DÜRR DENTAL

Installation and Operating Instructions
Dürr Compressed Air Station for Clinics
P 6000, P 9000

GB

CE

9000-610-43/30

2007/01

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Important Information

1. Observations

1.1 Note on Conformity

This product has been tested for conformity according to guidelines set by the European Union and has been found to conform to all requirements of these regulations.

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1.2 General Notes

- These Installation and Operating Instructions form an integral part of the unit. They must be kept close to the unit at all times. Precise observance of these instructions is a precondition for use of the unit for the intended purpose and for its correct operation.
  New personnel must be made aware of the contents, and they should be passed on to future operating staff.
- Safety for the operator as well as trouble-free operation of the unit are only ensured if use is made of original equipment parts. Only accessories which are expressly mentioned in the Installation and Operating Instructions may be connected or those recommended explicitly by Dürr Dental. If other accessories are used with this appliance, Dürr Dental cannot guarantee safe operation or proper functioning. No liability on the part of the manufacturer will be accepted in the case that damage arises through the use of non-approved accessories.
- Dürr Dental are only responsible for the equipment with regard to safety, reliability and proper functioning where assembly, resettings, changes or modifications, extensions and repairs have been carried out by Dürr Dental or an agency authorized by Dürr Dental and if the equipment is used in conformity with the Installation and Operating Instructions.
- These Installation and Operating Instructions conform to the relevant version of the equipment and the underlying safety standards valid at the time of going to press.
  All switches, processes, trade marks, software programs and appliances named in this document are registered names.
- Any reprinting of the technical documentation, in whole or in part, is subject to prior approval of Dürr Dental being given in writing.

1.3 General Safety Notes

The Compressed Air Station has been so designed by Dürr Dental that any danger in operation is out of the question when the appliance is used correctly. In spite of this, we feel it is our duty to mention the following safety measures in order to prevent any possible danger.

- When using this appliance all local and relevant regulations must be observed! Converting or modifying the appliance in any way is strictly prohibited. In such cases, any and all guarantees immediately become invalid. The operation of modified appliances can be punishable by law. In the interests of trouble-free operation the operator is responsible for observing these regulations.
- Retain the packaging for possible return of the product to the manufacturers. Ensure that the packaging is kept out of the reach of children. Only the original packaging provides adequate protection during transport of the unit.
  Should return of the product to the manufacturers be necessary during the guarantee period, Dürr Dental accepts no responsibility for damage occurring during transport where the original packaging was not used!
- Before every use the operator must check the functional safety and the condition of the appliance.
- The operator must be knowledgeable in the operation of the appliance.
- The product is not designed to be used in medical treatment areas where there exists the danger of explosion. Areas where explosions could occur are those where flammable anesthetic material, skin cleansers, oxygen and skin disinfectants are present. This appliance is not to be used in areas where the atmosphere could cause fire.

1.4 Safety notes concerning protection from electrical current

- The compressed air station may only be connected to a socket fitted with a strip terminal or block connector or, alternatively, connected directly to the mains supply.
- Before connecting the appliance check that the voltage given on the appliance and the frequency are compatible with the mains supply.
- Check the appliance and the power supply cables for possible damage before switching on. Damaged cables, plugs and sockets must be replaced before use.
- When working with or on this appliance all the relevant electrical safety regulations must be observed.

1.5 Warnings and Symbols

The following terms and symbols have been used in these installation and operating instructions for especially important information:

Information and/or mandatory regulations or prohibitions for the prevention of personal injury or substantial property damage

Warning high voltage.

Special information regarding economical use of the appliance or other information.

CE CE-labeling without Notified Body Number.

Warning! Hot surface

Warning! The compressed air station can start automatically.

Connection to ground

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2. Product Information

2.1 Correct Usage

The Compressed Air Station has been designed to provide compressed air for the operation of dental units or similar applications.

Installation in medical care facilities:
The design and construction of this Compressed Air Station have both been carried out bearing in mind the requirements of medical products as far as possible. This appliance may be installed in facilities providing medical care.
When installing this appliance in a medical care facility, then the guidelines 93/42 EWG IEC 601-1 as well as any relevant standards must be observed during installation and fitting.

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2.2 Incorrect Usage

The compressed air which is provided by the compressed air station is not suitable for use in operating areas or similar use, e.g. for operating breathing apparatus, without the additional use of special filters.

- The station has been designed for use in dry, well-ventilated rooms with an ambient temperature of+10 to +40 °C.
- Never use this station in an area where it can become wet, e.g. in rain. Never use the machine in damp or wet surrounding conditions. The use of this appliance in the vicinity of combustible gases or fluids is strictly forbidden.
- Before fitting this station in medical facilities, ensure that the available compressed air provided is sufficient for the needs of the surgery. See also section 4. “Technical Data”.
  Classification and Conformity assessment must be carried out by the manufacturer of the end product.
- Any usage above and beyond that explicitly mentioned in the installation and operating instructions is deemed to be incorrect usage. The manufacturer cannot be held liable for any damage resulting from incorrect usage. The operator / user bears all risks.

2.3 Product description

The compressed air station produces oil free, dry and filtered compressed air, which can be used for the operation of dental equipment.

3. Delivery Contents

The compressed air station consists of 2 modules.

Tank module
Dry air storage, dryer and controls

Compressed air module
with 2 or 3 compressors

P 6000 (2 compressors) **5921-51**

P 9000 (3 compressors) **5931-51**

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4. Technical Data

Model		**P 6000**	**P 9000**
		5921-51	**5931-51**
Number of compressors		2	3
Treatment stations at 60% performance		to 30	to 50
Voltage	V	400/3N/PE/AC	400/3N/PE/AC
Frequency	Hz	50	50
Rated current	A	22.5	32
Power consumption	KW	8.6	12.6
Fuse	A	32	40
Characteristic C/D according to EN 60898			
Electrical connection Ø	mm^2	4	6
The size of the power cable must take into consideration the voltage, length of cabling and the local situation.			
RPM	min-1	1500	1500
Interference according to EN 55014-1: 2003-09			
Jamming resistance according to EN 55014-2: 2002-08			
Protection type	IP	20	20
Protection class		1	1
Noise levels	dB(A)	88	91
on starting temporarily	dB(A)	93	93
Duty cycle	%ED	100	100
Weight of compressed air module Kg		294	384
Weight of tank module	Kg	306	306
Starting pressure	bar	*6,5 / 7	*6 / 6.5 / 7
Switch-off pressure	bar	*7.5 / 8	*7 / 7.5 / 8
*Adjustable using a key-operated switch			
Safety valve	bar	10	10
Tank volume	l	500	500
Performance at 5 bar	l/min	1133	1700

Temperature range in operation +10 to +40 °C
(ideal +25 °C, with regard to life-cycle of compressed air station and condensation)
Storage and Transport -10 to +60 °C
Relative humidity in operation max. 70%
Relative humidity storage and transport max. 95% (without condensation)
Compressed air outlet connection G1" Internal threading
Connection to central suction air DN70
Condensate connection DN50
Condensation volume
150-210cm^3 per condensate drain cycle, depending on temperature and relative humidity

Required room ventilation m^3/min		15	21
Dimensions (H x B x D)			
compressed air module	cm	68x200x100	68x200x100
with pallet	cm	80x200x100	80x200x100
tank module	cm	210x90x180	210x90x180
with pallet	cm	222x95x180	222x95x180

Required distance between the tank and the compressed air module ca. 30cm

Required area in total			
(including accessibility)	cm	210x400x280	210x400x280

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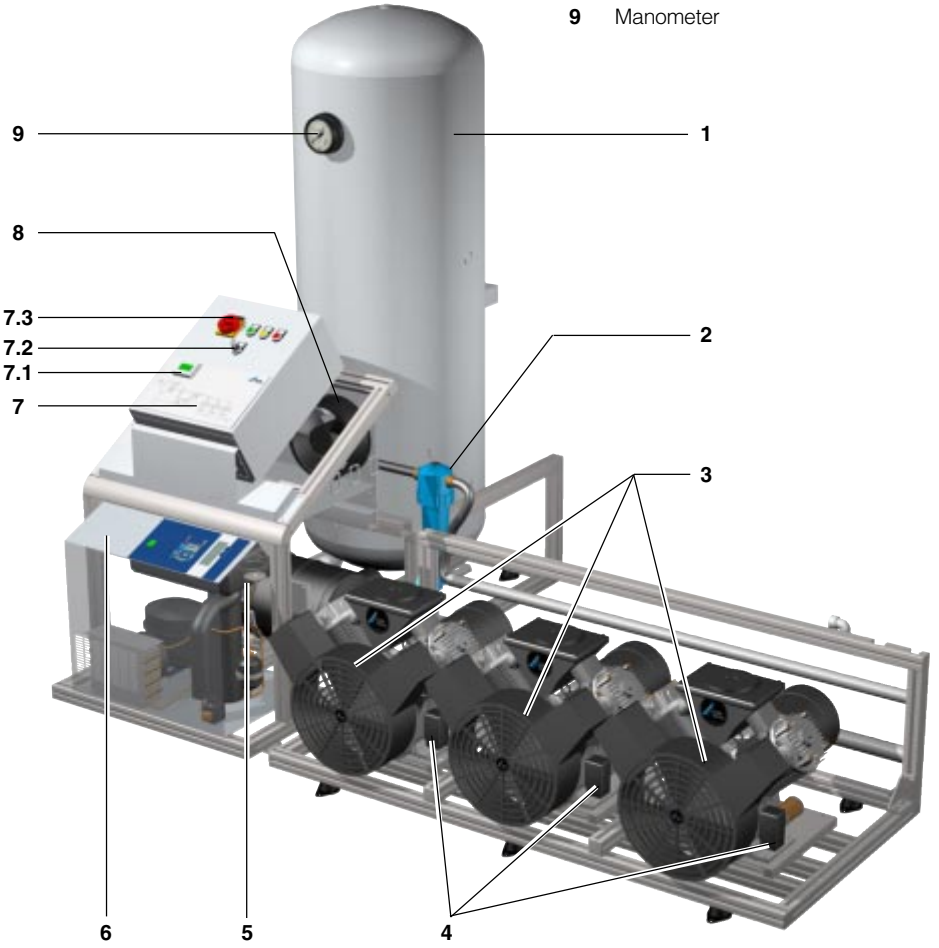
5. Functional Diagram

Compressed Air Station P 9000

1 Pressure tank
2 Cyclone separator
3 Compressor
4 Bleed valve
5 Heat exchanger
6 Refrigerant dryer
7 Control box
7.1 SPS Display
7.2 Key-operated switch
7.3 Main switch
8 Ventilators
9 Manometer



6. Functional Description

6.1 Start-up

After turning on at the main switch(7.3) the refrigerant dryer begins operation (6) and cools the heat exchanger down to its operating temperature. (During this period all three ventilators operate (8)). After approx. three minutes the heat exchanger in the refrigerant dryer has reached its operating temperature (display on dryer 3 °C dew point). The first compressor will now operate (3) and fill the tank (1).
The mechanical start-valve is now closed and the bypass is opened, allowing the air from the valve to flow to the pressure tank (1). As a result of the flow volume of the compressor and the bypass setting size, a rising counterpressure of 6 bar is created. The counterpressure serves to provide air to the refrigerant dryer and to the cyclone separator (2). This provides a high degree of air drying.

6.2 Standard operation

Standard operation = key-operated switch (7.2) set to 0

A pressure sensor monitors the pressure in the tank and, once the level of 4 bar has been reached, switches on the second compressor and after a further delay of three seconds compressor three (3).
At 7 bar the third compressor switches off, at 7.5 bar the second and at 8 bar the first compressor switches off, thereby filling the 500 l pressure tank (1). The ventilators (8) will continue running for approx. two minutes.
If compressed air is extracted from the tank, then the system pressure will fall. At 7 bar the first compressor will switch on again. If the pressure in the system falls further then the second compressor starts up again at 6.5 bar and at 6 bar the third compressor will reoperate. (In auxiliary operation the key-operated settings for 7.2 to I, at 6 / 5.5 and 5 bar). If more air is removed from the system than the compressor can provide, the system pressure will continue to fall. As soon as this falls below 1 bar the start-up cycle is initiated.

Any dampness arising during operation of the compressor will first be transported to the electronic cyclone separator (2) and, in the second stage, through the refrigerant dryer (6) and then to the waste water system. This process takes place automatically via a solenoid valve fitted in the cyclone separator and the internal electronic controller of the refrigerant dryer, but dependent on the actual volume present.

A load-bearing interval changer allows the compressors to be rotated on a daily basis. A change of compressor takes place every 8 hours (for as long as current is available). The 400 V supply voltage should not be cut off at all due to the timer which is integrated in the SPS. (E.g. switching off the mains supply overnight.)
In the case that a powerout occurs, then a forthcoming exchange may not be carried out which will lead to an uneven distribution of the motors!

The compressors always begin with no pressure, after approx. 5 seconds the bleeder valve (4) is closed and the compressor begins to produce counter pressure.

The pressure in the system is displayed both on a manometer (9) and also on the SPS display (7.1).

Auxiliary operation = key-operated switch (7.2) to I

Changing the position of the key-operated switch to I alters the limit setting and therefore the switch-off pressure from 8 to 7 bar.
The compressors stop operating at 6 / 6.5 / and 7 bar.

6.3 Emergency operation

Key-operated switch (7.2) to II

Using the key-operated switch to change the setting to II allows the unit to be used in emergency operation. This mode of operation should only be used for short periods in order to maintain operation in the occurrence of a defect in the unit and only under supervision . When operated under this setting one compressor (3) will run continuously. This ensures to guarantee that even in the event that the SPS stops functioning or there is a complete breakdown of the electronics that compressed air is provided by means of emergency operation. The system pressure will rise to 10 bar under emergency operation and will be limited to a maximum 10 bar by the opening of the safety valve.

Loud blow off noises

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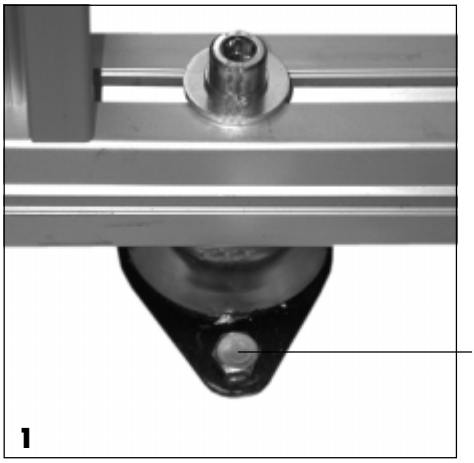

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Installation

7. Transport

The compressed air station may only be transported under no pressure.
Before transport the compressed air must be bled from the tank and from the pressure hoses.

7.1 Remove transport clips

Unpack the modules, unscrew the retaining bolts on the pallet (10) and lift off the pallet.

8. Set-up

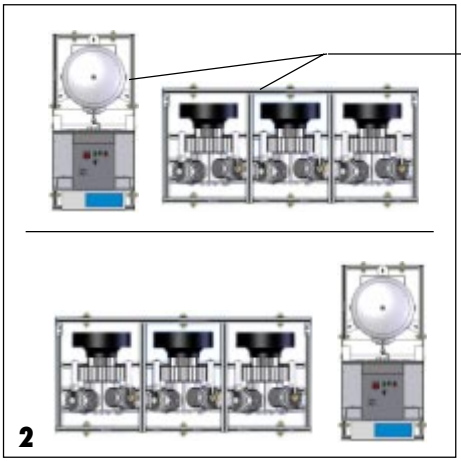
8.1 Set-up room

- Room temperature must not fall below + 10 °C in winter and must not exceed + 40 °C in summer.

Approximately 70% of the electrical energy consumed by the compressors is converted into warmth which is radiated to the surroundings.

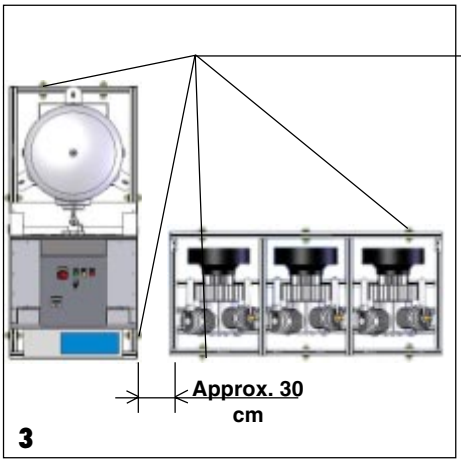
Danger of overheating
If the room temperature exceeds +40 °C, then some form of ventilation is required on the machine-side or some form of air-conditioning must be installed.

- The maximum relative humidity of the room air must not exceed 70%.
- Installation in a purpose-built room, e.g. in a boiler room, must be checked with local building regulations.
- Installation in a wet-room is not permitted.



8.2 Alternative set-ups

Module 2 can be set up either left or right of Module 1,
see Fig. 2.
Set up has been taken into consideration during design and provided for by Dürr Dental.
Standard delivery (11).

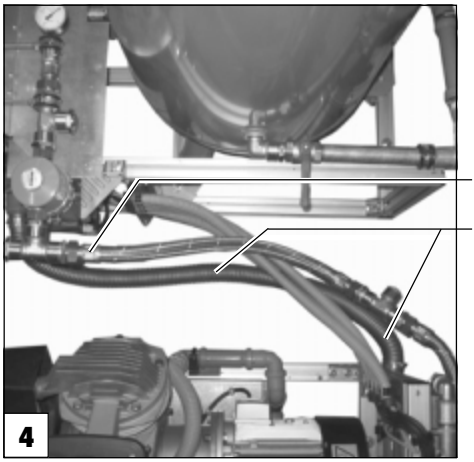


8.3 Set-up and Mounting

- Place both modules in their respective situations.

Maintain the minimum distance - 30cm - between the modules.
The connection hoses between the two modules must not be placed under any tension.

- Drill holes into the flooring for fixing the units, place dowels in position and screw firmly into position (10), see Figs. 1 and 3.

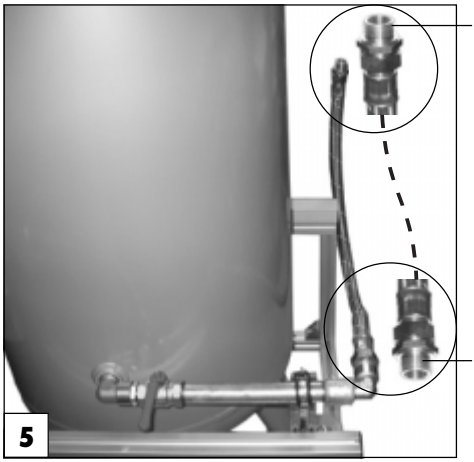


9. Installation

9.1 Connect the compressed air fitting (20) to the cyclone separator

9.2 Suction connection to the compressor motor

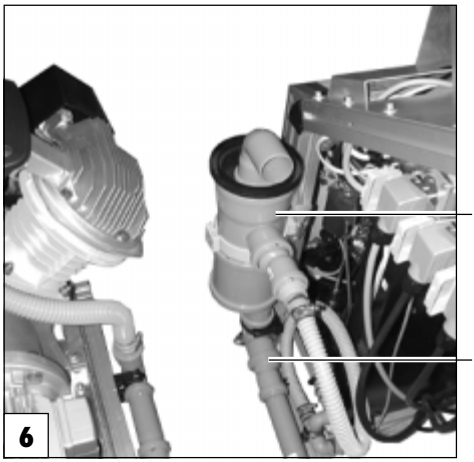
Fit the hose connector (21) between the air filter and compressor unit together and secure using the hose clamp and the screw.



9.3 Compressed air distribution

Use a flexible compressed air hose to connect the compressed air distribution net with the compressed air tank.
Connector piece G 1" external thread (22)

Observe maximum pressure (10bar) of the compressed air station.

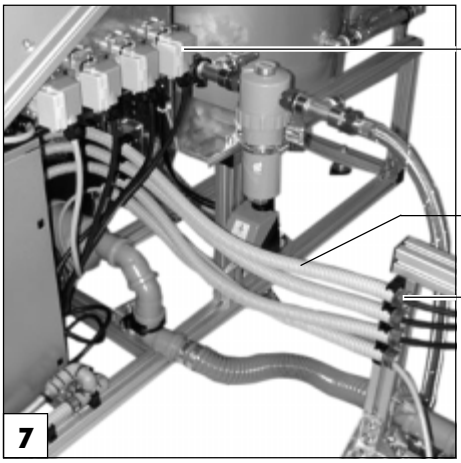


9.4 Condensate connection

- The condensation drain outlet (27) of the condensate separation unit (23) should be connected to the waste water system.

The condensate produced is first emptied from the cyclone separator and refrigerant dryer under pressure and subsequently, under no pressure, to the waste water drainage.

When connecting to the waste water system observe all local regulations (e.g. odour trap)



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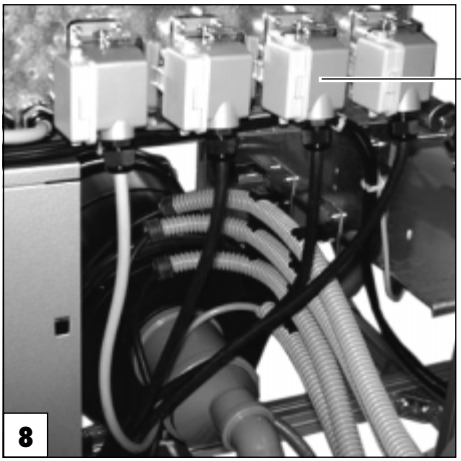

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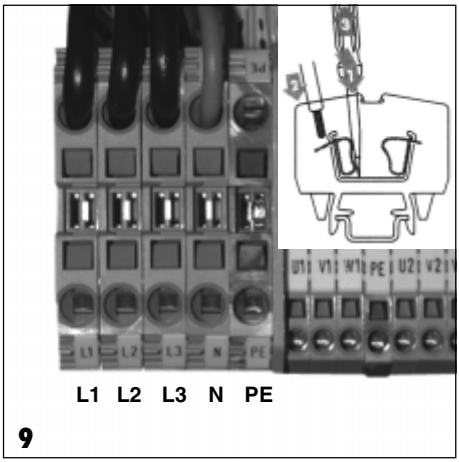

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10. Electrical connections

Before putting the appliance into operation check the power supply voltage with that on the unit name plate.

Ensure that all connections to the appliance are not subject to any mechanical tension.

10.1 Connections between the modules

- Place the connections between the compressor modules and the control unit in position and secure using strain relief clamp (32).
- Place the correctly marked plug into the appropriate socket in the control unit (30), figs. 7 and 8.

10.2 Remote display

Circuit elements have been pre-fitted in the control unit (7) (see 5. Function Diagram) which allow the remote monitoring of the operation of the compressors.
If required it is possible to run a control lamp connection from the control unit, contact strip X1 15, terminals 11, 12, 14, using NYM 5 x 1.5^2 to a suitable room (e.g. clinic technicians room).

10.3 Power supply

- Feed a five-wire cable through the strain relief clamp at the control unit and attach the wires to clamps L1, L2, L3, N, PE.
  (400V 3/N/PE AC 50Hz)
  Tighten the strain relief clamp in the control unit.
- Close the cover of the control unit.

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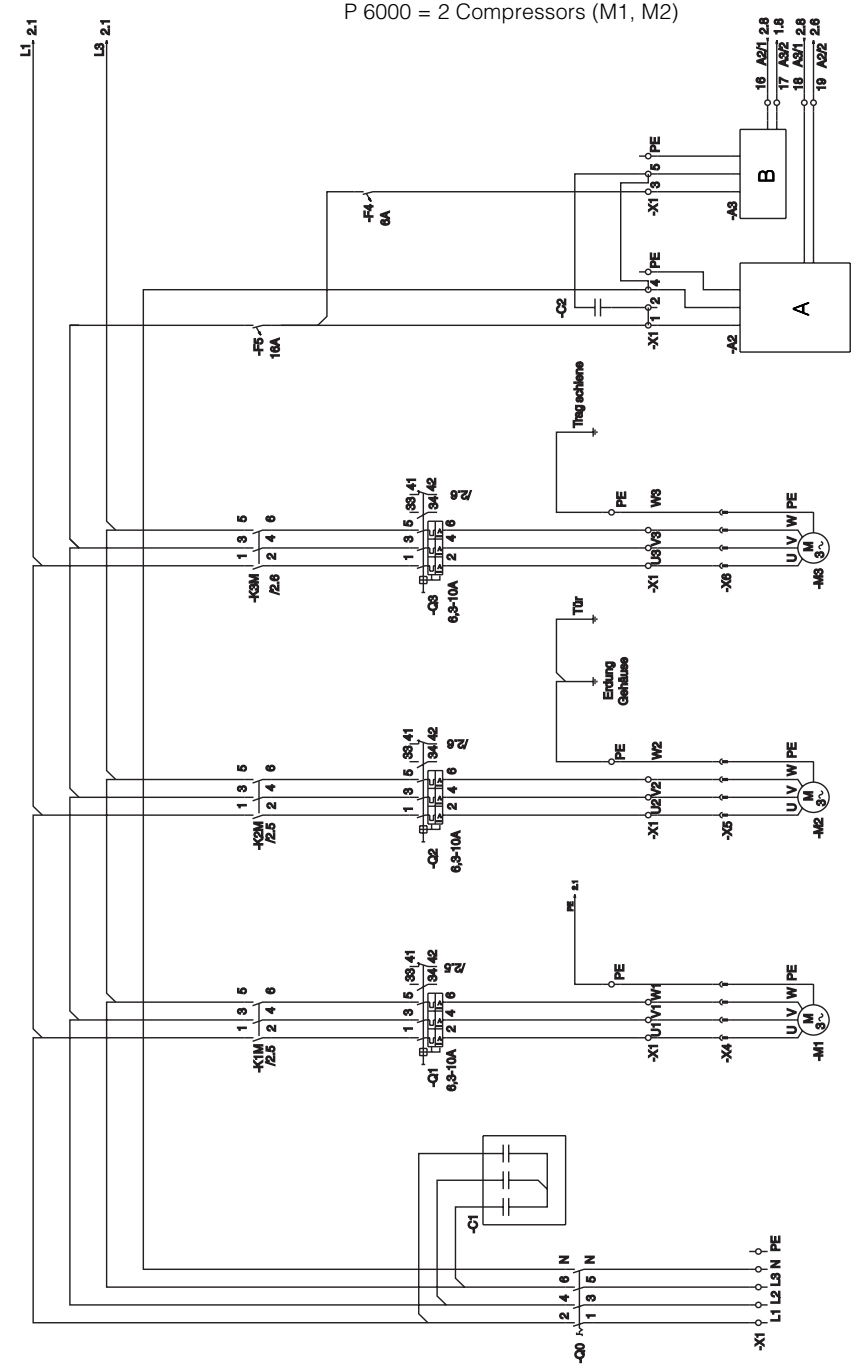
11. Circuit plan

11.1 P 6000, P 9000, P

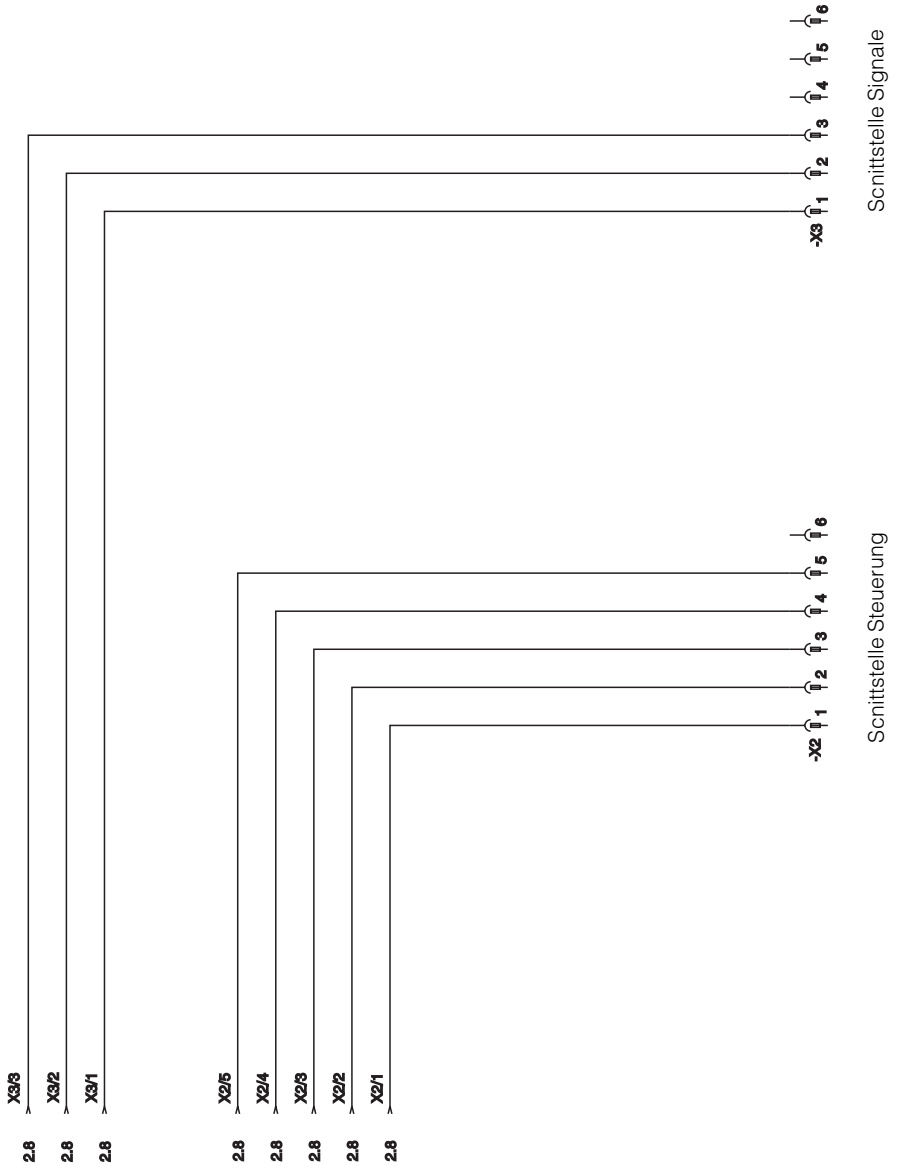
P 9000 = 3 Compressors (M1, M2, M3)

P 6000 = 2 Compressors (M1, M2)



A refrigerant dryer
B Cyclone separator

11.2 Connections



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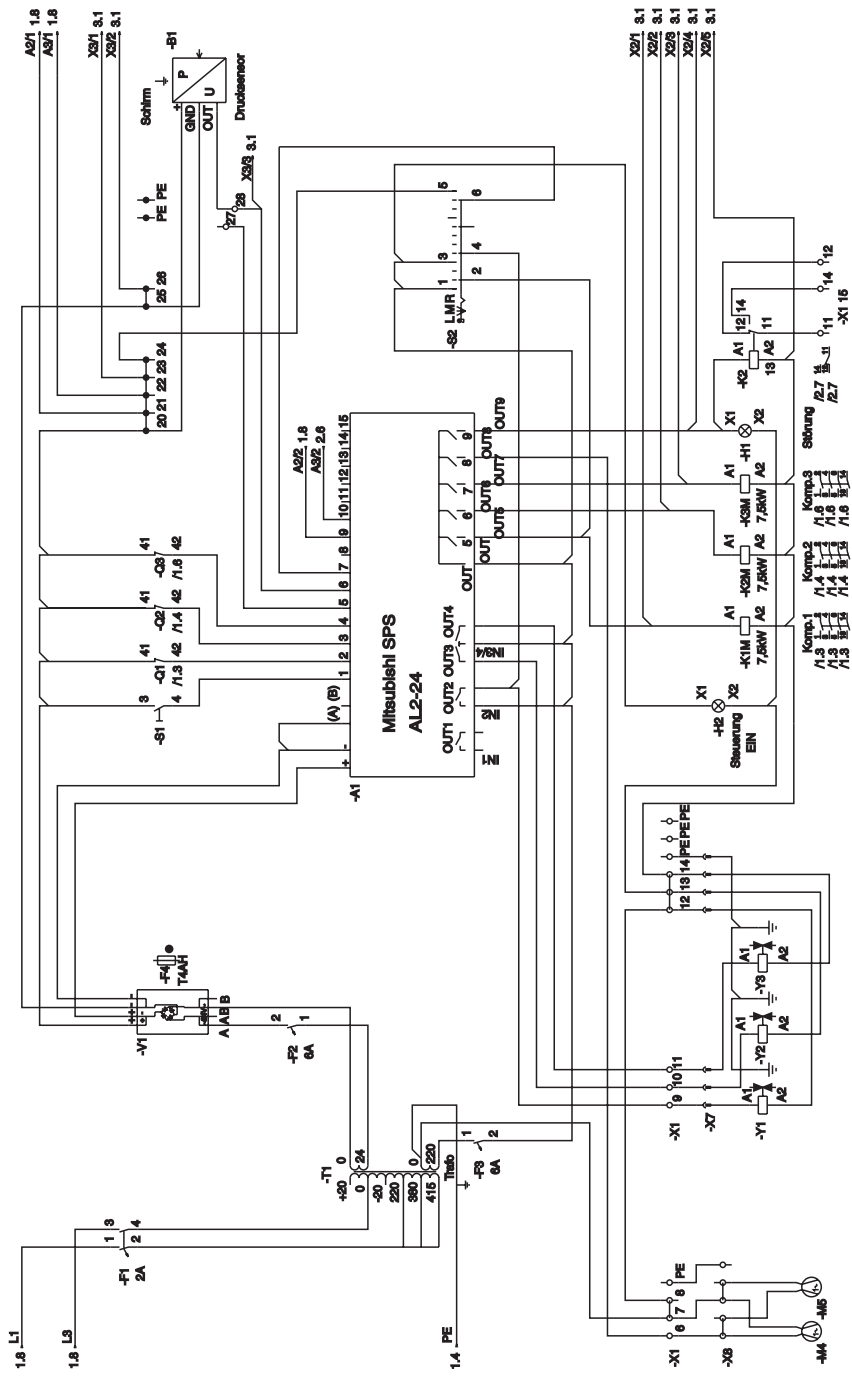
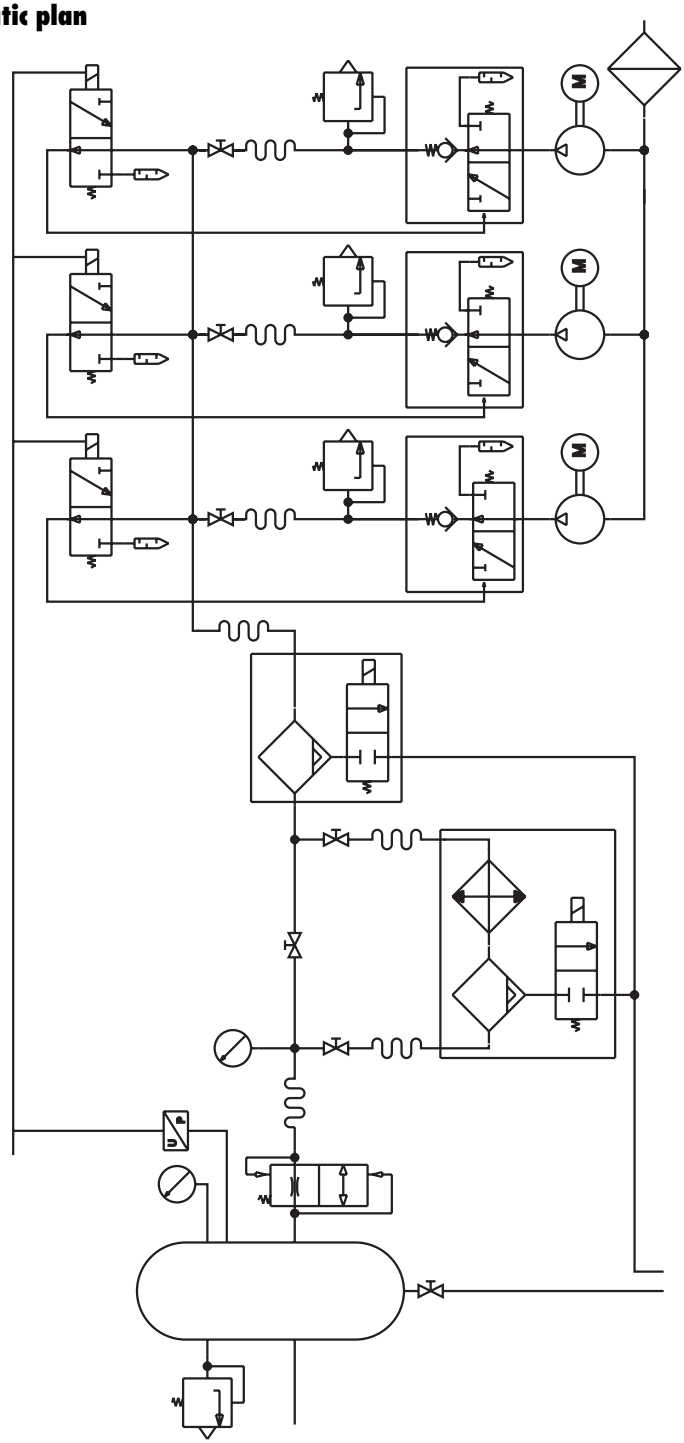
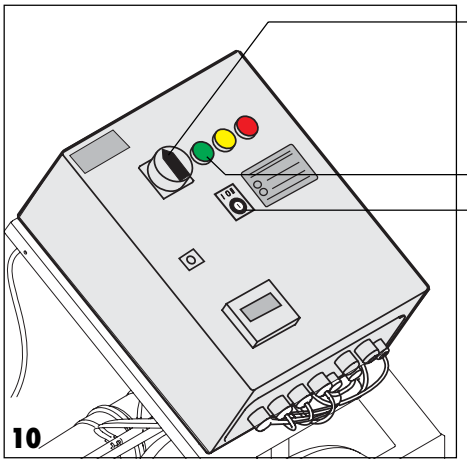
11.3 Controller



11.4 Pneumatic plan



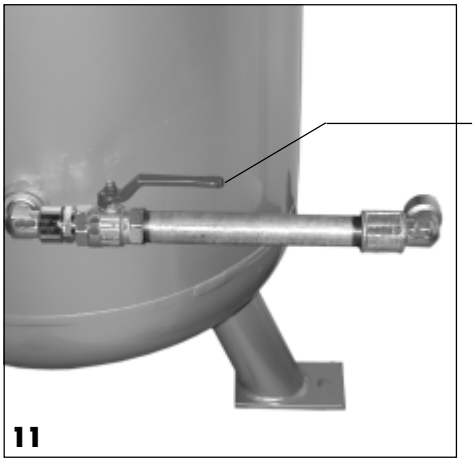


12. Commissioning

- Set key-operated switch (7.2) to **I** (auxiliary operation) or to **0** standard operation.
  I = auxiliary operation, cut-off pressure 7 bar
  0 = standard operation, cut-off pressure 8 bar
  II = emergency operation
- Switch on at main switch (7.3).

Green lamp (42) lights.
Both the refrigerant dryer and the ventilators switch on.
After a delay of approx. 3 minutes the compressor motors begin to operate.
As soon as the compressed air tank is full and the cut-off pressure has been attained the motors cut out.

- Check all connections for leaks.

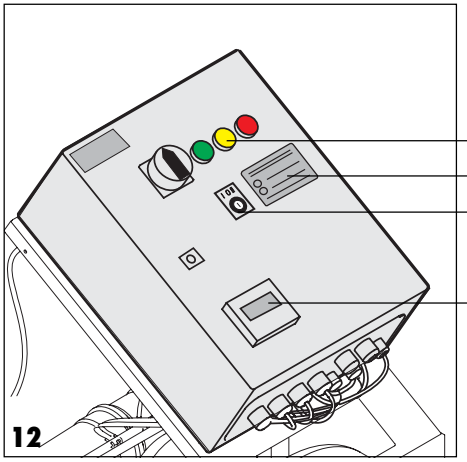


- Open the cut-off valve (44) on the tank.

12.1 Language selection

The language to be used on the display (7.1) can be selected:

- Press the yellow reset button (45) and hold down. At the same time turn the key-operated switch (7.2) to position **I**. Now release the yellow reset button S1.
- Select the language by pressing the yellow button several times until the required language appears.
- Turn the key-operated switch (7.2) to position 0; the selected language will automatically be employed.
- Turn the key-operated switch to **I** (auxiliary operation) or to **0** for standard operation.



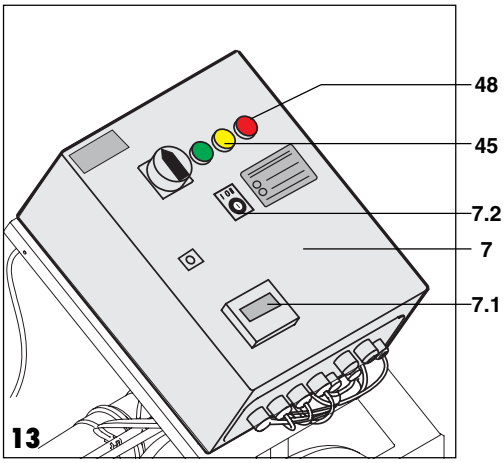
12.2 Labelling operational mode

Before operating the unit it is extremely important to label the operational mode to be used, i.e. whether the unit runs in “standard or auxiliary operation”.
Use the sticker supplied (46) next to the key-operated switch, label operating mode with X and include the date and name.

Example:

☒ **0 - Standard operation**

○ **I - Auxiliary operation**



13. Operational defect

Red lamp (48) lights!
Display (7.1) shows source of problem.

- 7e.g. open cover to control unit, reset the activated motor protection switch Q1 and press the yellow reset button (45) to restart. See also Troubleshooting Point 16. Tips for Technicians.

If the control unit breaks down it is possible to continue in emergency operational mode.

- Set key-operated switch (7.2) to **II** (emergency operation).

The first compressor will now run continuously and excessive pressure (above 10 bar) is released using the safety valve on the compressor tank.
Loud noise of escaping air!
This operational mode should only be used for short periods and the unit never unattended.

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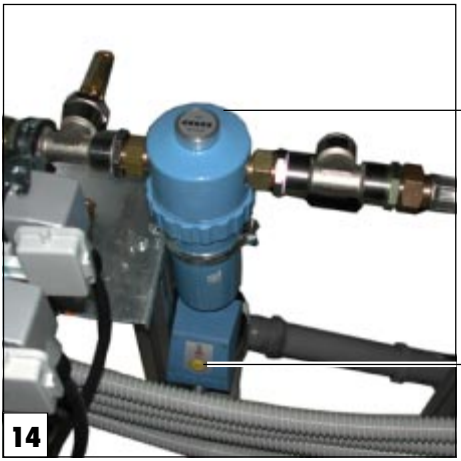
14. Technician maintenance

All maintenance work may only be carried out by qualified personnel or a member of our service team.

14.1 Maintenance and maintenance intervals

1.	Check the refrigerant dryer (6)* and condensate separator	every day	see instruction sheet provided
2.	Check the condensate connections from the cyclone separator (2)	every day	Press button „Test“ (50)
3.	Check the cool air inlet valve on the refrigerant dryer (6) for signs of dirt	once a month	clean when necessary
4.	Check the air tightness of the compressed air station for leaks	once a month	seal where signs of leaks occur
5.	Regular compressor tank checks (1) 5 years (observe national regulations)		(e.g. operational safety regulations in BRD)
6.	Maintenance of refrigerant dryer (6)	8000 operating hours	by the service team
7.	Filter insert of the bacterial filter	3500 operating hours	replace (51) order number 0705-991-05
8.	Function check of pressure regulation Switch-on of 2nd and 3rd motor 3 Months	6 Months	See also section 5. Function al description
9.	Check number of operating hours	6 Months	see 14.3 Operating hours
10.	General visual check	6 Months	secure any screws which have become loose etc.
11.	Switch on/off of compressors (3) (note settings 0 or I!)	6 Months	check, see 6. Function description
12.	Return stroke-rest combination (4)	12 months	check order number 0729-060-00

* Position-Number, e.g. (6), see 5. Function description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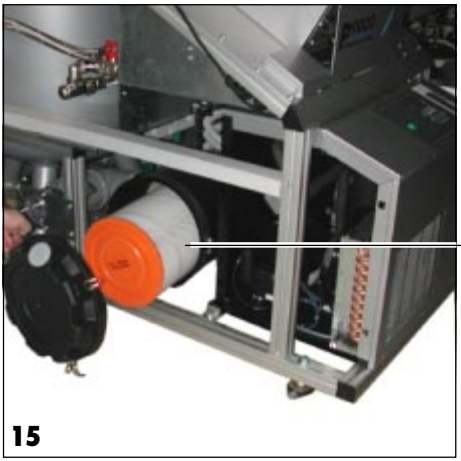
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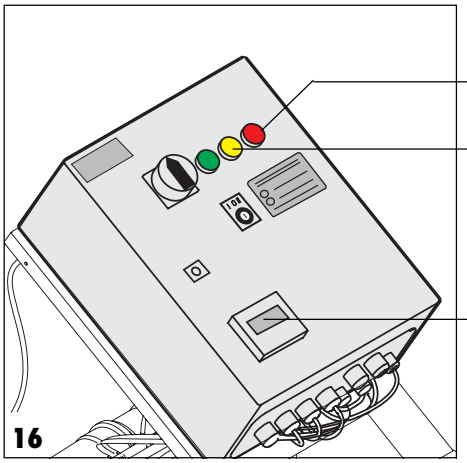

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14.2 Reading operating hours / ambient temperature

By pressing the yellow reset button S1 (45) for approximately 12 seconds it is possible to read the number of operating hours as well as the ambient temperature (should be 10-40 °C) on the display (7.1).
Do not carry out if there is an operational malfunction at the same time!

14.3 Cancel the red malfunction (48) display

- Remove the cause of the problem, see Display (7.1).
- Cancel the red malfunction (48) by pressing the yellow button S1 (45), see Section 15. Tips for Technicians.

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Disposal

15. Appliance disposal

- Remove from mains power supply.
- Open the safety valve (53) and let off all compressed air which is present in the tank.
- Dispose of the compressed air station according to national regulations.
  E.G. the control unit, electronic board and components should be disposed of as electronic waste and the tank as metal (steel) waste.

16. Tips for Technicians

Repairs and maintenance above and beyond that included in general maintenance procedures may only be carried by qualified personnel or our service team.

Before troubleshooting remove the unit from the mains supply.

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Fault	Possible Cause	Removal of fault
1. Red malfunction light is displayed (potential free switch / contact is aktivated)		see 14.3 Cancel the red malfunction .
F1 Motor protection switch (MS)	• One of the motor protection switches has activated (MS) Q1-Q3.	• Check setting: (9.0 A at 50 Hz), allow the motor protection switch to cool. Press yellow button S1, in order to cancel the malfunction display. Switch on the unit.
F2 refrigerant dryer (6)	• see instructions to refrigerant dryer	• Delete the red malfunction display by pressing the yellow button.
F3 Bacterial filter	• Filter insert is dirty replacement interval 3500 operating hours	• Replace the filter insert. Press the ESC-key on the controller, see Fig. 17 position (52)
F4 Cyclone separator (2)	• see instructions to cyclone separator	
F5 Sensor	• Leak in plumbing system • Sensor defect	• Check all connections between the sensor to the control unit, check plumbing for leakages, if necessary replace the sensor.
F6 Temperature	• Temperature + 40 °C exceeded. (Room temperature should be 10-40 °C)	• Cancel the malfunction display once the temperature has cooled down by pressing the yellow button S1. (Check the room ventilation)
2. Control unit breakdown	• Power out	• Check fuses F1, F2, F3 • Check the power unit V1, if necessary replace the control unit.

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