C, max. relative humidity 80%.

2.2. Fan unit

The fan unit is mounted over the steam generator (with a vertical gap of at least 300 mm). When several fan units are used simultaneously, none is to be more than 5 m away from the steam generator. The fan unit is to be positioned to avoid draughts. The minimum height of 2000 mm is generally sufficient. In addition, the clearances from walls given in diagram 2.2.1. are to be observed.

The louvres of the outlet grill can be adjusted to alter the direction of the air flow.

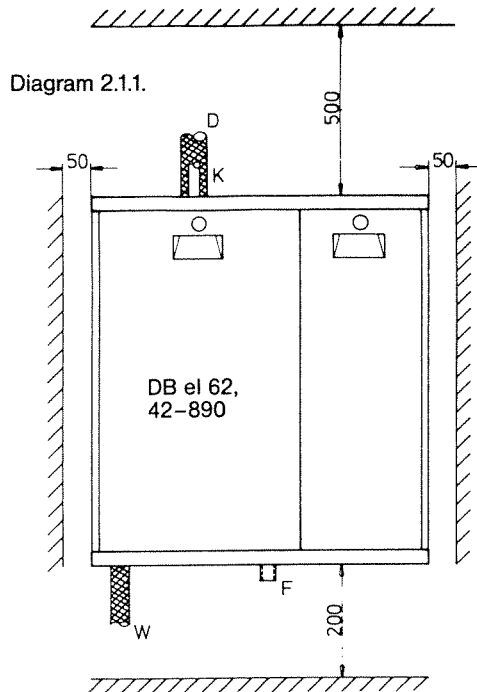
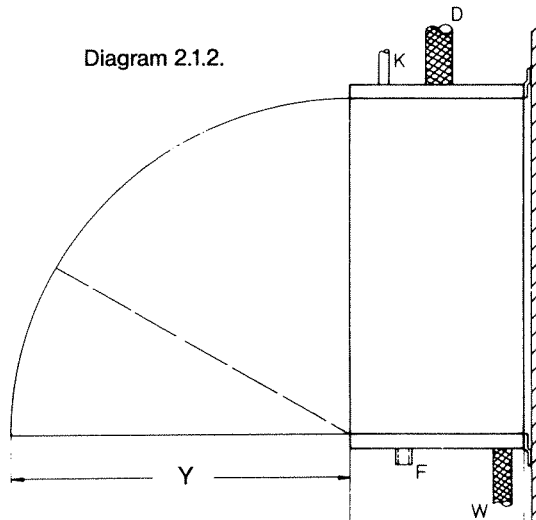


Diagram 2.1.1.



DB el	42-132	182-562	845-890
Y	630	690	790

- D = Steam outlet
- K = Condensate inlet
- F = Water feed
- W = Water drain

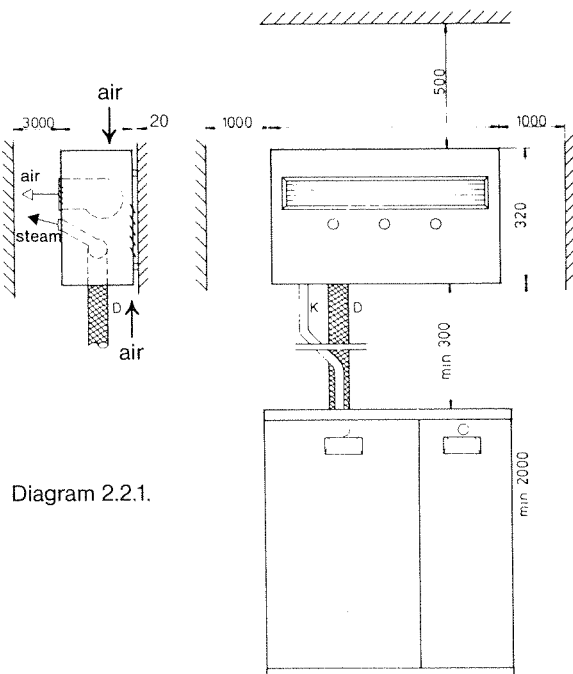


Diagram 2.2.1.

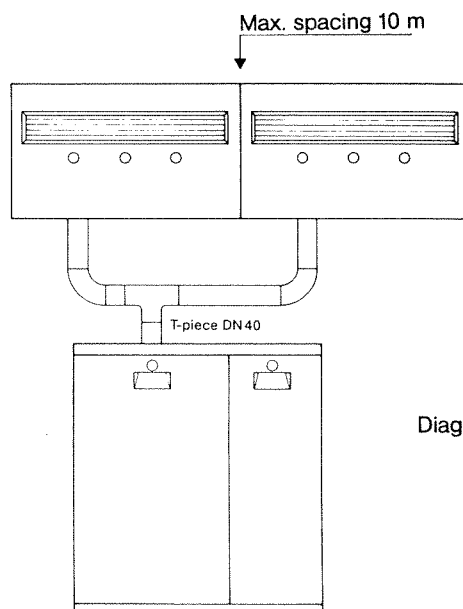
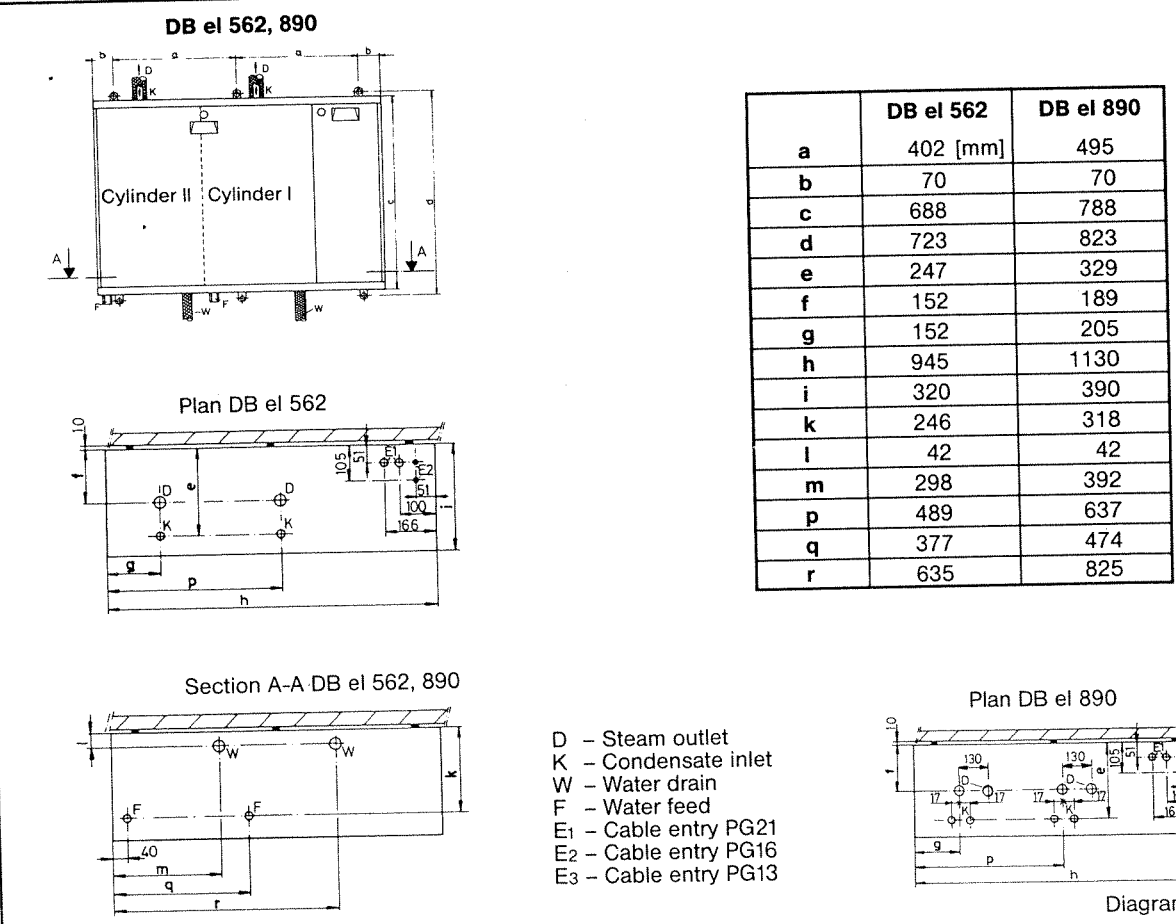
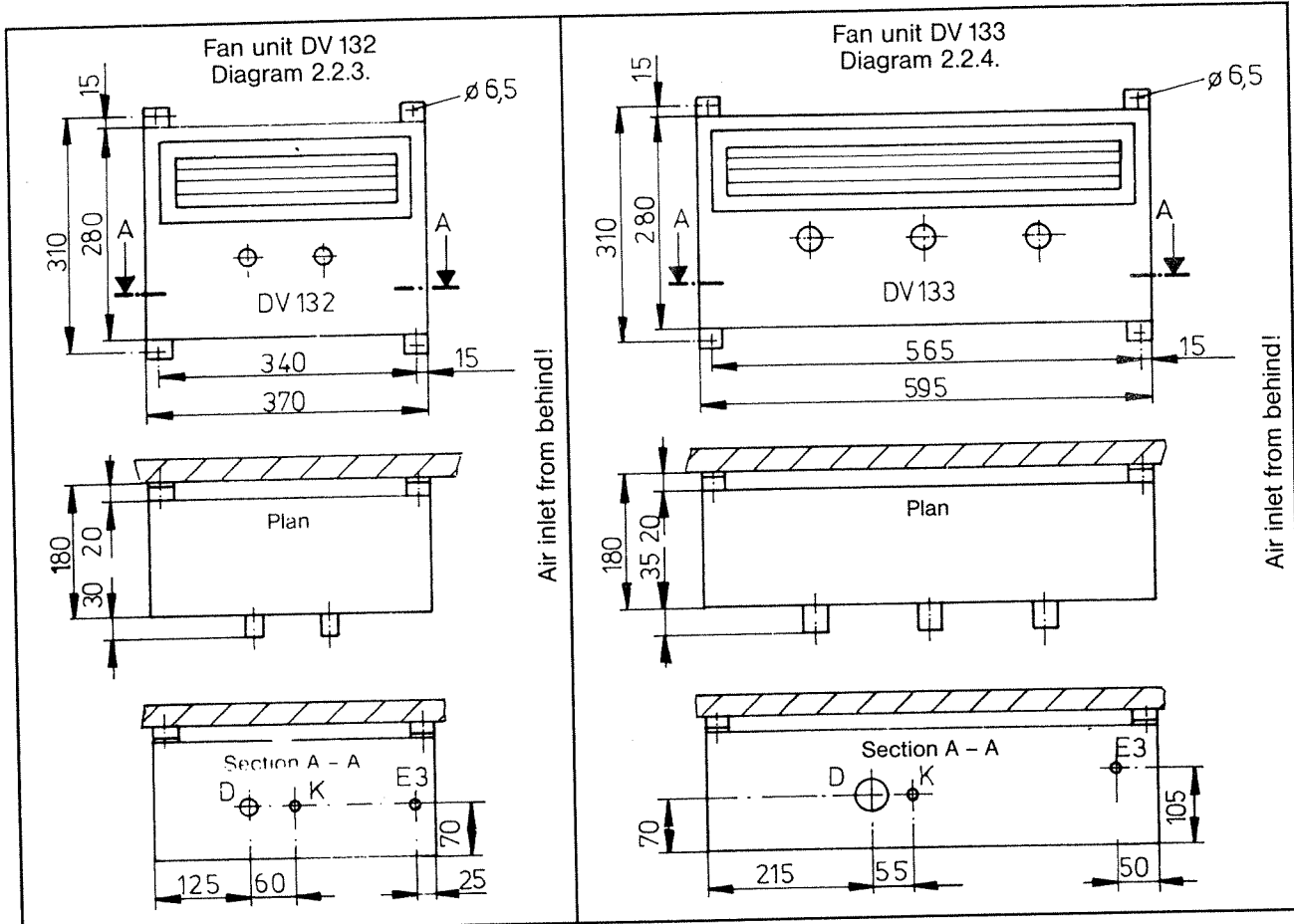


Diagram 2.2.2.



Diagrams 2.1.4., 2.2.3., 2.2.4.

General and connection dimensions
HYGROMATIK DB el 562, 890, DV 132-133

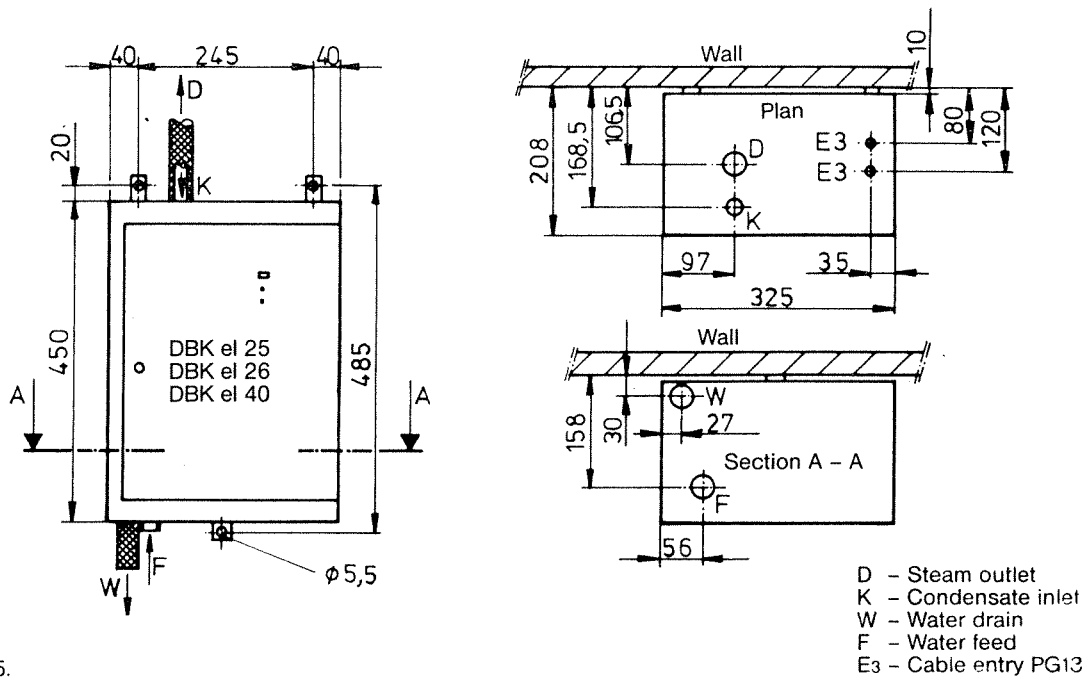
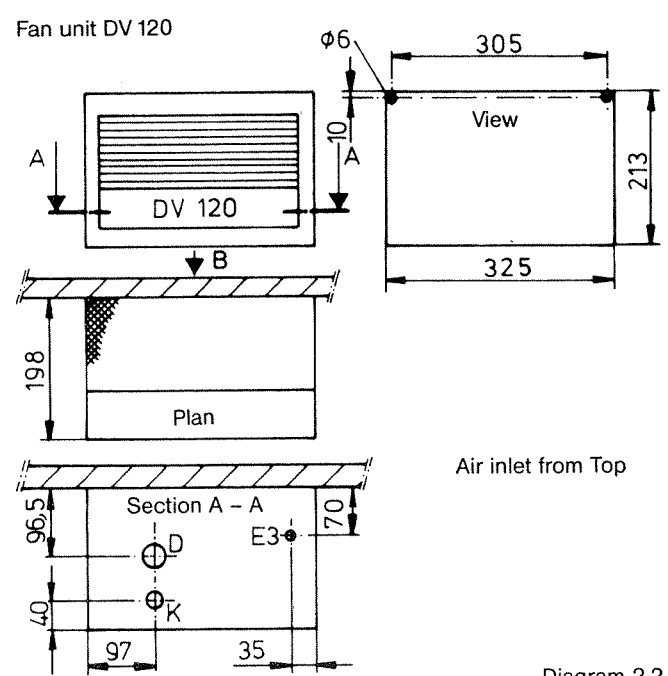
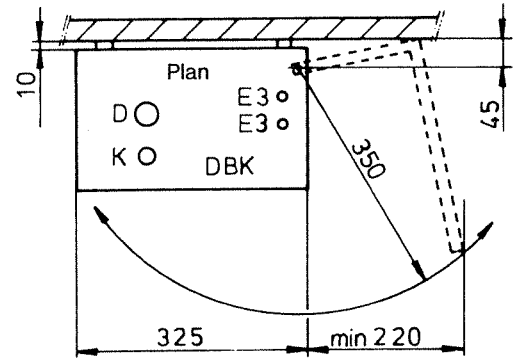
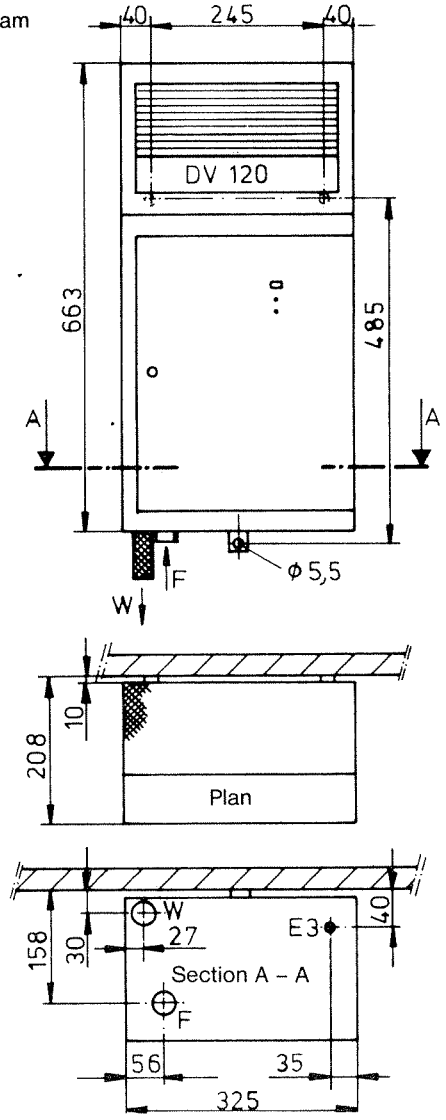


Diagram 2.1.6.

Compact model DBK el + DV 120



Diagrams
2.1.5.
2.1.6.
2.2.5.

General and connection dimensions
HYGROMATIK DBK el 25-40 K/EM/KV, DV 120

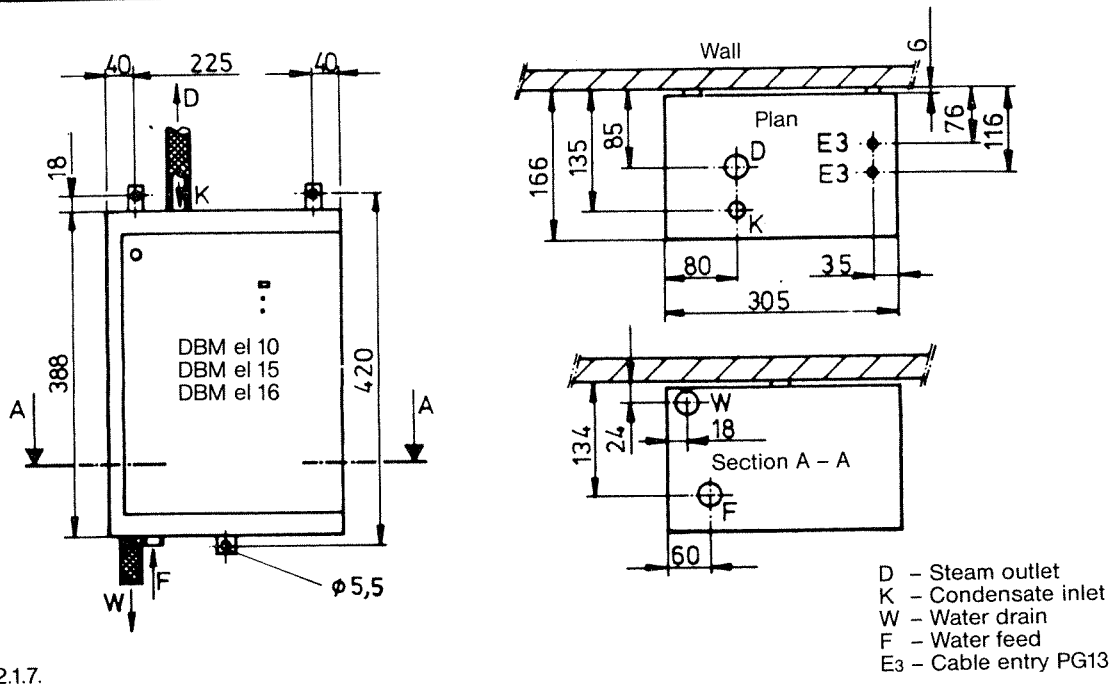


Diagram 2.1.7.

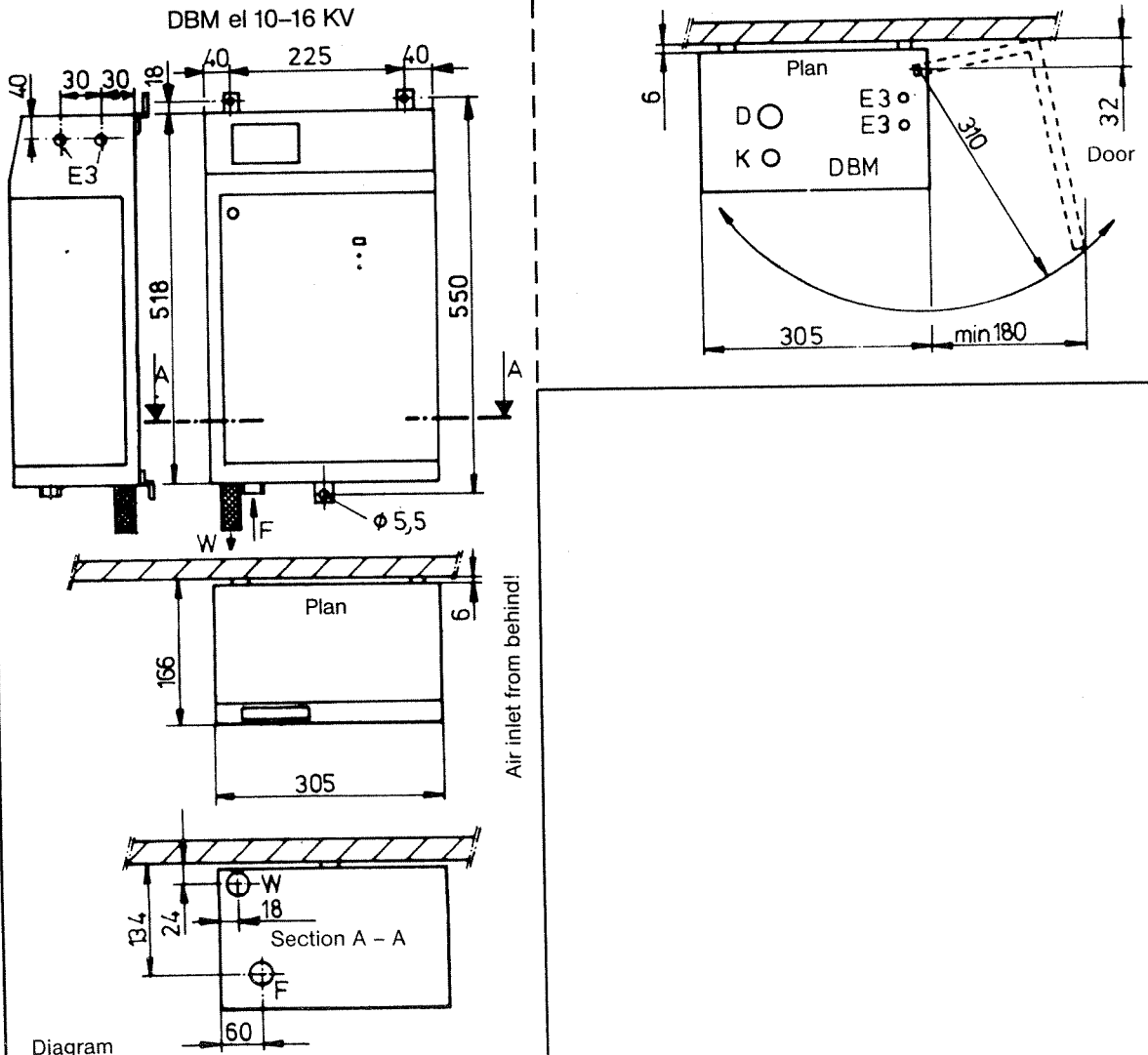


Diagram 2.1.8.

Diagrams
2.1.7.
2.1.8.

General and connection dimensions
HYGROMATIK DBM el 10-16 / KV

2.3. Duct nozzles

Duct nozzles are supplied as accessories with the humidifier but not in connection with fan units.

The steam inlet into the air duct is effected dropless. Sensors and limiting devices are to be positioned sufficiently far away from the last channel nozzle to take account of the total distance along which steam is diffused.

The number and size of the duct nozzles supplied as standard and the nominal diameters of the various steam and condensate hoses and recommended duct widths are to be found in tables 2.3.1. and 2.3.2.

2.3.1. Number and nominal diameter of duct nozzles, nominal diameters of steam and condensate hoses

Mod. DBM/E el Mod. DBK/E el Mod. DB/E el	10-17 25-80	62, 42-132	182-282	845-562	890
Duct nozzles	1	1	1	2	4
Duct nozzles, nominal dia.	20	25	40	40	40
Steam hose, nominal dia.	20	25	40	40	40
Condens. hose, nominal dia.	9	12	12	12	12

2.3.2. Duct nozzles – standard and special lengths (in mm)

Duct nozzles, stand. length	240	295	395	595	795	995	1400	SL
Width of duct	350	450	650	900	1200	1700	2400	3500

It is recommended that duct nozzles be fitted as close as possible to the steam generator. Every unnecessary metre of steam hose laid wastes power. Steam hoses longer than 5 m should basically be lagged.

Positioning on the outlet side is preferable up to a maximum total pressure of 1200 PA (on the inlet side down to a vacuum of 500 PA). The drain hoses of high-pressure installations must be modified in accordance with the total pressure. Detailed instructions are available on request.

Please see Diagram 2.3.7. on p. 9.

Duct nozzles are always fitted level in the side walls of the duct, air being admitted from the right, left, top or bottom as required.

A minimum clearance of 120 mm from the roof of the duct is to be maintained. When the steam distributor is inclined at 30 to 45° to the flow this can be reduced to 70 mm. See diagram 2.4.1.

2.4. Fitting instructions for duct nozzles

The following guidelines are given for fitting duct nozzles:

- flat air duct**, diagram 2.4.2.
different lengths next to one another, the longest air nozzle, followed by the next longest etc, in the direction of air flow.
- narrow, high air duct**
equal lengths above one another, additional steam outlet offset to the side if possible.
- square air duct**
different lengths, displaced horizontally and vertically
- flat, extremely wide air duct**
duct nozzles opposite to one another.

The air flow conditions must always be checked carefully when the installation conditions are unfavourable, especially to see whether is a risk of condensation in the air duct.

Diagram 2.3.3.

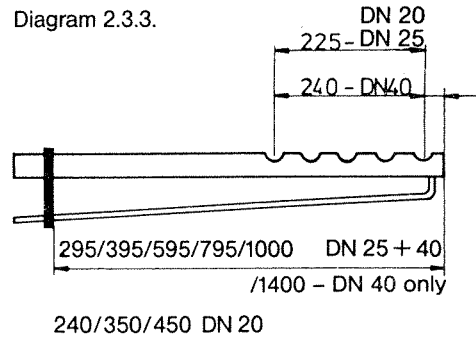


Diagram 2.3.4.

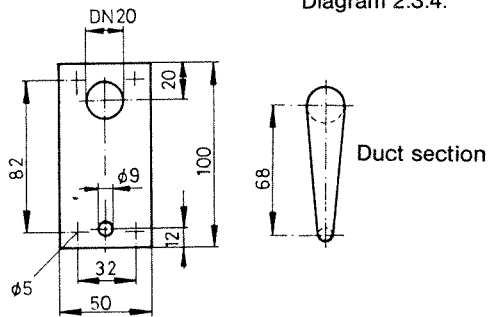


Diagram 2.3.5.

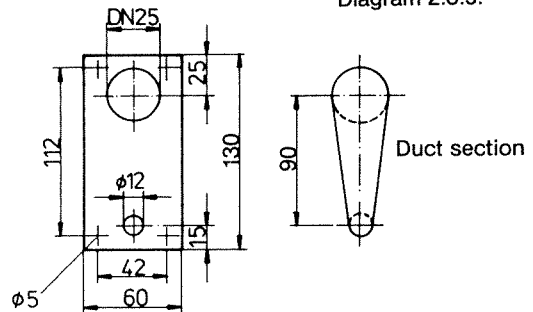


Diagram 2.3.6.

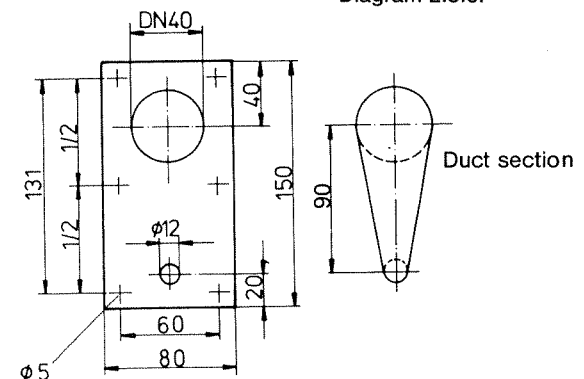


Diagram 2.4.2.

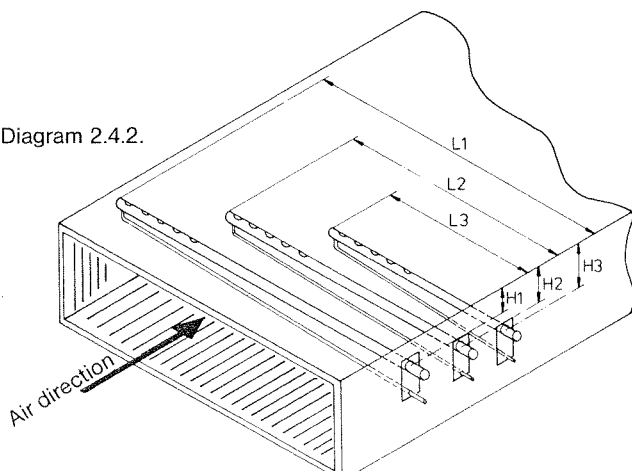
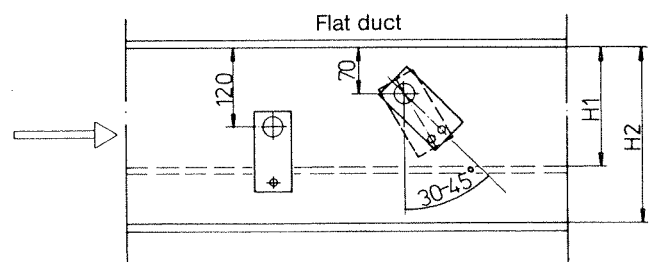


Diagram 2.4.1.



2.5. Steam hose routing

Only original HYGROMATIK grade hoses will stand up to the operating conditions.

The minimum bend radii are:

Steam hose DN 20: R min = 150 mm

Steam hose DN 25: R min = 200 mm

Steam hose DN 40: R min = 400 mm

The following plastic fittings are available for laying in confined spaces:

25 mm – 90° elbow, T

40 mm – 45 and 90° elbows, T, union-cross.

Steam hoses are to be laid as short as possible, without bows and kinks and at a uniform rise/fall of about 5 to 10%.

Preformed lagging is to be drawn over hoses over 5 m in length to save energy.

They are to be secured with hose clamps no more than 500 mm apart depending on routing.

It is recommended that straight runs longer than several metres be laid in copper or temperature-resistant plastic pipe or in a conduit or jacket pipe.

40 mm ID for 20/25 mm steam pipe,

60 mm ID for 40 mm steam pipe.

2.6. Routing of condensate hose

a) When the steam distributor is positioned 200 mm or more above the top of the humidifier the condensate hose is taken at a fall of about 5 to 10% to the inlet on the steam cylinder so that the condensate flows back freely.

b) When the steam distributor is positioned below the dimension given in a) the condensate must be drained separately. To avoid steam losses a loop at least 200 mm high is to be laid. The unused condensate inlet on the steam cylinder must be sealed with a suitable plug which is to be available free of charge from HYGROMATIK. Diagram 2.6.1.

Fix the hose with clamps no more than 500 mm apart and to suit routing.

12 mm plastic T's are available for junctions of several condensate hoses.

2.7. Methods of fitting the steam distributors

a) Steam distributors positioned 200 mm or more above the top of the cabinet.

First take the steam hose up at least 400 mm, and then to the steam distributor at a constant fall/rise. Take the condensate hose at a fall to the steam cylinder. Diagrams 2.7.1. and 2.7.2.

b) When the steam distributor is positioned below the dimension given in a) first take the steam hose up at least 600 mm and then with a constant fall to the steam distributor. Take the condensate hose, with a loop 200 mm in height, to the drain. Diagrams 2.7.3. The loop is generally recommended, to avoid condensate-noises and energy-losses.

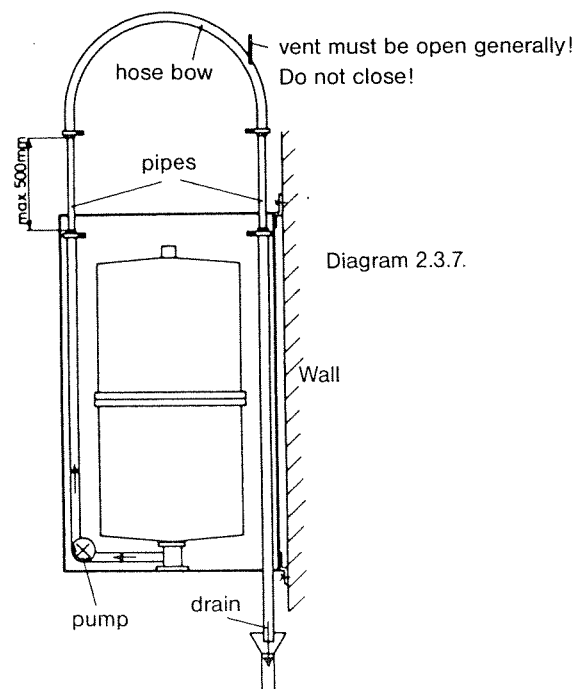


Diagram 2.3.7.

Diagram 2.7.1. min. 5-10%

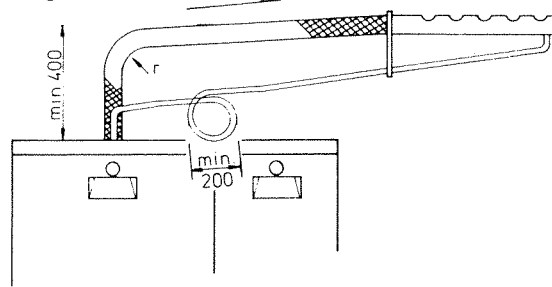


Diagram 2.7.2. min. 5-10%

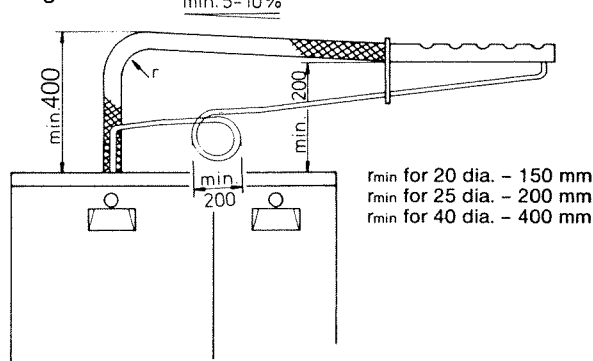
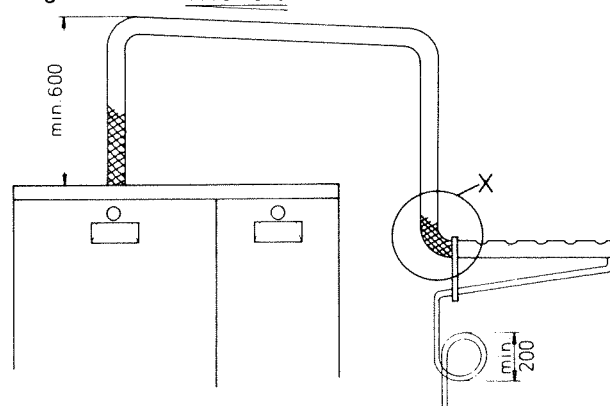
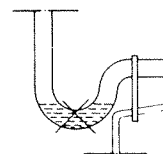


Diagram 2.7.3. min. 5-10%

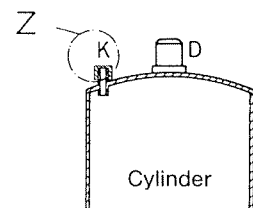
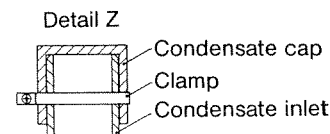


Detail X



Wrong!

Diagram 2.6.1.

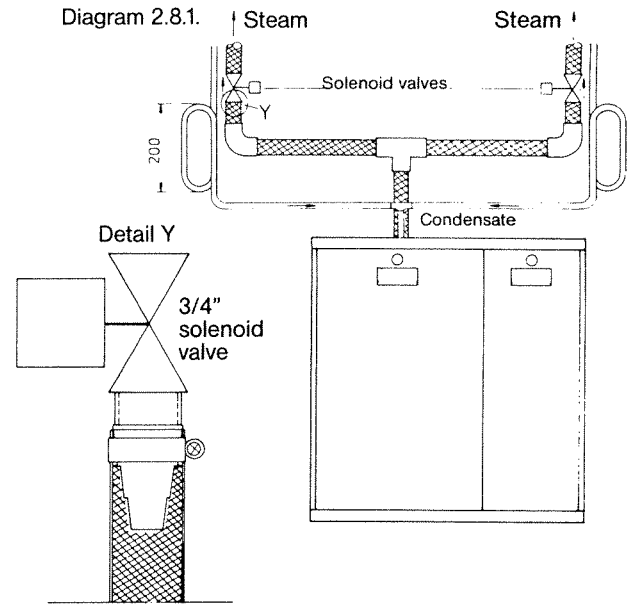


2.8. Positioning of steam solenoid valves

To humidify several loads that are to be supplied and controlled separately by one steam humidifier, solenoid valves must be interposed in the steam lines. **They are generally fitted in vertical risers with an upward flow.**

The most favourable position is directly above the HYGRO-MATIK steam humidifier. Hose nozzles are supplied with the solenoid valves for simple insertion of the 25 mm steam hose.

The condensate hose generally has to be laid to the steam cylinder or drain with a loop (at least 200 mm dia.). Diagram 2.8.1.



3. Plumbing

Comply with the regulations of the local water board or company.

3.1. Water feed

The humidifier is connected to normal tap water. Feeding with softened or innoculated water leads to operating faults. Demineralized water can be used but needs a special programming of the "Energie-Minimatik".

A shut-off valve and a dirt trap are to be installed in the feed line, which is to be at least 1/2".

If the total pressure in the air duct > 1000 PA a check valve is also to be fitted.

If local regulations require, water feeding pipe can be led 300 mm over cabinet with additional aut. de-aeration on highest point and check valve.

1 to 10 bar water supply, diagrams 3.1.1. and 3.1.2.
DBM/E el 10 - 17, DBK/E el 20 - 80:

1 pipe fitting for 10 mm OD

DB/E el 62, 42 - 282, 845:

1 pipe fitting for 10 mm OD

DB/E el 562 and 890:

2 pipe fittings for 10 mm OD

The inlet protrudes from the base of the cabinet. All the connection parts are supplied loose. Installation is to be carried out as follows: diagram 3.1.3.

1. Hand-tighten the large plastic union nut without using a tool.
2. Insert the 10 mm OD pipe into the inlet and home against the shoulder and hand-tighten the brass nut.
3. Tighten the brass nut 1/2 to 1 1/4 turns with a 17 mm spanner - hold with a second 14 mm spanner.

Over-tightening damages the fitting!

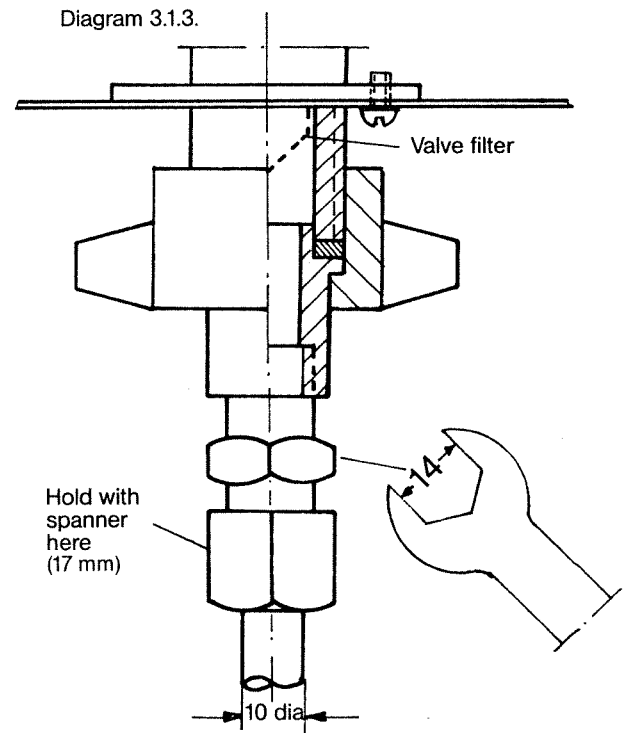
3.2. Water drain

Humidifier drain: diagrams 3.2.1. to 3.2.4.

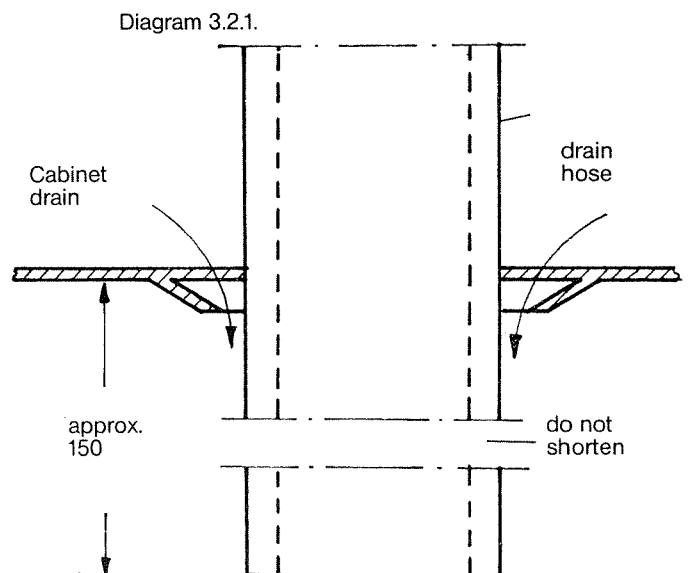
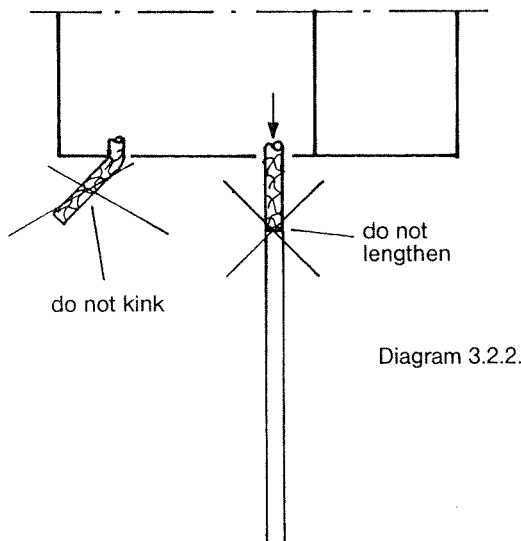
DBM/E el, DBK/E el 1 drain hose, 15 mm

DB/E el 62, 42 - 282, 845 1 drain hose, 15 mm

DB/E el 562 and 890 2 drain hoses, 15 mm

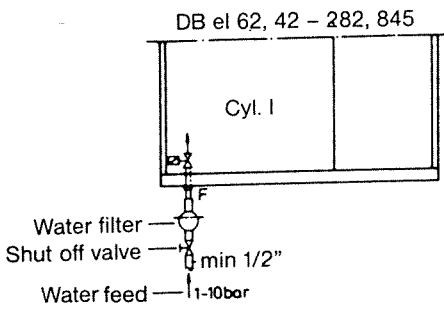


The drain must flow **freely into an open hopper**. The drain hose, protruding about 150 mm from the base of the cabinet must not be kinked and is also not to be shortened lengthened. The hopper and drain line are to be made of a material resistant to a temperature of 95° C and of sufficient size for 2 to 3 l of hot water to be drained from each steam cylinder temporarily. The hopper must cover the cabinet drain.



Plumbing

Diagram 3.1.1.



Schema 3.1.2.
DB el 562, 890

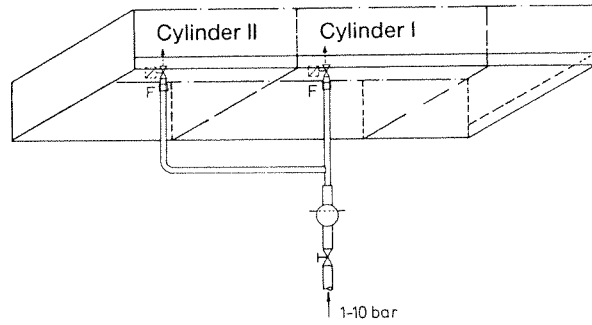
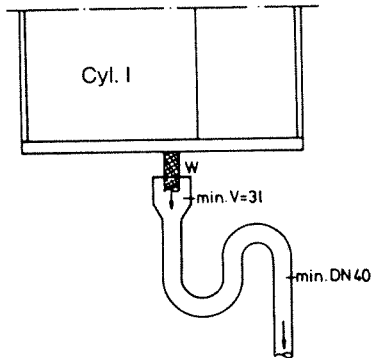
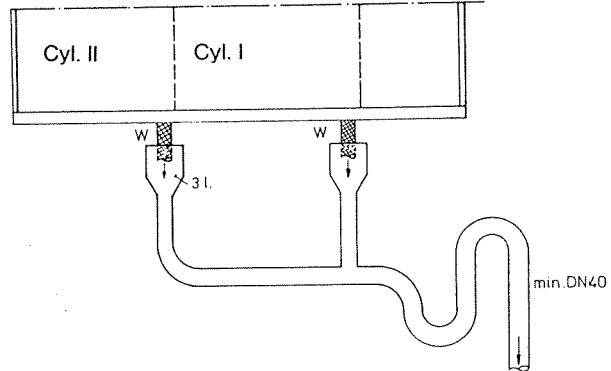


Diagram 3.2.3.



Schema 3.2.4



4. Electrical installation – mains supply

- All work is to be carried out by a qualified electrician.
- Observe local regulations.
- Connect the potential equalisation to the outer M6 base bolt (plastik solenoid valve).
- For ratings over 33 KW only a permanent connection to a permanently laid installation is permissible. (German rule).
- A Separate main connection with main fuses, main switch etc. is provided for each steam cylinder.

DBM/E el 10/15 and DBK/E e 25,
DB/E el 62 = 1 main connections 220 V 1 N AC
DBM/E el 16/17, DBK/E el 26/40 and
DB/E el 42 – 282,845 = 1 main connections 380 V 3 N AC
DB/E el 562 and 890 = 2 main connections 380 V 3 N AC

f) Selection of main fuses, quick-acting to medium slow-blow:

DBM/E el	10	15	16	17	DBK/E el	25	26	40	80
A	1 x 10	1 x 16	3 x 6	3 x 10	A	1 x 16	3 x 6	3 x 10	3 x 16

DB/E el	62	42	82	132	182	282	845	562	890
A	1 x 25	3 x 16	3 x 20	3 x 25	3 x 25	3 x 35	3 x 63	6 x 35	6 x 63

Note: The quick-acting control fuse (5 x 20 mm) sits in the terminal block indicated:
5 A – all models DB/E el,
2.5 A – all models DBM/E el, DBK/E el.

Note: do not apply any external voltage to terminals nos. 1 to 50, since these are reserved for internal control voltages, feeding in of continuous signals and for internal connections for kits.

4.1. Electrical connection of fan unit Models DV 120 / 132 / 133 / 134

- On/off switching using the hygrostat, operation of each unit in parallel to demand for moisture – diagram 8314 – 4.1.1.
- Continuous fan – on/off switching using the humidifier control switch – diagram 8314 – 4.1.2.

5. Stepped and proportional regulation system interlocking, signal outputs (remote indication relay)

The control system must be designed to operate so that the on/off switching cycles do not exceed the maximum permissible 240 alternations per hour.

5.1. All interlocking contacts (floating)

of the safety chain, such as the max. hygrostat, wind vane relay, duct pressure switch, fan contact etc are connected in series between controller terminals 1 and 2 – diagram 8313.

5.2. 1- to 4-step regulation (floating)

Diagram 8314 – 5.2.1.

Standard stepped control in accordance with the table.

DBM/E el	10	15	16	17	DBK/E el	25	26	40	
stand. Steps	1	1	1	1		1	1	1	
DB/E el	62	42	82	132	182	282	845	562	890
stand. Steps	1	1	1	1	2	2	2	2	2

3- or 4-step regulation as optional extra (not deliverable for DBM el-models).

5.3. Proportional regulation with universal adapter type b12 including integral residual humidification contact for the following DC controller signals, (not deliverable for DBM/E el):

2 to 10 V	– at least 0.2 mA
4 to 20 V	– at least 0.2 mA
2 to 10 mA	– at least 10 V
4 to 20 mA	– at least 10 V
30 to 140 ohms ore more	– at least 1 mA/0.1 V

See 8315 and 8317 connections and control diagrams.

5.4. Floating signal outputs

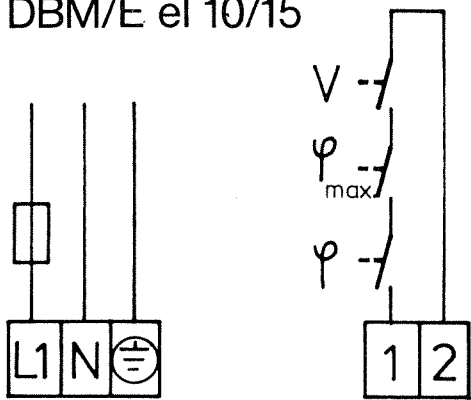
Diagrams 8314 – 5.4.1 and 8317

Wired to terminal block via the following auxiliary relays:

- Auxiliary relay K 5 – Cylinder max. level
- Auxiliary relay K 6 – Operating
- Auxiliary relay K 7 – Collective fault (cylinder max. level and/or deconcentration fault) with 600 s delay
- Auxiliary relay K 8 – Ready

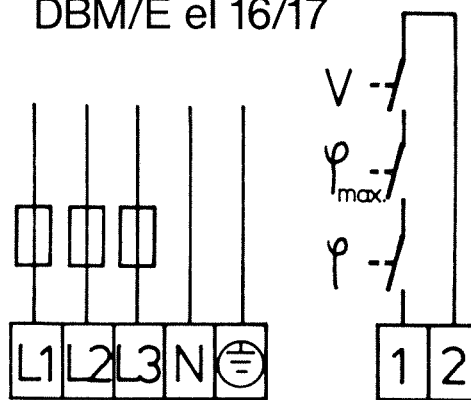
Note: Control trafo must not be used for power supply of proportional regulation. This must have separate power source. Regulation wirings must be laid insulated.

DBK/E el 25/20
 DB/E el 62
 DBM/E el 10/15



DBK/E el 25 - 16 A
 DB/E el 62 - 25 A
 DBM/E el 10 - 10 A
 DBM/E el 15 - 16 A

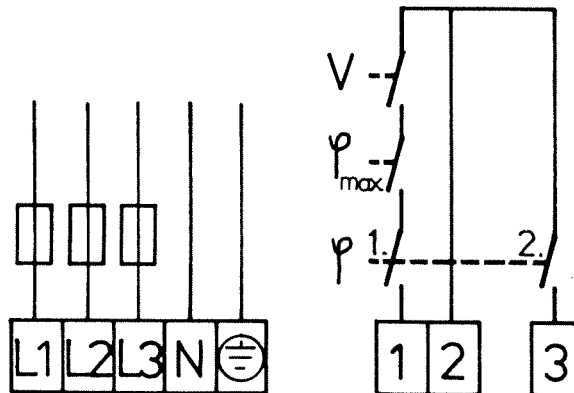
DBK/E el 40/26/80
 DB/E el 42 - 132
 DBM/E el 16/17



DBK/E el 40 - 3x10 A
 DB/E el 42 - 3x16 A
 82 - 3x20 A
 132 - 3x25 A
 DBK/E el 26 - 3x 6 A
 DBM/E el 16 - 3x 6 A
 DBM/E el 17 - 3x10 A
 DBK/E el 80 - 3x16 A

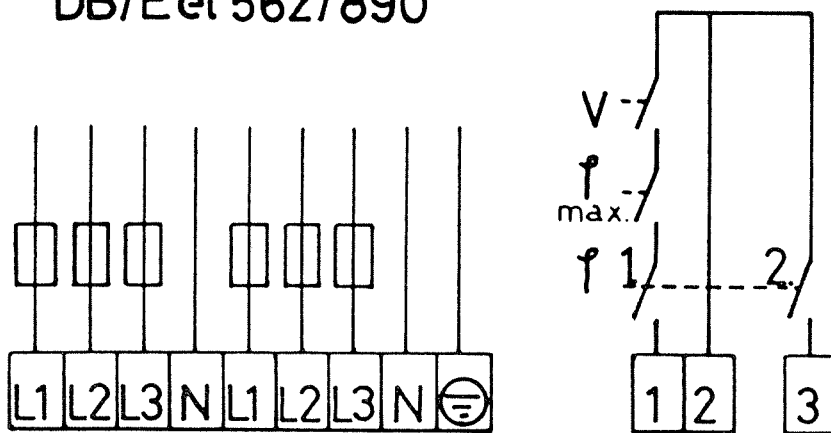
DB/E el 182 - 282, 845

φ = Hygostat, 1 or 2 steps
 φ_{max} = Max.-Hygostat
 V = System interlocking -
 Max.-Hygostat
 Diff. pressure switch
 Wind vane relay



DB/E el 182 - 3x25 A
 282 - 3x35 A
 DB/E el 845 - 3x63 A

DB/E el 562/890

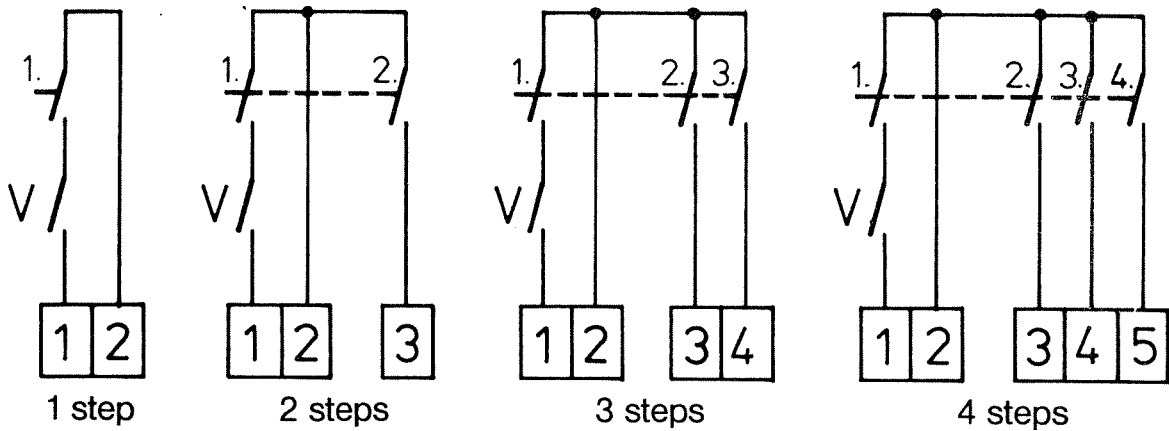


DB E el 562-6x35A
 890-6x63A

Diagram
 8313

Mains and control connection, standard
HYGROMATIK DB/K/M/E el

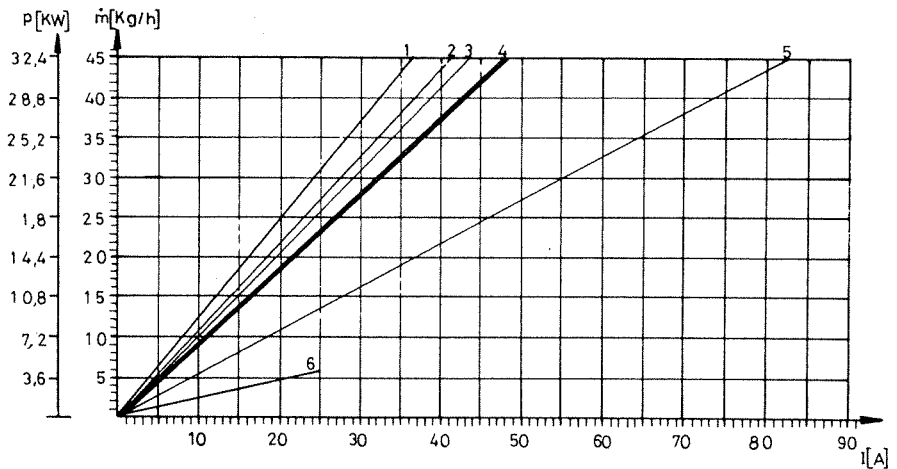
1- to 4-level control, diagram 8314 - 5.2.1.



1 - 4 levels, floating
V = System interlocking, floating

- P = Nom. power
- \dot{m} = steam output
- I = Nom. current
- 1 = 500 V 3 N ~
- 2 = 440 V 3 N ~
- 3 = 415 V 3 N ~
- 4 = 380 V 3 N ~
- 5 = 220 V 3 N ~
- 6 = 220 V 1 N ~

Diagram 8314 - 6.5.1.



Fan unit DV 220 V AC

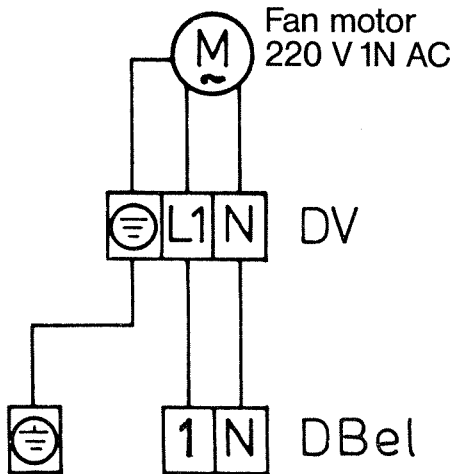


Diagram 8314 - 4.1.2.

Fan unit DV 220 V AC

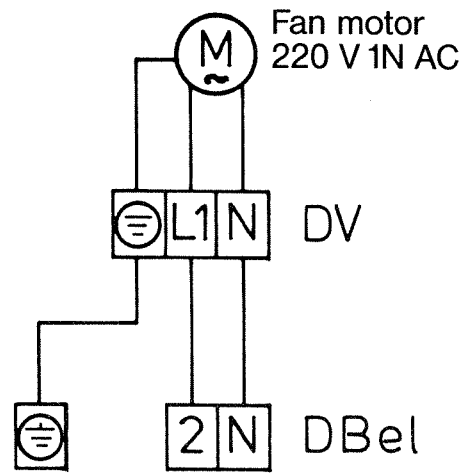


Diagram 8314 - 4.1.1.

Diagram
8314

Connection for 1- to 4-steps regulation, steam output, fan unit DV
HYGROMATIK DB/K/M/E el

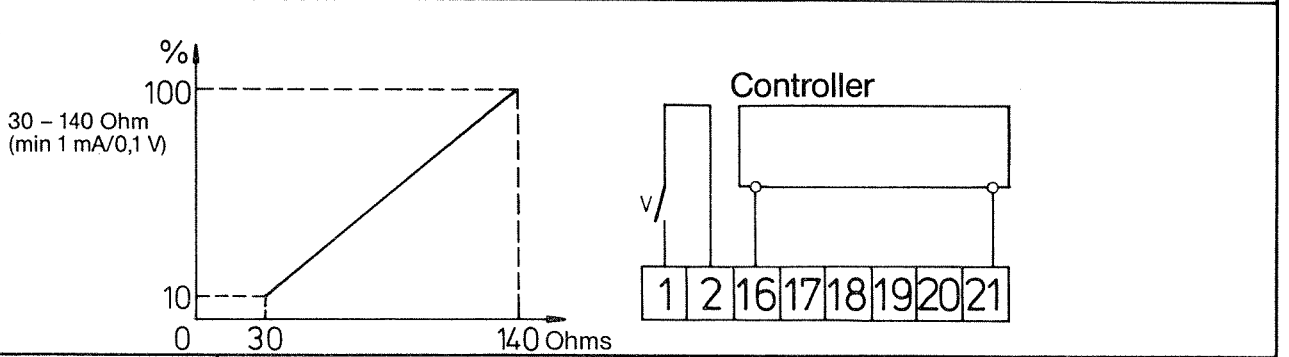
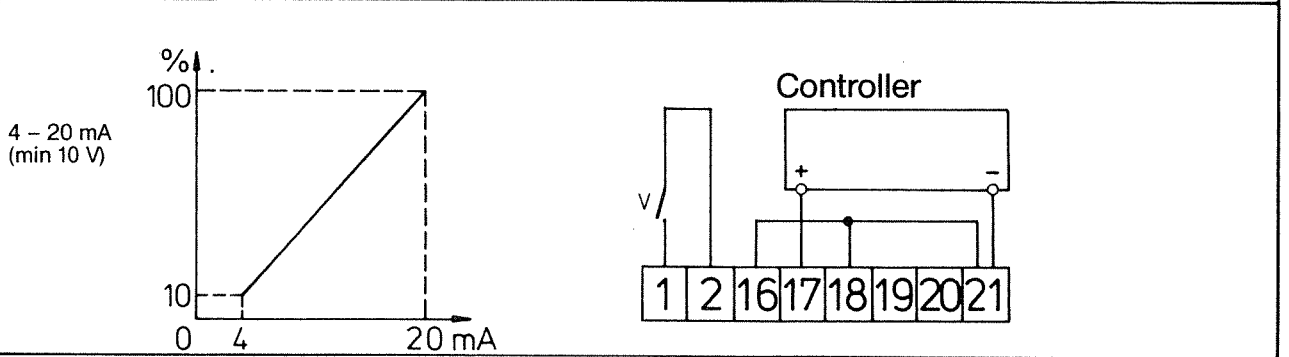
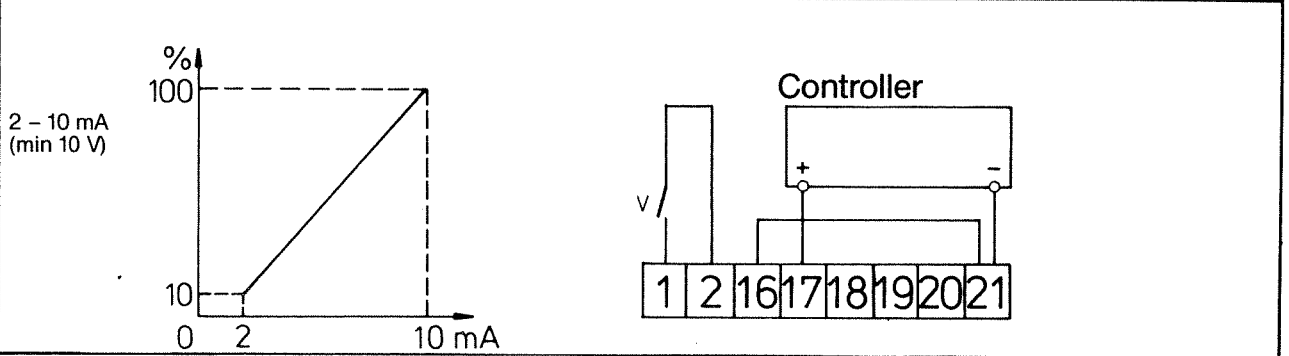
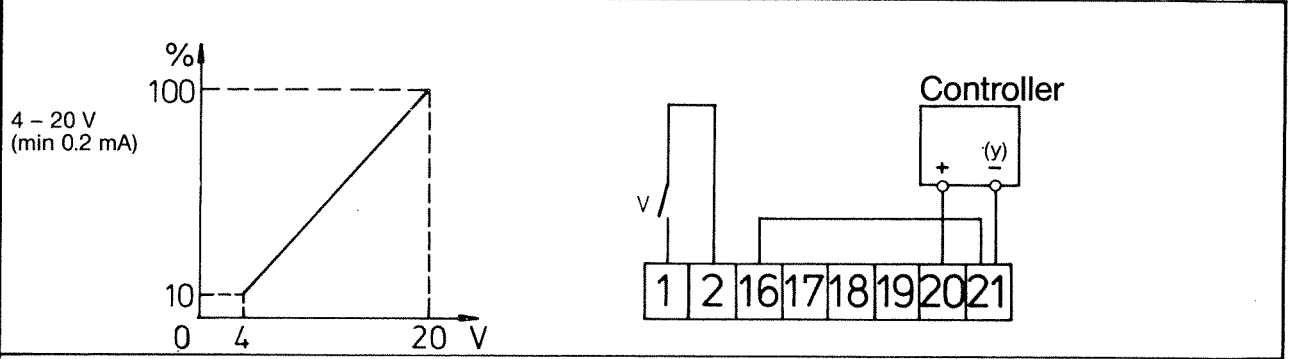
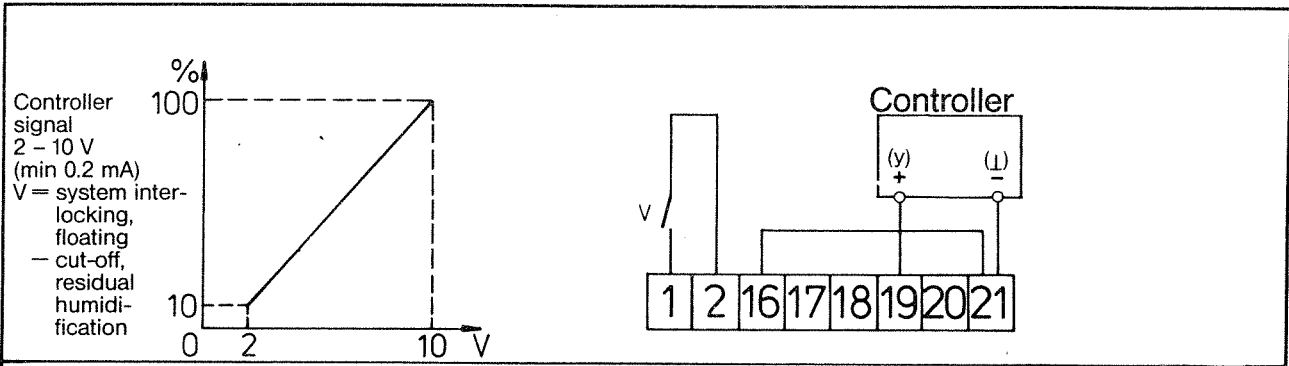
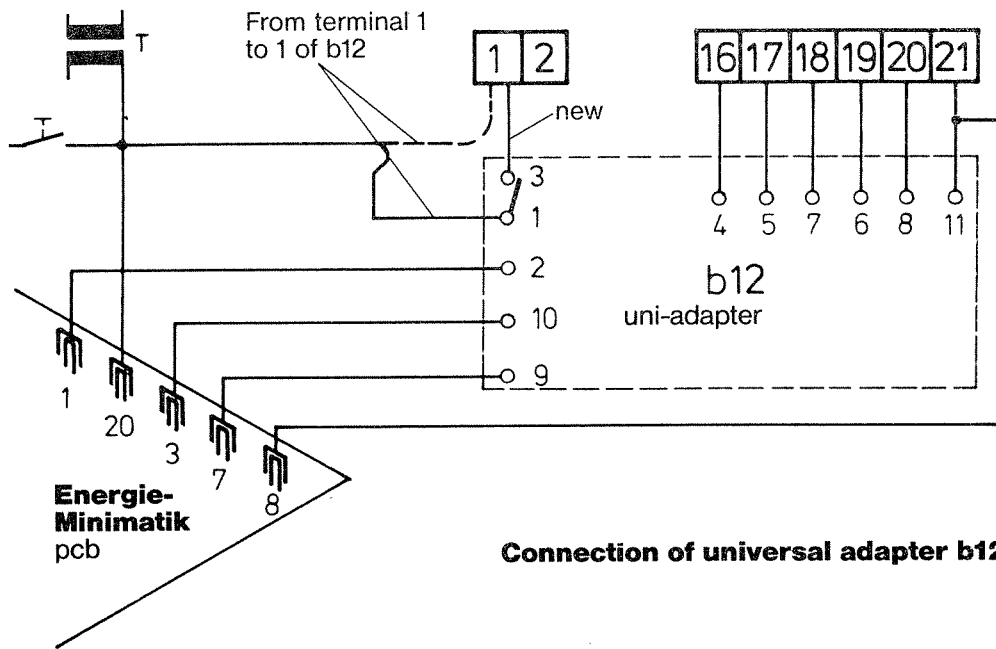


Diagram 8315 Connection for proportional regulation with uni-adapter b12 **HYGROMATIK DB/K/E eI**

Note: It is recommended to lay the regulation wirings insulated to avoid inductions by surrounding high voltage cables, which could cause malfunctions!
The control trafo of the electronics must not be used as a power source for other users. Proportional regulation must be supplied by a separate trafo!

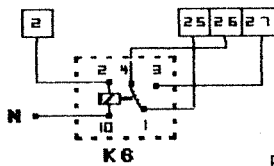


Connection of universal adapter b12

Signal output, floating

Operation

For all DBM/E, DBK/E, DB/E el . . . K/EM

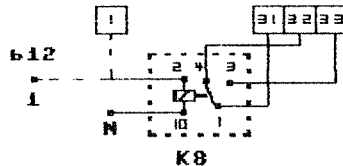


Relay 220 V ~

Signal output, floating

Ready for operation

For all DBM/E, DBK/E, DB/E el . . . K/EM

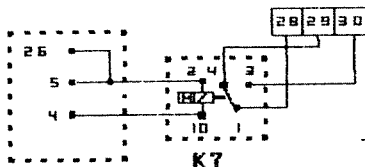


Relay 220 V ~

Signal output, floating

Collective fault, 600 s delay

For DBK/E el . . . EM and DB/E el 42 - 282, 845 EM



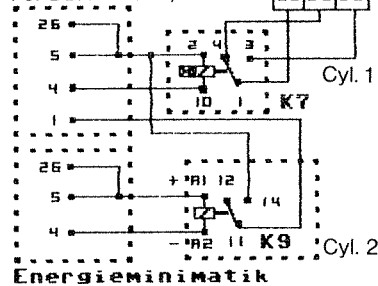
Time relay 24 V =

Energie-Minimatik

Signal output, floating

Collective fault, 600 s delay

For DB/E el 562, 890 EM



Time relay 24 V =

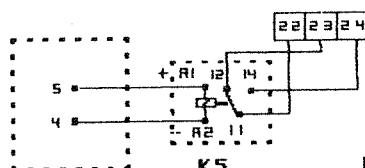
Relay 24 V =

Energieminimatik

Signal output, floating

Cyl. max. level

For DBK/E el . . . EM and DB/E el 42 - 282, 845 EM



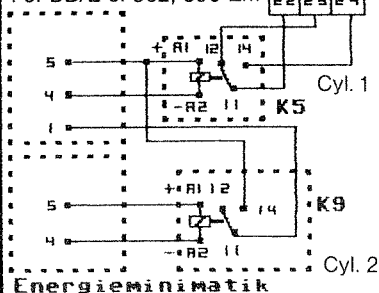
Relay 24 V =

Energie-Minimatik

Signal output, floating

Cyl. max. level

For DB/E el 562, 890 EM



Relay 24 V =

Relay 24 V =

Energieminimatik

Diagram 8317

Connection of universal adapter b12 and signal outputs
HYGROMATIK DB/K/M/E el

6. Commissioning

6.1. Check that all threaded cable fittings are tight.

6.2. Clear "ready":

Insert the main fuses in accordance with table 4. f) Main switch ON (if fitted by customer), turn the water feed on – operating pressure 1 to 10 bar, set the hyrostat or proportional regulator on max. moisture demand.

6.3. Cold starting

Control switch – ON, green indicator lamp in the switch rocker – ON, green indicator LED "operating" – ON, yellow indicator LED "filling" – ON, the solenoid valve opens and feeds tap water into the steam cylinder. As soon as the electrodes become immersed, the current begins to increase from 0 up to the rating (given on the type label) since the limiting potentiometer on the "Energie-Minimatik" electronics is set on "max." in the works.

If the current rating is exceeded by more than 30% the active immersed area of the electrodes is reduced by draining off some of the water (pump – ON, yellow indicator LED "deconcentration") until the rating is reached again.

When the conductivity of the water is normal, steam production recommences within a few minutes.

As soon as the solenoid valve tops up with water periodically, operation with constant rating is achieved and the cold-starting procedure finished.

6.4. In the case of humidifiers with 2 steam cylinders each cylinder is brought into operation individually in accordance with the above instructions. There are 2 of all the operating, control and indicating elements.

6.5. Limiting of the output to within 10 and 100% of the rating of the humidifier or cylinder.

The output of each steam cylinder can be set independently on a value between 10 and 100% by adjusting the output potentiometer on the "Energie-Minimatik".

The A values and associated steam outputs are in accordance with diagrams 8314 – 6.5.1.

Note:

DBM/E el and DBK/E el are equipped with "K-Elektronik" – green "humidifying" lamp, red max. level LED, no Ammeter. Limiting of output by poti 10 – 100%.

Note for proportional regulation

When the unit is equipped with universal adapter b12 the output-limiting potentiometer of the "Energie-Minimatik" is ineffective (the adjusting shaft is therefore removed from the pcb). A standard limit on the output is set for all the steam cylinders with the potentiometer on the universal adapter – works setting = max. value.

Exception; sequential control:

In the case of sequential control (special model) one universal adapter is fitted for each steam cylinder to allow the corresponding outputs to be limited individually.

6.6. LED signal for cylinder level (red, continuous)

When the conductivity of the water is low the cylinder is filled up to the maximum limiting electrode B1 during cold starting, without the rated current or the rated output being reached. This operating condition is indicated by the red LED "Cyl. level", the water feed being deliberately interrupted at the same time. With continuing vaporisation and the consequent increase in the conductivity of the water the indication is cancelled automatically and the rated output reached automatically after operation for some time.

6.6.1. LED signal for deconcentration fault (red, intermittent)

A monitoring function for draining is integrated in the "EM". If drainage does not take place, the pump runs for a maximum of up to 60 seconds. If drainage is still not detected within this period, e.g. as the result of clogged cylinder filter, defective pump or blocked hoses, the humidifier is switched off by the "EM" and the red LED "Cyl. max. level" flashes (double-function: continuous signal = cylinder max. level, intermittent signal = deconcentration fault). The drain system has to be checked. After commissioning the indication will be cancelled.

6.7. Deconcentration

The "Energie-Minimatik" decides automatically when dilution of the concentration in the steam cylinder is required. Only the minimum possible volume of water is drained each time. The losses for normal tap water are between 7 and 15% of the humidification rating. About 2 l of hot water are output temporarily for each deconcentration cycle.

6.7.1. Complete drainage

Depending on the water quality a complete drainage of the cylinder water takes place approx. once a week (3 – 8 days).

Note: In case of water qualities with low conductivity (condensate, demineralized water) this function must be cancelled (please contact HYGROMATIK).

6.8. Tighten electrodes

Electrodes should be tightened after approx. 30 min. of first commissioning by turning the nut 1/4 – 1/2 cycle. This will avoid possible leakages.

7. Maintenance

In the interests of fault-free operation regular maintenance is to be carried out – at least once a year. The work is mainly limited to the removal from the steam cylinder, water drain hose and deconcentration pump of hardness-causing salts accumulated during vaporisation, and checking of the large-area electrodes, which are subject to normal wear.

The operating characteristics and maintenance intervals of the HYGROMATIK essentially depend on the quality of the water used (total hardness, conductivity) and the volume of steam generated during each interval.

When normal quality water is used the first service is to be carried out after an operating time of about 4 to 8 weeks. Different water qualities can increase or reduce the period. The residue found in the steam cylinder gives an indication of the maintenance interval required for the future. The maintenance intervals can also be suitably monitored with counters for the number of operating hours. These can be fitted in the works or retrofitted.

The latest point in time at which a cylinder can be serviced after a long operating period is indicated by the red LED "Cyl. level".

Instructions for the most important checking procedures are given below.

7.1. Cleaning of steam cylinder – diagram 7.3.1.

a) Pressing the button marked "drain steam cylinder" on the "Energie-Minimatik" resp. "pump" on the "K-Elektronik" causes the deconcentration pump to immediately drain the water in the cylinder.

b) Disconnect the humidifier from the mains – main switch – OFF, remove the main fuse.

c) Pull the electrode plugs out.

d) Lift the cylinder out of the base and the strap on the back.

e) Remove the clamps from the cylinder flange and open the cylinder.

f) Remove all the loose hardness-causing salts. Solid encrustations can be removed with a commercial lime solvent – a 1 kg tin of de-liming powder for mixing with water is available from HYGROMATIK at a reasonable price. The large-area electrodes do not have to be polished to a bright metallic finish, it is sufficient of remove the loose coating mechanically.

g) Check the top of the cylinder for encrustations and any electrical bridging (black grooves) between the electrode sleeves – on the inside – and wash them off completely. If electrical bridges have penetrated deeply into the material the top part must be replaced.

h) Clean the cylinder filter.

i) Give the 5 mm dia. sensor electrode in the top part of the cylinder a bright metallic finish. Reassemble and install in the HYGROMATIK in the reverse order.

j) Every time the cylinder is opened the flange and base O-rings are to be replaced with solvent-free HYGROMATIK grade spares.

7.2. Unequal electrode consumption

When consumption is unequal the lengths of the electrodes are to be equalised.

7.3. Replacement of electrodes – diagram 7.3.1.

The electrodes are subject to normal operating wear, their life depending on the aggressivity of the feedwater used and the number of operating hours. In general, a comparatively long life is achieved with the highgrade, stainless steel HYGROMATIK electrodes. The latest point in time at which electrodes may be changed is reached when, after cleaning a cylinder, the red "Cyl. level" LED comes on and the rated current is no longer reached.

Otherwise, the unused electrode area still available for further steam generation, or the fact that no significant area remains available and replacement is necessary, can be recognised from the coating of harness – causing salts on the electrodes – approximately corresponding to the immersion depth.

The original lengths of stainless-steel, large-area HYGROMATIK electrodes are:

Type DB/E el 42 – 562 = 235 mm, Type DBM/E el = 125 mm
Type DBK/E el = 155 mm, Type DB/E el 845 – 890 = 300 mm
When the electrodes are replaced all the O-rings are to be replaced with original HYGROMATIK grade spares.

Nuts with pin, nuts, plain washers, serrated lock washers and O-rings are to be assembled in the correct order in accordance with diagram 7.3.1. Electrodes are not to be tightened too firmly by the nuts, which then will be fixed by the nuts with pin. Check for leaks after 30 min. of operation (see 6.8.).

7.4. Operation with softened water

Supplied the HYGROMATIK with softened water risks formation of salt bridges between the electrodes or between an electrode and an electrode sleeve on the inside of the top part of the cylinder. The electrical flashovers caused by this can be recognised by the black grooves. The top part must then be replaced otherwise the material suffers further damage and short circuits occur, which lead to the main fuses being blown.

7.5. Cleaning of the draining system and pump – diagram 7.3.1. Remove residues from the drain hoses and pump (bayonet fitting). It may be necessary to replace the pump impeller, O-ring, shaft seal or body if these parts are no longer in perfect condition.

7.6. Cleaning the inlet solenoid valve and filter – diagram 7.3.1. a) Pull out the cable plug, remove the solenoid valve, the coil (bayonet fitting) and any residue from the valve bore.

b) When there is a leak between the metal plate and plastic casing replace the O-ring.

c) Remove the gauze filter from the inlet and clean – diagram 7.3.1.

d) Check the water feed hose for leaks.

7.7. Visual check

of all the electrical and mechanical components, cables, plugs etc.

7.8. Threaded cable fittings

Check that all the threaded cable fittings are tight.

7.9. Functional check

Set the humidifier in operation and run it for several minutes at maximum output if possible. Turn the regulator or stepped switching from "max." to "min.". Check the safety devices.

8. Faults, their causes and elimination.

Some notes on rapid detection.

8.1. Red indicator LED "Cyl. level" (continuous signal)

a) After a long operating period, when the cylinder is filled and the electrodes closed in by deposits, the water level climbs continuously until the LED comes on. Clean the steam cylinder in accordance with 7.1.

b) Due to electrode wear the water level increases until the indicator comes on, first periodically and then continuously. Replace the electrodes in accordance with 7.3.

c) The solenoid valve is open all the time or does not close properly. Check the sealing function by switching off electrically with the control switch. Check the water pressure, it is not to exceed 10 bar.

Carry out mechanical cleaning in accordance with 7.6.

Give the sensor electrodes in the steam cylinder a bright metallic finish in accordance with 7.1. i).

d) The overload function of the "Energie-Minimatik" is not working.

Drain the humidifier by pressing the button and start up from cold again.

e) The water conductivity is too low from time to time, e.g. with combined networks:

the "Energie-Minimatik" provides automatic adaptation after a lengthy operating period.

8.1.1. Red indicator LED "deconcentration fault" (intermittent signal)

This additional supervising system indicates faulty function of draining and switches off the unit, see 6.6.1. Check the whole drain system particularly the pump (push button).

8.2. Main fuses blow

correct fuse sizes? (see 4. f)

if they blow again check the inside of the top part of the steam cylinder for short-circuit bridges (see 7.1. g.)

8.11. Check-list

Stepped regulation

1) Check voltage if appliance is switched off

– main switch off:

L 1 – L 2 e. g. 380 V ~

L 1 – L 3

L 1 – L 3

2) Check trafo voltage

in: e. g. 220 V ~

out: always 24 V ~

3) Check control voltage – e. g. 220 V ~

N – 1 Control voltage

N – 2 System interlocking and 1. step

N – 3 2. step

N – 4 3. step

N – 5 4. step

4) Operation with nominal capacity:

Switch on highest regulation step – after some minutes nominal capacity and current acc. to type label.

Except: red LED cyl. max. level on – see 8.1.

5) Check pump:

Switch on/off the main switch several times (with 5 sec. delay) – cylinder emptied. Note pumping noises.

6) Cold start:

Main switch on – steaming – see 6.3.

7) If main fuses blow – see 8.2.

8.3 All the indicator LEDs and the green control switch lamp not functioning

5 A quick-acting control fuse (fine-wire fuse 5 x 20 mm) in the terminal block defective "Kompakt-Elektronik" units 2,5 A.

8.4. Indicator LEDs not functioning

0.5 A quick-acting control fuse (fine-wire fuse 5 x 20 mm) on the "Energie-Minimatik" pcb defective.

8.5. Ammeter indicates more than 1.3 times the rated current

The over-current protection of the "Energie-Minimatik" ensures that the rated current can only be exceeded by about 30%. The current is brought back to the rating by draining some of the water from the cylinder with the deconcentration pump. Check this by resetting the output potentiometer on the "Energie-Minimatik" – the pump must run for a short period immediately.

8.6. Ammeter indicates insufficient current or steam output too low

a) The output potentiometer of the "Energie-Minimatik" is not set on max. Check main fuses.

b) Proportional or stepped regulation is operating in the partial load region.

c) The steam output has not reached its maximum at the moment since the red indicator LED "Cyl. level" is coming on at the same time (see 8.1.).

8.7. Water coming out of the drain hose

a) The humidifier is going through the normal 5 to 20 sec blow-down cycle, resp. complete drainage 60 sec.

b) The overload limiter is draining the unit for safety reasons.

c) Stepped switching: switching back from higher levels. The output is being matched by blowing down.

d) Proportional regulation. The proportional signal is reducing rapidly over a larger region – output is being matched up by blowing down.

e) The back pressure in the air duct is too high.

f) There is a sag or a kink in the steam hose.

g) The steam solenoid valve (optional extra) has not opened.

8.8. Cylinder filled with black sludge or residues

The drain hose, pump or cylinder filter is dirty.

When the **HYGROMATIK** is supplied with normal tap water a deconcentration cycle must take place every 1 to 3 operating hours.

8.9. Electrodes wearing within a short period

In spite of the fact that stainless steel, large-area electrodes are used there may be components in the tap water that lead to premature wear of the electrodes. If this happens consult your nearest **HYGROMATIK** dealer.

8.10. "Energie-Minimatik"

If operation is not in accordance with the program the following checks are to be carried out before consulting the nearest **HYGROMATIK** dealer:

a) Check the 0.5 A (quick-acting) control fuse on the pcb,

b) there must be a voltage of about 24 V AC between terminals A and B,

c) there must be a voltage of about 24 V DC between terminals 1 and 3.

Proportional regulation

1) Check voltage if appliance is switched off

– main switch off:

L 1 – L 2 e. g. 380 V ~

L 1 – L 3

L 2 – L 3

2) Check trafo voltage

in: e. g. 220 V ~

out: always 24 V ~

3) Check control voltage – e. g. 220 V ~

N – 1 Control voltage

N – 2 System interlocking.

4) Check on/off contact of uni-adaptor b12:

If regulation signal lower than 10% of max. –

the appliance must switch off (see diagram 8315).

5) Check regulation signal:

Disconnect the regulation (terminal 16 – 21 free).

Measure the regulation signal at the free cables.

100% signal \approx 100% capacity.

6) Operation with nom. capacity:

Connection between terminal 1 – 2, Poti of b12 on 100% –

after some minutes nominal capacity and current acc. to

type label. (No connection on Terminal 16 – 21).

Except: red LED cyl. max. level on – see 8.1.

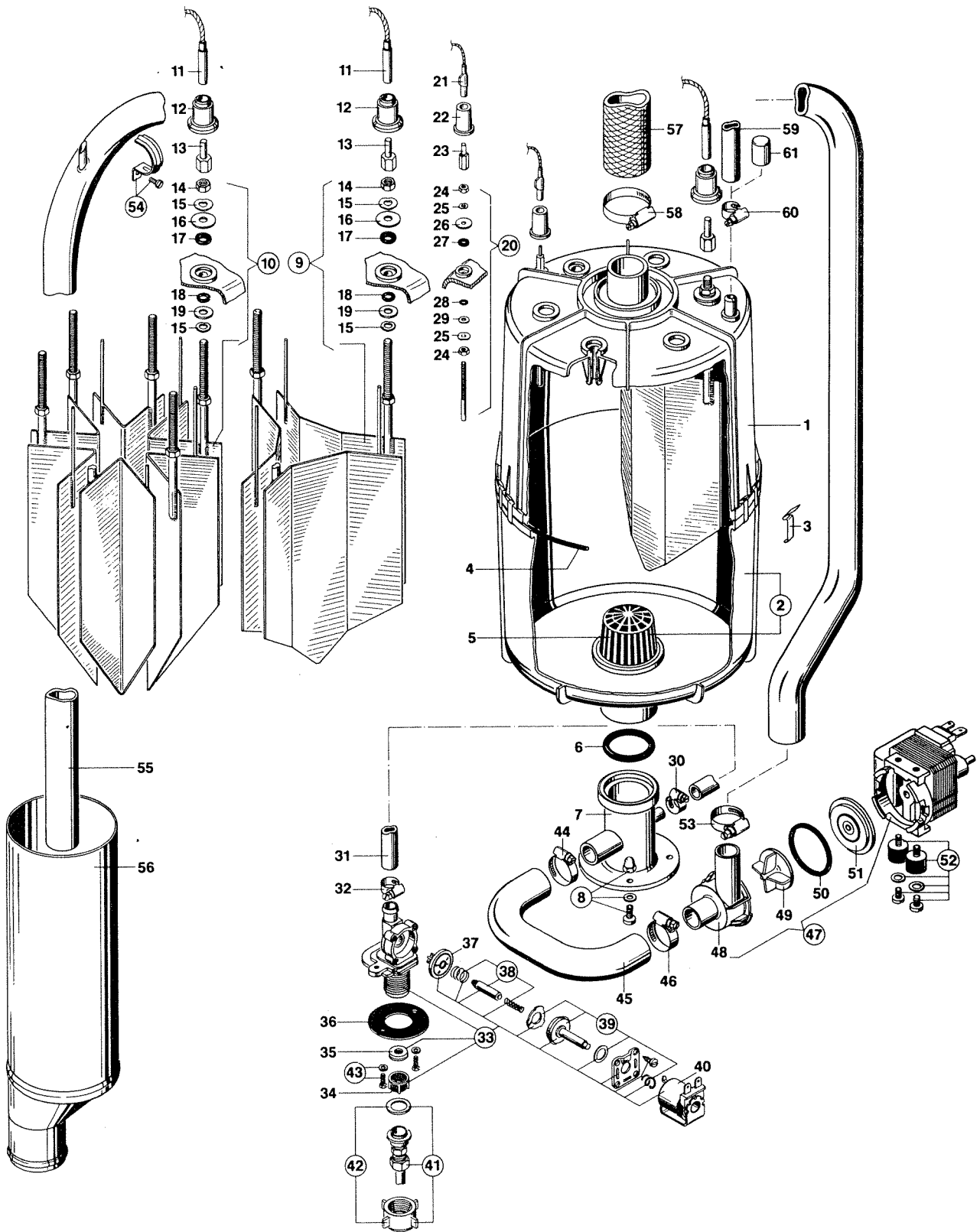
7) Check pump:

Switch on/off the main switch several times (with 5 sec. delay) – cylinder emptied. Note pumping noises.

8) Cold start:

Main switch on – steaming – see 6.3.

9) If main fuses blow – see 8.2.



DBM/E, DBK/E, DB/E el 42/82/132 K/Em=3 electrodes
 DB/E el 62,182 - 890=6 electrodes

Diagram
7.3.1.

Assembly drawing of cylinder, pump, solenoid valve and hoses
HYGROMATIK DB/K/M/E el

Spare parts list DB/E el

Item No.	Diagram 7.3.1.	DB/E el 62	DB/E el 42	DB/E el 82	DB/E el 132	DB/E el 182	DB/E el 282	DB/E el 845	DB/E el 562	DB/E el 890	Art.-No.	Description
		1	1	1	1	1	1		1		E-2106031	Main group 21 – cabinet
											E-2106032	Cabinet DB el 62/42/82/132 beige/light beige, empty
											E-2106033	Cabinet DB el 182/282 beige/light beige, empty
								1			E-2107010	Cabinet DB el 562 beige/light beige, empty
										1	E-2107020	Cabinet DB el 845 beige/light beige, empty
											E-2106035	Cabinet DB el 890 beige/light beige, empty
		1	1	1	1	1	1				E-2106036	Front panel for steam section incl. quick-release fastener
											E-2106037	Front panel for steam section incl. quick-release fastener
											E-2107011	Front panel for steam section incl. quick-release fastener
											E-2107021	Front panel for steam section incl. quick-release fastener
		1	1	1	1	1	1				E-2106039	Front panel for steam section incl. quick-release fastener
											E-2106040	E-panel, swivelling, for electrical control system
											E-2106041	E-panel, swivelling, for electrical control system
											E-2107012	E-panel, swivelling, for electrical control system
											E-2107022	E-panel, swivelling, for electrical control system
											E-2106043	E-panel, swivelling, for electrical control system
											E-2107023	Base plate for electrical control system, fixed to back panel of cabinet
		2	2	2	2	2	2	2	3	3	E-2104014	Base plate for electrical control system, fixed to back panel of cabinet
		1	1	1	1	1	1	1	1	1	E-2104015	Quick-release fastener for front panel or E-panel
		1	1	1	1	1	1	1	1	1	E-2105016	Key for quick-release fastener
											E-2103017	Complete set of cable entry fittings for connecting cable
											E-2107014	Complete set of cable entry fittings for connecting cable
											E-2107024	Complete set of cable entry fittings for connecting cable
											E-2101019	Complete set of cable entry fittings for connecting cable
											E-2102020	Steam section retaining bracket for split-model DBE el 182 – 282
											E-2107015	Steam section retaining bracket for split-model DBE el 562
											E-2107025	Steam section retaining bracket for split-model DBE el 845
											E-2101022	Steam section retaining bracket for split-model DBE el 890
		1	1	1	1	1	1	1	1	1	E-2102023	E-panel, blank, for split-model DBE el..EM
		1	1	1	1	1	1	1	1	1	E-2101020	E-panel, blank, for split-model DBE el..EM
		1	1	1	1	1	1	1	1	1	E-3116038	Steam section retaining bracket for split-model DBE el 62, 42 – 132
												E-panel, blank, for split-model DBE el..K
		1	1	1	1	1	1	1	2	2	B-2206067	Main group 22 – steam generation
											B-2206065	Steam cylinder transp. compl. with electr., DB el 62, ready for installation
											B-2206066	Steam cylinder transp. compl. with electr., DB el 42/82/132, ready for installation
											B-2207000	Steam cylinder transp. compl. with electr., DB el 182 – 562, ready for installation
											E-2206088	Steam cylinder transp. compl. with electr., DB el 845 – 890, ready for installation
1	1	1	1	1	1	1	1	1	2	2	E-2206088	Top part of steam cylinder, empty, DB el 62
1	1	1	1	1	1	1	1	1	2	2	E-2206068	Top part of steam cylinder, empty, DB el 42/82/132
1	1	1	1	1	1	1	1	1	2	2	E-2206069	Top part of steam cylinder, empty, DB el 182 – 562
2	1	1	1	1	1	1	1	1	2	2	E-2207001	Top part of steam cylinder empty, DB el 845 – 890
2	1	1	1	1	1	1	1	1	2	2	B-2206046	Lower part of steam cylinder compl. with filter, DB el 42 – 132
											B-2206071	Lower part of steam cylinder compl. with filter, DB el 182 – 562
											B-2207002	Lower part of steam cylinder compl. with filter, DB el 845 – 890
											B-2206085	Top part of steam cylinder compl. with electr., DB el 62
											B-2206086	Top part of steam cylinder compl. with electr., DB el 42, 82, 132
											B-2206087	Top part of steam cylinder compl. with electr., DB el 182 – 562
											B-2207003	Top part of steam cylinder compl. with electr., DB el 845 – 890
9	10	1	1	1	1	1	1	1	2	2	B-2205008	Set of 3 electrodes compl. with O-rings and washers, for steam generation, type DB 2/3
10	16	1	1	1	1	1	1	1	2	2	B-2205009	Set of 6 electrodes compl. with O-rings and washers, for steam generation, type DB 2/6
16	10	6	3	3	3	6	6	6	12	12	B-2207005	Set of 6 electrodes compl. with O-rings and washers, for steam generation, type DB 10
16	16	6	3	3	3	6	6	6	12	12	E-2204011	Large plain washer for steam generating electrode, ϕ 8 mm, DB el 42 – 562
16	16	6	3	3	3	6	6	6	12	12	E-2204012	Small plain washer for steam generating electrode, ϕ 8 mm, DB el 42 – 562
13	13	6	3	3	3	6	6	6	12	12	E-2207006	Large plain washer for steam generating electrode, ϕ 10 mm, DB el 845 – 890
13	13	6	3	3	3	6	6	6	12	12	E-2207007	Small plain washer for steam generating electrode, ϕ 10 mm, DB el 845 – 890
15	15	12	6	6	6	12	12	12	24	24	E-2204014	Nut with contact pin, M8 for steam generating electrode DB el, DB el 42 – 562
15	15	12	6	6	6	12	12	12	24	24	E-2207010	Nut with contact pin, M10 for steam generating electrode DB el 845 – 890
4	4	1	1	1	1	1	1	1	2	2	E-2204016	Serrated washer ϕ 8 mm, steam generating electrode DB el 42 – 562
4	4	1	1	1	1	1	1	1	2	2	E-2207008	Serrated washer ϕ 10 mm, steam generating electrode DB el 845 – 890
4	4	1	1	1	1	1	1	1	2	2	E-2206050	O-ring seal for cylinder flange, transparent cyl., DB el 42 – 132
17	17	6	3	3	3	6	6	6	12	12	E-2206051	O-ring seal for cylinder flange, transparent cyl., DB el 182 – 562
17	17	6	3	3	3	6	6	6	12	12	E-2207011	O-ring seal for cylinder flange, transparent cyl., DB el 845 – 890
18	18	6	3	3	3	6	6	6	12	12	E-2204020	Large O-ring seal for steam generating electrode, outside, ϕ 8 mm, DB el 42 – 562
											E-2207012	Large O-ring seal for steam generating electrode, outside, ϕ 10 mm, DB el 845 – 890
											E-2204026	Small O-ring seal for steam generating electrode, inside, ϕ 8 mm, DB el 42 – 562
											E-2207013	Small O-ring seal for steam generating electrode, inside, ϕ 10 mm, DB el 845 – 890
											B-2206053	Complete set of O-rings for transp. cyl., flange, base, all electrodes, DB el 42/82/132
											B-2206054	Complete set of O-rings for transp. cyl., flange, base, all electrodes, DB el 182 – 562
											B-2206055	Complete set of O-rings for transp. cyl., flange, base, all electrodes, DB el 62
											B-2207014	Complete set of O-rings for transp. cyl., flange, base, all electrodes, DB el 845 – 890
6	8	1	1	1	1	1	1	1	2	2	E-2204022	O-ring seal for cyl. base
8	8	1	1	1	1	1	1	1	2	2	E-2204023	Drain filter
12	12	6	3	3	3	6	6	6	12	12	E-2204025	Nut/bolt for fixing cyl. base
12	12	6	3	3	3	6	6	6	12	12	E-2204028	Cap for plug-in contact of steam generating electrode, DB el 42 – 562
61	61	1	1	1	1	1	1	1	2	2	E-2207015	Cap for plug-in contact of steam generating electrode, DB el 845 – 890
12	12	1	1	1	1	1	1	1	2	2	E-2204035	Condensate plug
14	14	6	3	3	3	6	6	6	12	12	E-2206052	Base for steam cyl., short, 90 mm
14	14	1	1	1	1	1	1	1	2	2	E-2206057	Nut for nut with contact pin for steam generating electrode, M 8, DB el 42 – 562
24	24	1	1	1	1	1	1	1	2	2	E-2207009	Nut for nut with contact pin for steam generating electrode, M 10, DB el 845 – 890
23	23	1	1	1	1	1	1	1	2	2	E-2206058	Nut for nut with contact pin for sensor electrode, M 5, DB el 42 – 890
22	22	1	1	1	1	1	1	1	2	2	E-3216030	Nut with contact pin, M 5 for sensor electrode
11	11	6	3	3	3	6	6	6	12	12	E-3216014	Cap for plug-in contact of sensor electrode, DB el 42 – 890
11	11	6	3	3	3	6	6	6	12	12	E-2206059	Plug-in contact with insulating hose for steam generating electrode, DBE el 42 – 562
20	20	1	1	1	1	1	1	1	2	2	E-2207016	Plug-in contact with insulating hose for steam generating electrode, DBE el 854 – 890
21	21	1	1	1	1	1	1	1	2	2	B-2206061	Sensor electrode compl. with O-rings and washers, max. limit., 5 mm
3	3	18	18	18	18	24	24	24	48	48	E-3216025	Plug-in contact with insulating hose for sensor electrode, DBE el 42 – 890
											E-3216022	Clamp for flange of transparent cylinder
												Main group 23 – water feed
31	31	1	1	1	1	1	1	1	2	2	B-2305013	Connecting hose, solenoid valve – cyl. base, 1500 mm, DB el 42 – 562
30/32	30/32	2	2	2	2	2	2	2	4	4	B-2307000	Connecting hose, solenoid valve – cyl. base, 1950 mm, DB el 845 – 890
33	33	1	1	1	1	1	1	1	2	2	E-2304015	Clamp for connecting hose solenoid valve – cyl. base
33	33	1	1	1	1	1	1	1	2	2	E-2304017	Solenoid valve DB el 42 – 562, servo, 0,2 – 10 bar
41	41	1	1	1	1	1	1	1	2	2	E-2307001	Solenoid valve DB el 845 – 890, servo, 0,2 – 10 bar
40	40	1	1	1	1	1	1	1	2	2	B-2304024	Threaded inlet fitting for 10 mm dia. pipe compl. with plastic union nut
38	38	1	1	1	1	1	1	1	2	2	E-2304034	Solenoid valve coil with bayonet fitting ϕ 8 mm
39	39	1	1	1	1	1	1	1	2	2	B-2304038	Valve piston with springs
34	34	1	1	1	1	1	1	1	2	2	B-2304039	Piston coating, valve cover, coil-spring
42	42	1	1	1	1	1	1	1	2	2	E-2304029	Fine filter in the inlet fitting of solenoid valve
37	37	1	1	1	1	1	1	1	2	2	B-2304030	Plastic union nut with seal for inlet fitting of solenoid valve
											E-2304031	Membrane for solenoid valve, servo
												Main group 24 – water drain
55	55	1	1	1	1	1	1	1	2	2	E-2404003	Pump drain hose, DN 15, DB el 42 – 562
45	45	1	1	1	1	1	1	1	2	2	E-2407000	Pump drain hose, DB el 845 – 890
45	45	1	1	1	1	1	1	1	2	2	E-2404002	Drain hose from base to pump, DN 25, DB el 42 – 562
46/44/55	47	3	3	3	3	3	3	3	6	6	E-2407001	Drain hose from base to pump, DB el 845 – 890
50	50	1	1	1	1	1	1	1	2	2	E-2404004	Clamp for drain hose, from base to pump
51	51	1	1	1	1	1	1	1	2	2	B-2404005	Drain pump without mounting-set

Spare parts list DB/E el

Item No. Diagram 7.3.1.	DB/E el 62	DB/E el 42	DB/E el 82	DB/E el 132	DB/E el 182	DB/E el 282	DB/E el 845	DB/E el 562	DB/E el 890	Art.-No.	Description
48	1	1	1	1	1	1	1	2	2	E-2404008	Main group 24 – water drain
49	1	1	1	1	1	1	1	2	2	E-2404009	Body for drain pump
54	1	1	1	1	1	1	1	2	2	E-3416003	Impeller for drain pump
52	1	1	1	1	1	1	1	2	2	B-2404014	Fastening clamp for drain hose, DB el 42 – 890
54	1	1	1	1	1	1	1	2	2	E-3416005	Mounting-set for drain pump incl. resilient blocs
											Fastening clamp for drain hose, for split-models, DBE el
	1	1	1	1	1	1	1	2	2	B-2504101	Main group 25 – electrical control system
		1	1	1	1	1	1	2	2	B-2504201	Control switch with green indicator lamp, single-pole
		1	1	1	1	1	1	2	2	E-2501104	Special control switch with green indicator lamp, 2-pole, for mains without N
										E-2505105	Ammeter, 20 A
										E-2505106	Ammeter, 40 A
										E-2501006	Ammeter, 60 A
										E-2505007	Main contactor, 20 A
										E-0505009	Main contactor, 40 A
										E-2504008	Main contactor, 60 A
										E-2504023	Auxiliary relay, 220 V – 3-pole, plug-in type
										E-2501028	Socket for auxiliary relay and universal adapter b12
										E-2507008	Connecting cable for solenoid valve cylinder 1 and 2, L = 1300 mm, DB el 42 – 562
										E-2505030	Connecting cable for solenoid valve cylinder 1, L = 1500 mm, DB el 845 – 890
										E-2504031	Connecting cable for solenoid valve cylinder 2, L = 2000 mm, DB el 890
										E-2503032	Connecting cable for drain pump, cylinder 1 and 2, L = 1300 mm, DB el 42 – 562
										E-2506034	Connecting cable for drain pump, cylinder 1 and 2, L = 2000 mm, DB el 845 – 890
										E-2506035	Connecting cable for sensor electrodes with plug-in contact, cyl. 1 and 2, DB el 42 – 562
										E-2504036	Connecting cable for sensor electrodes with plug-in contact, cyl. 1 and 2, DB el 845 – 890
										E-2505037	Set of 3 connecting cables for electrodes with plug-in contact, cylinder 1, DB el 42 – 562
										E-2507009	Set of 6 connecting cables for electrodes with plug-in contact, cylinder 2, DB el 562
										E-2507010	Set of 6 connecting cables for electrodes with plug-in contact, cylinder 1, DB el 845 – 890
										E-2504039	Set of 6 connecting cables for electrodes with plug-in contact, cylinder 2, DB el 890.
										E-2504079	Control fuse, 5 A, 5 x 20 mm
										E-2504041	Holder for control fuse
										E-2504044	U-retainer for universal adapter b12
										E-2504045	Connecting cable, terminal block to main contactor
										E-2507011	Connecting cable, terminal block to main contactor
										E-2505048	Connecting cable, terminal block to main contactor
										E-2505049	Toroidal instrument transformer MI 30
										B-2504077	Toroidal instrument transformer MI 45
										B-2504078	Terminal block, complete
										B-2507012	Terminal block, complete
										E-2504062	Terminal block, complete
										E-2505121	Time relay, 24 V – 600 sec
										E-2505132	Cover for electronics
										E-2505133	Electronics pcb, „Energie-Minimatik“ for DB el 62, 42 – 890
										E-2504141	Electronics pcb, „Energie-Minimatik“ for DBE el 62, 42 – 890
										E-2504151	Universal adapter b12 for proportional regulation with residual humidification contact, input signals: 2 – 10 V/mA, 4 – 20 V/mA, 30 – 140 Ω
										E-2506152	Transformer 220/24 V
										E-2506153	Transformer, 200/24 V
											Transformer, 240/24 V
										E-2604001	Main group 26 – accessories
										E-2604002	Duct nozzle, 295 mm, 25 dia.
										E-2604003	Duct nozzle, 395 mm, 25 dia.
										E-2604004	Duct nozzle, 595 mm, 25 dia.
										E-2604005	Duct nozzle, 795 mm, 25 dia.
										E-2604006	Duct nozzle, 1000 mm, 25 dia.
										E-2604007	Duct nozzle, 295 mm, 40 dia.
										E-2604008	Duct nozzle, 395 mm, 40 dia.
										E-2604009	Duct nozzle, 595 mm, 40 dia.
										E-2604010	Duct nozzle, 795 mm, 40 dia.
										E-2604011	Duct nozzle, 1000 mm, 40 dia.
										E-2604012	Duct nozzle, 1400 mm, 40 dia.
										E-2604013	Steam hose, 25 dia., per m
										E-2604014	Steam hose, 40 dia., per m
										E-2404004	Condensate hose, 12 dia., per m
										E-2604016	Steam hose clamp, 25 dia.
										E-2304015	Steam hose clamp, 40 dia.
										E-2604019	Condensate hose clamp, 12 dia.
										E-2604020	Steam distributor T, 25 dia.
										E-2604021	Steam distributor T, 40 dia.
										B-2604022	Condensate distributor T, 12 dia.
										B-2604023	Fixings and accessories
										B-2604024	Fixings and accessories
										B-2607000	Fixings and accessories
										B-2607001	Fixings and accessories
										B-2604026	Fixings and accessories
										B-2604040	Steam solenoid valve, 0 – 0,4 bar, complete for 25 dia. steam hose
										E-2604029	Steam solenoid valve, 0 – 0,4 bar, complete for 40 dia. steam hose
										E-2604030	Hose nozzle, 25 dia.
										E-2604031	90° elbow, 25 mm, for extremely small bend radius
										E-2604034	Reducing piece 40 mm/25 mm
										E-2604036	90° elbow, 40 mm, for extremely small bend radius
										E-2604038	Drain hopper, 100 dia., 3 l capacity
											Clamp for hopper
										E-2701001	Main group 27 – fan units – number und type required per steam humidifier
										E-2705002	Housing DV 132, empty
										E-2705003	Housing DV 133, empty
										E-2701004	Housing DV 134, empty
										E-2705005	Front panel, blank, for DV 132 housing
										E-2705006	Front panel, blank, for DV 133 housing
										E-2701007	Front panel, blank, for DV 134 housing
										E-2705008	Air grill, adjustable, for DV 132
										E-2705009	Air grill, adjustable, for DV 133
										E-2701010	Air grill, adjustable, for DV 134
										E-2705011	Cross-current fan for DV 132
										E-2705012	Cross-current fan for DV 133
										E-2701013	Cross-current fan for DV 134
										E-2705014	Steam nozzle for DV 132
										E-2705015	Steam-nozzle for DV 133
										E-2704016	Steam-nozzle for DV 134
										E-2705017	Fabric reinforcement for steam nozzle
										E-2704018	Resilient mountings for the fan
										E-2704019	Retaining rods for steam nozzle
											Retaining rods for steam nozzle

Spare parts list DBK/E el, DBM/E el

- KOMPAKTELEKTRONIK -
- ENERGIE-MINIMATIK -

Item No. Diagram 7.3.1	DBM/E el 10/15/16/17	DBM el 10 -16 KV	DBK el 20 KV	DBK/E el 20/21/25/26/40/80	Art. Nb.	Description
Main group 31 – cabinet –						
			1	1	E-3116001	Cabinet DBK el, empty
			1	1	E-3116002	Front panel DBK el
			1	1	E-3117003	Front panel with cutting for blower
			1	1	E-3116004	Partition wall DBK el
		1			E-3117005	Retaining bracket for blower, DBM el
		1	1		E-3117006	Air grill
		1	1		E-3117007	Blower
		1	1		E-3117008	Steam nozzle
		1	1	1	E-3116009	Quick-release fastener
	2	2	2	2	E-3116010	Cable entry fitting for connection cable and humidistat cable
				1	E-3116012	Steam section retaining bracket for DBKE el
	1			1	E-2101022	E-panel blank, for split-model DBME el and DBKE el..EM
	1				E-3116031	Cabinet DBM el, empty
	1				E-3116032	Front panel DBM el
		1			E-3116033	Cabinet DBM el..KV, with integrated fan unit, empty, beige/light beige
	1	1			E-3116034	Partition wall DBM el
	1				E-3116035	Steam section retaining bracket for DBME el
	1				E-3116036	Special cabinet for split-model DBME, empty
	1				E-3116037	Insert door for cabinet E-3116036
	1			1	E-3116038	E-panel blank for split model DBME el und DBKE el..K
			1		E-3117009	Retaining bracket for blower, DBK el
Main group 32 – steam generation						
				1	B-3216001	Steam cylinder compl., DBK el – 3 phases
				1	B-3217002	Steam cylinder compl., DBK el – 1/2 phases, DBK/E el 20/21
				1	B-3217047	Steam cylinder compl., transp., DN 25, special for DBK el 40 kV
	1	1			B-3216041	Steam cylinder compl. DBM el
				1	B-3217048	Top part of steam cylinder, compl. with electrodes, transp., DN 25, special for DBK el 40 KV
				1	B-3216003	Top part of steam cylinder DBK el, with 3 electrodes
				1	B-3217004	Top part of steam cylinder DBK el, with 2 electrodes, DBK/E el 20/21
	1	1			B-3216042	Top part of steam cylinder compl. with electrodes, DBM el
1				1	E-3216005	Top part of steam cylinder DBK el, empty
1	1	1			E-3216043	Top part of steam cylinder DBM el, empty
			1	1	E-3216006	Top part of steam cylinder DBK el, empty, DBK/E el 20/21
2			1	1	B-3216007	Lower part of steam cylinder DBK el with filter
2	1	1			B-3216044	Lower part of steam cylinder DBM el, with filter
9				1	B-3216008	Set of 3 electrodes for DBK el
				1	B-3217009	Set of 2 electrodes for DBK/E el 20/21
9	1	1			B-3216045	Set of 3 electrodes for DBM el
4			1	1	E-3216010	O-ring seal for steam cylinder flange DBK el
4	1	1			E-3216046	O-ring seal for steam cylinder flange DBM el
6	1	1	1	1	E-3216011	O-ring seal for cylinder base DBK/DBM el
7	1	1	1	1	E-3216012	Base for steam cylinder DBK/DBM el
13	3	3	2	3	E-3216013	Nut with contact pin for steam generating electrode M 5
12/22	4	4	3	4	E-3216014	Cap for plug-in contact of electrodes
15/25	8	8	6	8	E-3216015	Serrated washer, ø 5 mm
16/26	4	4	3	4	E-3216016	Large plain washer, ø 5, electrodes, outside
19/29	4	4	3	4	E-3216017	Small plain washer, ø 5, electrodes, inside
17/27	4	4	3	4	E-3216018	O-ring seal, ø 5, electrodes, outside
18/28	4	4	3	4	E-3216019	O-ring seal, ø 5, electrodes, inside
20	1	1		1	B-3216020	Sensor electrode compl. with O-rings and washers for max. limit., DBM/E el..K/KV/EM, DBK/E el 25 – 80 K/KV/EM
				1	B-3216028	Sensor electrode compl. with O-rings and washers for max. limit., DBK/E el 20 – 21 K/KV/EM
23	1	1	1	1	E-3216030	Nut with contact pin for sensor electrode, M 5
61	1	1	1	1	E-3216021	Condensate plug
3	12	12	12	12	E-3216022	Clamp for cylinder flange
11	3	3	2	3	E-3216024	Plug-in contact with insulating hose for steam generating electrode, DBKE/DBME el
21	1	1	1	1	E-3216025	Plug-in contact with insulating hose for sensor electrode, DBKE/DBME el
14/24	4	4	3	4	E-3216026	Nut for nut with contact pin, M 5
5	1	1	1	1	E-2204023	Drain filter
Main group 33 – water feed						
33	1	1	1	1	E-3316001	Solenoid valve, 0.2 – 10 bar, edge-model, servo
41	1	1	1	1	B-2304024	Threaded inlet fitting for 10 mm dia. pipe compl. with plastic union nut
42	1	1	1	1	B-2304030	Plastic union nut with seal for inlet fitting of solenoid valve
34	1	1	1	1	E-2304029	Fine filter in the inlet fitting of solenoid valve
40	1	1	1	1	E-2304034	Coil for solenoid valve
38	1	1	1	1	B-2304038	Valve piston with springs
39	1	1	1	1	B-2304039	Piston coating, valve cover, coil-spring
31	1	1	1	1	B-3316002	Connecting hose solenoid valve/cylinder
30/32	2	2	2	2	E-2304015	Clamp for connecting hose, ø 12
33				1	E-3316004	Solenoid valve, 0.2 – 10 bar, straight-model, servo, DBKE el
37	1	1	1	1	E-2304031	Membrane for solenoid valve, servo
Main group 34 – water drain –						
55			1	1	E-3416001	Pumpe drain hose DN 25/15, DBK/E el
55	1	1			E-3416023	Pumpe drain hose DN 25/15, DBM/E el
45			1	1	E-3416002	Drain hose from base to pump, DBK el
45	1	1			E-3416021	Drain hose from base to pump, DBM el
45					E-3416022	Special drain hose from base to pump, 90°, DBME el
54	2	2	2	2	E-3416003	Fastening clamp for pump drain hose
44	1	1	1	1	E-3616006	Clamp for drain hose, cylinder base
46/53	2	2	2	2	E-2404004	Clamp for drain hose, pump
47	1	1	1	1	B-2404005	Drain pump without mounting-set
52	1	1	1	1	B-2404013	Mounting-set for drain pump
50	1	1	1	1	E-2404006	O-ring seal for drain pump
51	1	1	1	1	E-2404007	Corrugated seal for drain pump
48	1	1	1	1	E-2404008	Body for drain pump
49	1	1	1	1	E-2404009	Impeller for drain pump
54	1				E-3416005	Fastening clamp for pump drain hose, split-models, DBME/DBKE el

Spare parts list DBK/E el, DBM/E el

- KOMPAKTELEKTRONIK -
- ENERGIE-MINIMATIK -

Item No. Diagram 7.3.1	DBM/E el 10/15/16/17	DBM el 10 -16 KV	DBK el 20 KV	DBK/E el 20/21/25/26/40/80	Art. Nq.	Description
Main group 35 – electrical control system –						
	1	1	1	1	B-2504101	Control switch with green indicator lamp, single pole
	1	1	1	1	E-2501006	Main contractor, 20 A
	1	1	1	1	E-2504151	Transformer 220 V/24 V
	1	1	1	1	E-3504025	Kompaktelektronik, 1-step
					E-3516005	Shunt 5 A
					E-3516006	Shunt 6.25 A
					E-3516007	Shunt 8 A
					E-3516008	Shunt 10 A
					E-3516015	Shunt 2.6 A
					E-3516016	Shunt 3 A
					E-3516003	Shunt 3.7 A
	1	1	1	1	E-3516020	Fuse 2,5 A
	1	1	1	1	E-3516009	Resistance pump
	1	1	1	1	E-3516010	Operation control lamp, green, 220 V
	1	1	1	1	E-3516011	LED red, cyl. max. level
	1	1	1	1	B-3516023	Terminal block, complete
	1	1	1	1	E-2504079	Holder for control fuse
11	1	1	1	1	E-3516013	Set of 3 connecting cables with plug-in contact for steam generating electrodes
					E-3516014	Connecting cable with plug, mains
11				1	E-3516017	Set of 2 connecting cables with plug-in contact for steam generating electrodes, DBK el 20 KV, DBKE el 20/21
21	1	1	1	1	E-3516018	Connecting cable with plug-in contact for sensor electrode
	1	1	1	1	B-3516021	Complete set of cables unless steam generating and sensor electrode cables, for DBM/DBK el . . K
Special electronics						
	1			1	E-2505133	Electronics pcb "Energie-Minimatik", for DBME el . . EM, DBK/E el . . EM
	1			1	E-2505121	Cover for electronics
	1			1	E-2505048	Torodial instrument transformer Mi 30
	1			1	E-2504141	Universal-adapter b12 for proportional regulation with residual humidification contact, input signals: 2 to 10 V/mA, 4 – 20 V/mA, 30 – 140 Ω
	1			1	E-2504041	U-retainer for universal adapter b12
				1	E-2504008	Auxiliary relay 220 V – 3-pole, plug-in type
	1			1	E-2504023	Socket for auxiliary relay and universal adapter b12
				1	E-2504062	Time relay 24 V – 600 sek.
	1			1	E-2501104	Ammeter 20 A
				1	B-2504201	Special control switch with green indicator lamp, 2-pole, for mains without N
				1	B-3516022	Complete set of cables unless steam generating and sensor electrode cables, for DBK el . . EM
Main group 36 – accessories –						
					E-3616001	Duct nozzle, 20 dia., 240 mm
					E-3616002	Duct nozzle, 20 dia., 350 mm
					E-3616003	Duct nozzle, 20 dia., 450 mm
					E-3616004	Steam hose, 20 dia.
					E-3616005	Condensate hose, 9 dia.
					E-3616006	Steam hose clamp, 20 dia.
					E-2304015	Condensate hose clamp, 20 dia.
					E-3616008	Steam distributor T, 20 dia.
					E-3616009	Condensate distributor T, 9 dia.
					B-3616010	Mounting-set, fixings and accessories for humidifier
					B-3616011	Steam solenoid valve, 0 to 0.4 bar, complete for 20 dia. steam hose
					B-3616012	Piston with seal for steam solenoid valve
					E-3616013	Spring for steam solenoid valve
					E-3616014	Spool for steam solenoid valve
					E-3616015	Hose nozzle, 20 dia.
					B-3616017	Fixings and accessories for split-models, DBME/DBKE el
57						
58						
60						
Main group 37 – fan unit DV 120 –						
				1	B-0701001	Fan unit DV 120, steam inlet 20 dia.
				1	B-0701002	Fan unit DV 120, steam inlet 25 dia.
				1	E-3716001	Housing DV 120, empty
				1	E-3716002	Front panel DV 120, blank
				1	E-3716003	Air grill
				1	E-3716004	Cross-current fan for DV 120
				1	E-3716005	Steam nozzle for DV 120, steam inlet 20 dia.
				1	E-3716006	Set of 2 reinforcements for steam nozzle
				1	E-3716007	Steam hose, cylinder – steam nozzle
				1	E-3716008	Condensate hose, cylinder – steam nozzle
				1	E-3716009	Steam nozzle for DV 120, steam inlet 25 dia.