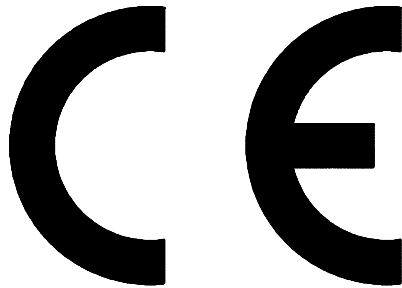


M21

M26

M30

# **I**nstruction **M**anual



**This machine complies with the EC Machinery  
Directive 98/37 EC, the EC Low Tension Directive 73/23 EEC  
as amended by RL 93/68 EEC, EMV-recommendation  
89/336/EWG  
and the Harmonised Standards:**

**EN ISO 12100-1 und 12100-2**

**EN 60204-1 (DIN-VDE 0113 Part I)**

**EN 1127-1**

Der Inhalt entspricht unserem besten Wissen und basiert auf dem Stand der Technik. Rechtsverbindlichkeiten können nicht hergeleitet werden. Technische Änderungen vorbehalten. Nachdruck oder Vervielfältigung nur mit unserer ausdrücklichen Genehmigung.

The contents are correct to the best of our knowledge and belief and correspond to the present level of technology. No legal claims can be derived. Technical modifications reserved. Reproduction or duplication only with our express permission.

**BÖWE**  
Textile Cleaning

**Dear Customer,**

It gives us great pleasure to present you with your **BÖWE** machine. You are acquiring a machine that has been designed and manufactured to meet the highest quality standards and that corresponds to the latest standards in research and technology.

Please do not put these operating instructions away without reading them!

This manual contains all of the important information that you need to operate your drycleaning machine.

If the prescribed maintenance work is neglected or improperly performed, if repair work is carried out by service technicians other than those authorized by BÖWE or if parts other than original BÖWE spare parts are used, we naturally cannot fulfill the guarantee obligations according to our General Terms of Delivery.

Measurements and other values reflect the status as of the printing date.

We reserve the right to make technical changes, at any time and without prior notice, in the interest of continuing development or when changes are considered to be necessary for constructional reasons.

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**BÖWE Textile Cleaning GmbH**  
Dr.-Georg-Schaeffler-Strasse 22, D-77815 Bühl  
Telefon (07223) 80103-0, Telefax (07223) 80103-29  
Phone: ++49-7223-80103-0, Fax: ++49-7223-80103-29  
email: [service@boewe-tc.de](mailto:service@boewe-tc.de)

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# **Necessary Operating Materials and Chemical Additives**

Dear Customer,

In order to prevent any delays in the commissioning of your M21/M26/M30 drycleaning machine, we ask you to make sure that the following operating materials and chemical additives are available.

## **- Solvent**

The solvents used must have a flash point that is higher than the temperature stated on the machine nameplate. The polycyclic aromatic compound content is not allowed to exceed 0.01% by weight. The solvent must be heat-resistant under operating conditions.

The solvent flash point must be checked every six months.

We recommend that only fresh solvent should be used in order to avoid contamination through dirt, foreign substances and smells.

Total filling amount for the first filling:	M21: approx. 445 l (118 US gal)* M26: ca. 510 l (135 US gal)* M30: ca. 565 l (149 US gal)*
Tank I: Minimum filling volume:	M21: 110 l (29 US gal) M26: 135 l (36 US gal) M30: 155 l (41 US gal)

\* Machine with 1 economy filter.

For machines with 2 economy filters: + 50 l (13 US gal)

For machines with 2 economy filters and 1 cartridge filter: + 75 l (20 US gal)

For machines with 2 economy filters and 2 cartridge filter: + 90 l (24 US gal)

## **- Chemical additives**

The chemical additives used must be halogen-free and must have a flash point that is higher than the temperature stated on the machine nameplate. The polycyclic aromatic compound content is not allowed to exceed 0.01% by weight. The chemical additives must be heat-resistant under operating conditions.

Depending on the equipment, the following should be available:

- Drycleaning detergent
- Waterproofing agent
- Pre- and post-spotting agents



Caution

## Attention !

### Important information regarding solvents

When delivered, this machine is released only for the solvent specified on the nameplate.

At the time this manual was printed, the following statements are valid:

It is generally possible to use the following solvents.

- Cyclosiloxane (such as GreenEarth) with a flash point > 75° C (167° F)
- Hydrocarbons (such as DF 2000) with a flash point > 60° C (140° F)
- Hydrocarbons (such as Total TDC 3 or others) with a flash point > 55° C (131° F)
- Polyglycolether (such as Rynex) with a flash point > 95°C (203° F)

The use of the solvent perchlorethylene is not permitted!

The following must be observed in this regard:

If you plan to use the machine with a solvent whose data differs from that given on the machine nameplate, you must first consult with BÖWE and obtain its written authorization. This will necessitate different software and a different nameplate.

Permission to operate the machine becomes invalid in case of non-compliance!

**BÖWE**  
Textile Cleaning

BÖWE Textile Cleaning GmbH  
Dr.-Georg-Schaeffler-Strasse 22, D-77815 Bühl  
Telefon (07223) 80103-0, Telefax (07223) 80103-29  
Phone: ++49-7223-80103-0, Fax: ++49-7223-80103-29  
email: [service@boewe-tc.de](mailto:service@boewe-tc.de)

# BÖWE M21 /M26 /M30

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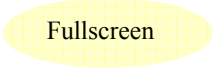


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## 1. General Information

1.

### 1.1 Technical Literature

1.1

We make particular reference here to the literature and leaflets of the trade and professional associations, research institutes and mutual indemnity associations, as well as safety data sheets provided by the solvent producers.

### 1.2 Laws, Ordinances, Regulations

1.2

To avoid health risks and environmental damage, you must strictly comply with all directives and regulations pertaining to the industry, particularly with regard to proper handling of solvents.

**In any case, you must observe the applicable laws and regulations in the country in which the machine is installed.**

**The machine complies with the following regulations:**

- EC Machinery Directive 98/37 EC
- EC Low Voltage Directive 73/23 EEC in the version RL 93/68 EEC
- EMC Directive 89/336/EEC
- Pressure Equipment Directive 97/23/EC

Applied harmonized standards:

- EN ISO 12100-1 and 12100-2
- EN 60204-1 (DIN-VDE 0113 Part 1)
- EN 1127-1

Applied national standards and directives:

- Accident Prevention Regulations for Refrigeration Plants, Heat Pumps and Cooling Equipment (BGVD4)
- CFC and Halon Prohibition Ordinance

**When operating the system in Germany, the following laws and directives must be observed:**

- Accident Prevention Regulations for Chemical Cleaning (BGR 500 chapter 2.14)
- Water Resources Law (WHG § 19)
- Waste Disposal Law
- Explosion protection guidelines
- Technical Regulations for Dangerous Working Materials (TRGS 402)
- VDI guidelines
- VDE regulations
- 31<sup>st</sup> BImSchV
- GefStoffV with technical rules (Regulation for hazardous material)
- Operating safety regulation

### 1.3 Corrective Maintenance Work

1.3

We recommend that you commission the customer service department of the BÖWE organization for the maintenance, servicing and operating safety of this valuable drycleaning machine. They use original BÖWE spare parts.

## 2. Safety Regulations

## 2.

Each person who is charged with the installation, commissioning, operation, maintenance or repair of the drycleaning machine must first have read and understood the operating and installation instructions. In particular, we refer to the observation of the relevant laws and regulations for the countries in question.

The cleaning machine has been built according to the latest state of the technology. Only persons who are familiar with the machine and informed of the possible risks are authorized to set up, install, commission, operate, maintain and repair this machine. The relevant accident prevention regulations and other regulations involving safety and medical care for workers must be strictly adhered to.

### Safety Symbols Used



This safety symbol identifies particular information regarding occupational safety. It points out hazards and serves to protect personnel from physical injury. You must observe all applicable laws and regulations; information on occupational safety only emphasizes particularly dangerous areas. Failure to observe this information can result in serious consequences for the health, up to and including life-threatening injuries.



This symbol provides important information on the correct use of the machine. Failure to observe this information can lead to disturbances in the machine or surrounding area.

### Mandatory signs for use of the machine



Use respiratory equipment



Use eye shield



Use hand guards

You are not permitted to bypass or turn off safety devices or to make them otherwise inoperative. You must observe all applicable industrial safety regulations during installation and repair work. You must dispose of distillation residues and process water in accordance with regulations.

### 2.1 Save Installation and Commissioning

### 2.1

You must install the drycleaning machine according to the enclosed installation instructions. The room must be sufficiently ventilated.

You are not permitted to operate the machine in potentially explosive areas or in areas in which systems with open flames have been installed. All electrical systems within a radius of 2 m (approximately 6.5 feet) must comply with the IP 54 degree of protection.

**The BÖWE Organization Customer Service department is responsible for carrying out the first startup.**

### 2.2 Authorized Use

### 2.2

This drycleaning machine is designed exclusively for operation with solvents with flash points higher than the temperature information on the machine nameplate. (See "Necessary Operating Materials and Chemical Additives"). Handle these solvents directly only when absolutely necessary and wear protective gloves and goggles.

## 2. Safety Regulations

## 2.

---

This closed-circuit drycleaning machine for industrial use (including use in cleaning shops) is intended for cleaning textile articles (also leather or fur or for treating skins). This drycleaning machine is not intended for customer access (such as in self-service shops).

You are not permitted to treat textiles that are easily inflammable or poisonous or that contain radioactive materials.

The definition of authorized use includes compliance with the operating, maintenance and repair conditions prescribed by BÖWE.

The manufacturer is not liable for damages resulting from unauthorized use or from changes to the system made without proper authority.

### 2.3 Operation and Maintenance

### 2.3

Only trained service personnel who are familiar with the machine are authorized to operate and maintain the BÖWE drycleaning machine. Safety regulations must be observed during operation and maintenance.

Do not start the system unless all protective devices (belt guard for cage and filter drive) are in place and working.

Check the operating safety of the machine (sealing test) and the liquid levels daily before turning it on. Dispose of lint, process water and distillation residues according to the operating instructions.



Do not perform any maintenance work when the machine is in operation. Make sure that the solvents, lubricants and chemical additives meet the specified quality requirements!

**Perform maintenance work only when the machine is turned off and secured and has cooled off.**


**When the machine is not in operation cooling water feed must be cut off by means of a stop valve to be fitted on site.**

## 2. Safety Regulations

## 2.

	<p><b>Attention:</b> Drain distillation residues only when the green lamp on the still is lit. The collecting tank must hold the amount that is expected to be drained and must be temperature and solvent-resistant at up to 150 °C (302 °F).</p>
	<p><b>Attention:</b> Check the liquid level before opening the still door</p>
	<p><b>Attention:</b> Do not dispose of distillation residues in the sewer system or normal garbage. You must dispose of these residues according to country-specific regulations on special waste.</p>

### Requirements for the owner and operating personnel

	<p>According to the legal stipulations of the German accident prevention regulations (BGR 500 chapter 2.14), special knowledge is required for the operation and maintenance of drycleaning systems. A person with this special knowledge must regularly be present during the operation of drycleaning systems.</p>
---	--

As a person / body who runs a plant one is obliged to have the refrigerating plant of the dry cleaning machine inspected annually with regard to tightness.

### 2.4 Repair Work

### 2.4

Only skilled workers with suitable protection devices and work tools are authorized to carry out repairs. Make sure that there are no solvent emissions.

#### During repair and cleaning work:

Turn main switch off.

Close the stop valves on the supply lines (steam, condensate and compressed air).

Make sure that the system cannot be turned on without permission (close off and put up a sign "DO NOT TURN ON - REPAIR WORK").

Always remove the main fuse when working on the electrical system.

Use only original fuses to replace defective ones.

When working on pneumatic control parts, make sure that there is no pressure in the system.

Only specially trained refrigeration technicians are authorized to make repairs to the refrigeration unit.



All spare parts used must comply with the technical standards set by the manufacturer.

## 2. Safety Regulations

2.

### 2.5 Decommissioning and Disassembling

2.5



Only skilled workers with suitable protection devices and work tools are authorized to decommission and disassemble the system.



When decommissioning and disassembling the machine, drain all solvent from the machine, including the pipelines, valves and fittings. You must remove residues that could cause environmental pollution.



You must separate electric lines and pipelines that were used to supply or drain the machine from the supply network. Make sure that they cannot be turned on by unauthorized persons.

Have an authorized customer service technician dispose of the cooling agent from the refrigeration unit.

### 2.6 Further Safety Regulations

2.6



This BÖWE drycleaning machine works with a solvent. These solvents are rated as hazardous to the health, in the context of the German Hazardous Substances Ordinance.

**Drinking, eating and food storage are prohibited in the area where the machine is installed.**

**Open flames and fires are not allowed in the operating area. Smoking is prohibited.**

Install steam generators in such a way that they do not draw in air that contains solvent.

A BÖWE customer service representative must train the personnel in the operation of the machine before the first startup. This training must include information on safe operation and possible hazards.

The owner is responsible for employing trained personnel to load and unload the machine and must employ well-informed and expert personnel for maintenance work. No unauthorized personnel are allowed in the area of the machine.

The daily checks prescribed in the operating instructions represent the minimum requirements. Operating personnel must immediately report any changes in the machine that could affect the safety.

## 2. Safety Regulations

## 2.

---

The owner is obligated:

- to draw up clear regulations regarding responsibility for operation and maintenance, to ensure that the machine is only operated when it is in perfect condition and to ensure the order, safety and cleanliness at the workplace by means of instructions and inspections.

The owner is obligated to make sure that no working method is used that could place the health of the personnel, the environment or the safety of the machine at risk.

Notice and warning signs must be placed on the machine or in the operating area in plain sight. Damaged or missing signs must be replaced immediately. The specified safety regulations must be followed at all times.

In the event of any kind of hazard, stop the machine immediately and turn off the main switch.

If there is a solvent leak:



Turn off the machine

Immediately send all personnel into the open air

Open windows and doors

Cut off the cause of the solvent leak

Change any clothing that is wet with solvent

If necessary, request a BÖWE customer service technician.

The escape of larger amounts of solvent is a reportable malfunction. It must be reported to the responsible authorities, industrial control group, fire department, water resources board or subordinate water authorities.

## 2. Safety Regulations

**2.**

---

The proper handling of solvent is an important prerequisite for workplace safety.

Note the following potential hazards:

Solvents are very good grease removers; they also remove natural oils from unprotected skin.  
Protection: Wear solvent-resistant protective gloves; apply skin cream with oil to the hands.

Liquid solvents are strongly irritating to the eyes.  
Protection: Wear protective goggles.

Solvents are combustible.  
Protection: Avoid ignition sources (smoking, sparks, fire).

Risk of explosion if the flash point is lowered.  
Protection: You must use solvents that have a flash point that is higher than the temperature stated on the machine nameplate. Use only chemical additives that do not lower the flash point.

Ignition sources  
Protection: Check pockets for cigarette lighters, matches and metallic objects.

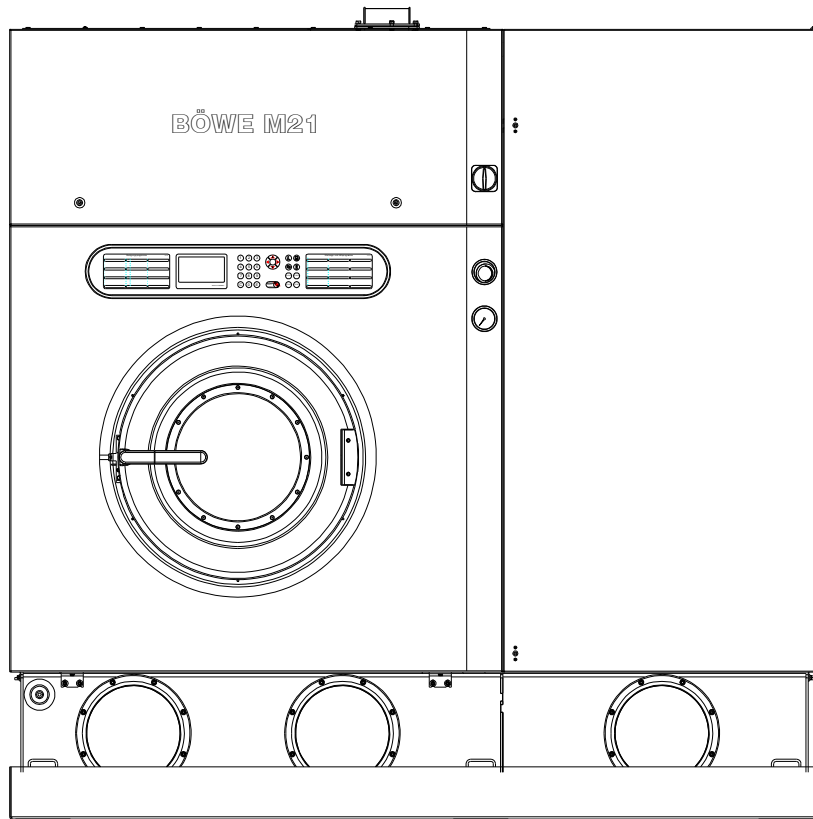
### **Do not overload the machine!**

You must hang up any operating instructions from the Clothing Mutual Indemnity Association in a visible location.



### 3. View of the Machine

3.



707764-01-01

#### 3.1 General Information

3.1

The BÖWE M21/M26/M30 is a state of the art drycleaning machine with computer control. The high level of processing technology it offers allows you to treat virtually all textiles on the market without problems.

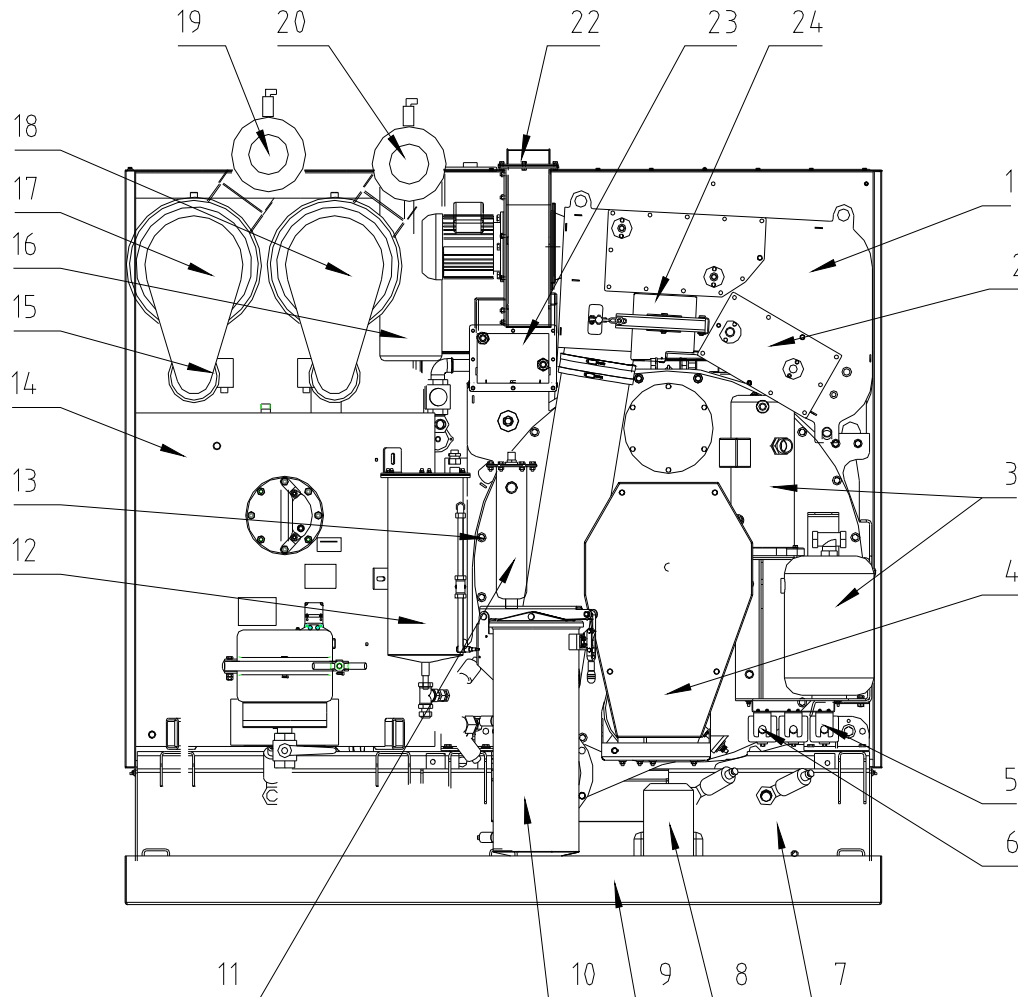
The machine serial number is on the nameplate.

### 3. View of the Machine

3.

#### 3.2 Rear of the Machine

3.2

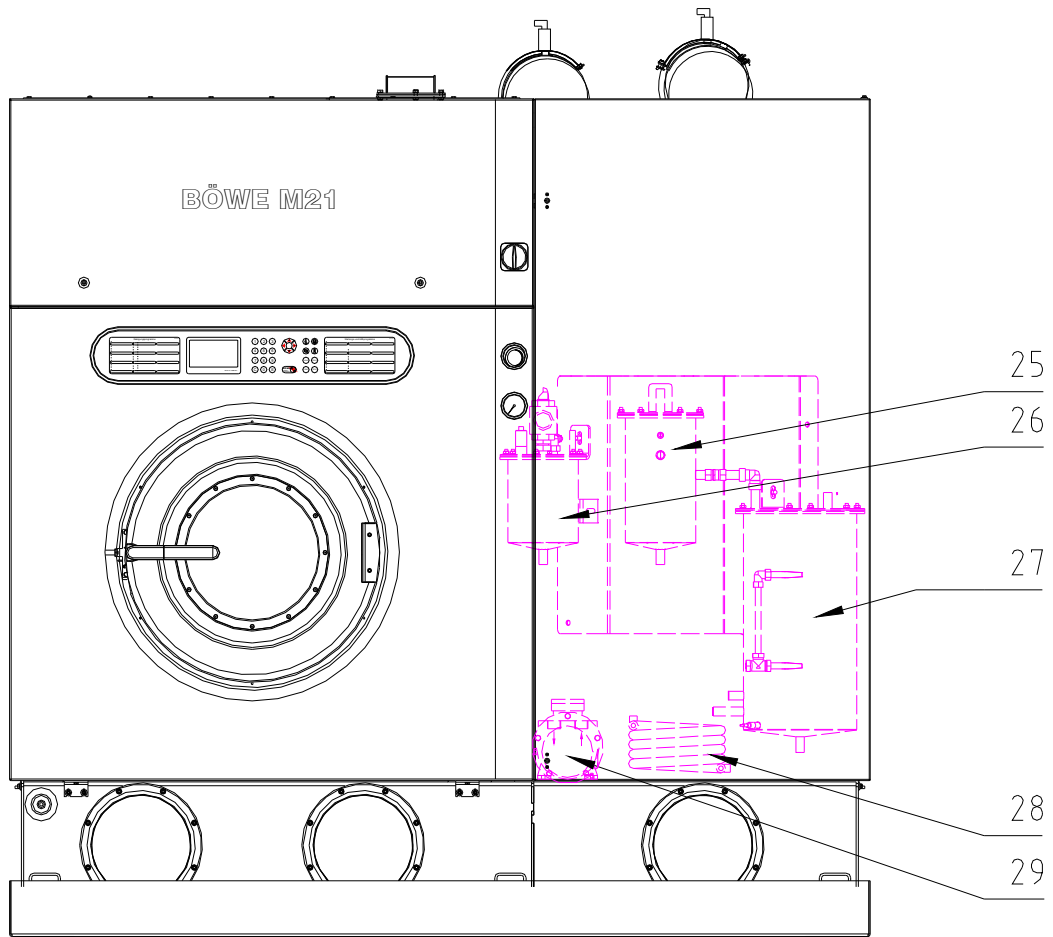


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- |    |                              |    |                                |
|----|------------------------------|----|--------------------------------|
| 1  | Airshaft                     | 13 | Cage housing with cage         |
| 2  | Cooling register             | 14 | Still                          |
| 3  | Refrigeration unit           | 15 | Filter drive                   |
| 4  | Cage drive                   | 16 | Condenser                      |
| 5  | Dosing unit                  | 17 | Economy filter 1               |
| 6  | Sprayer *                    | 18 | Economy filter 2 *             |
| 7  | Tanks 1, 2, 3                | 19 | Adsorption cartridge filter 1* |
| 8  | Solvent pump, solvent        | 20 | Adsorption cartridge filter 2* |
| 9  | Safety troughs               |    |                                |
| 10 | Button trap with lint filter | 22 | Fan                            |
| 11 | Solvent cooling system       | 23 | Heater battery                 |
| 12 | Water separator              | 24 | Additional lint filter         |

\* Option

### 3. View of the Machine

**3.**

707764-01-0

- 25 Operating material tank
- 26 Flash tank
- 27 Extraction tank
- 28 Operating material cooler
- 29 Vacuum pump

## 4. Technical Specifications

## 4.

### M 21

Heating		Steam	Electric
Filling quantity	kg (lb)	21 (46.3)	21 (46.3)
Cage volume	l (US gal)	420 (110.9)	420 (110.9)
Cage diameter	mm (in)	1000 (39.4)	1000 (39.4)
Cage depth	mm (in)	535 (21.1)	535 (21.1)
Cleaning speed/drying speed	RPM	35	35
Spinning speed:	RPM	600	600
Max. g-factor.		200	200
Low level	l (US gal)	52.5 (13.9)	52.5 (13.9)
High level	l (US gal)	105 (27.7)	105 (27.7)
<b>Operating load</b> (max. at 400 V,50Hz)			
Without distillation	kW	12	42
With distillation	kW	13	43
<b>Connected loads:</b>			
Compressor capacity	kW	5.0	5.0
Fan capacity	kW	1.5	1.5
Solvent pump capacity	kW	1.1	1.1
Cage drive capacity	kW	5.5	5.5
Filter drive capacity	kW	0.55	0.55
Vacuum pump capacity	kW	1.1	1.1
Steam generator capacity	kW	-	30
<b>Dimensions:</b>			
Machine dimensions:			
Width with distillation	mm (in)	2200 (86.6)	2200 (86.6)
Depth	mm (in)	1500 (59.1)	1500 (59.1)
Height without cartridge filter	mm (in)	2180 (85.8)	2180 (85.8)
Height with cartridge filter	mm (in)	2340 (92.1)	2340 (92.1)
Floor space	m <sup>2</sup> (ft <sup>2</sup> )	3.3 (35.5)	3.3 (35.5)
<b>Filling volumes:</b>			
Tank I	filling	l (US gal)	200 (52.8)
Tank II	filling	l (US gal)	125 (33.0)
Tank III	filling	l (US gal)	200 (52.8)
Economy filter 1		l (US gal)	75 (19.8)
Economy filter 2		l (US gal)	50 (13.2)
Distillation	filling	l (US gal)	220 (58.1)
Cartridge filter 1 (long)		l (US gal)	25 (6.6)
Cartridge filter 2 (short)		l (US gal)	15 (4.0)
Jumbo Cartridge Filter		l /US gal	40 (10.5)

The dimensions may differ if special options are used

## 4. Technical Specifications

4.

### M21

#### Heating

#### Steam

#### Electric

#### Consumption for drying:

Drying time inc. reduction	min.	26	26
Elec. energy drying	kWh	3.1	7.7
Saturated steam drying	kg (lb)	8.0 (17.6)	-
Cooling water dr.(12 °C/53.6 °F)	l (US gal)	130 (34.3)	130 (34.3)

#### Consumption for distillation(1x at low level):

Elec. energy for distillation	kWh	0.45	8.6
Saturated steam for distillation	kg (lb)	12.0 (26.5)	-
Cooling water for dist. (12 °C/53.6 °F)	l (US gal)	170 (44.9)	170 (44.9)

#### Consumption per cycle: \*

Elec. energy, total	kWh	4.05	16.8
Saturated steam, total	kg (lb)	20.0 (44.1)	-
Cooling water, total (12 °C/53.6°F)	l (US gal)	300 (79.2)	300 (79.2)
Compressed air (6 bar/87 psi)	l (US gal)	6 (1.6)	6 (1.6)

## 4. Technical Specifications

4.

### M21

Heating		Steam	Electric
<b>Other:</b>			
Dist. throughput (DIN 11916) max.	l/h (US gal/h)	180 (47.5)	180 (47.5)
Filter throughput	l/h (US gal/h)	5000 (1320.0)	5000 (1320.0)
Filter surface, economy filter 1	m <sup>2</sup> (ft <sup>2</sup> )	5.0 (53.8)	5.0 (53.8)
Filter surface, economy filter 2	m <sup>2</sup> (ft <sup>2</sup> )	3.5 (37.7)	3.5 (37.7)
Weight without solvent			
(with 2 economy filters, 2 cartridge filters)	kg (lb)	2120 (4674.6)	2120 (4674.6)
Weight with solvent			
(with 2 economy filters, 2 cartridge filters)	kg (lb)	2500 (5512.5)	2500 (5512.5)
Floor space	m <sup>2</sup> (ft <sup>2</sup> )	3.3 (35.5)	3.3 (35.5)
Floor surface **	m <sup>2</sup> (ft <sup>2</sup> )	2.3 (24.8)	2.3 (24.8)
Cage centrifugal force	N (lb)	18100 (4070)	18100 (4070)
Floor load, stat. and dyn.	N/m <sup>2</sup> (lb/ft <sup>2</sup> )	18500 (385)	18500 (385)
Noise level	dB (A)	62	62
<b>Heat balance: *</b>			
Heat to dissipate via cooling water ***:			
	kJ/cycle	41400	41400
Heat dissipated to the surroundings:			
	kJ/cycle	11000	11000

\* Values apply to a standard 2-bath cycle, 1<sup>st</sup> bath low level for distillation at cooling water inlet temperature + 12 °C (53.6°F), steam supply 4 - 5 bar (58.0 - 72.1 psi) overpressure saturated steam, ambient temperature 5 to + 40° C (41 to +104° F)

\*\* For portion of the floor surface for force transmission, see Installation Instructions, Point. 5.3.1

\*\*\* Refers to water without additives

**Subject to change!**

## 4. Technical Specifications

4.

Machine		M26	M30
Heating		Steam	Steam
Filling quantity	kg (lb)	26 (57.3)	30 (66.2)
Cage volume	l (US gal)	520 (137.3)	600 (158.4)
Cage diameter	mm (in)	1000 (39.4)	1000 (39.4)
Cage depth	mm (in)	665 (26.2)	770 (30.3)
Cleaning speed/drying speed	RPM	35	35
Spinning speed:	RPM	600	600
Max. g-factor.		200	200
Low level	l (US gal)	65 (17.2)	75 (19.8)
High level	l (US gal)	130 (34.3)	150 (39.6)
<b>Operating load</b> (max. at 400 V, 50 Hz)			
Without distillation	kW	12	12
With distillation	kW	13	13
<b>Connected loads:</b>			
Compressor capacity	kW	5.0	5.0
Fan capacity	kW	1.5	1.5
Solvent pump capacity	kW	1.1	1.1
Cage drive capacity	kW	5.5	5.5
Filter drive capacity	kW	0.55	0.55
Vacuum pump capacity	kW	1.1	1.1
Steam generator capacity	kW	-	-
<b>Dimensions:</b>			
Machine dimensions:			
Width with distillation	mm (in)	2200 (86.6)	2200 (86.6)
Depth	mm (in)	1630 (64.2)	1735 (68.3)
Height without cartridge filter	mm (in)	2180 (85.8)	2180 (85.8)
Height with cartridge filter	mm (in)	2340 (92.1)	2340 (92.1)
Floor space	m <sup>2</sup> (ft <sup>2</sup> )	3.6 (38.7)	3.8 (40.9)
<b>Filling volumes:</b>			
Tank I filling	l (US gal)	225 (59.4)	250 (66.0)
Tank II filling	l (US gal)	140 (37.0)	155 (40.9)
Tank III filling	l (US gal)	225 (59.4)	250 (66.0)
Economy filter 1	l (US gal)	75 (19.8)	75 (19.8)
Economy filter 2	l (US gal)	50 (13.2)	50 (13.2)
Distillation filling	l (US gal)	220 (58.1)	220 (58.1)
Cartridge filter 1 (long)	l (US gal)	25 (6.6)	25 (6.6)
Cartridge filter 2 (short)	l (US gal)	15 (4.0)	15 (4.0)
Jumbo Cartridge Filter	l /US gal	40 (10.5)	40 (10.5)

The dimensions may differ if special options are used

## 4. Technical Specifications

4.

Machine		M26	M30
Heating		Steam	Steam
<b>Consumption for drying:</b>			
Drying time inc. reduction	min.	31	36
Elec. energy for drying	kWh	3.6	4.1
Saturated steam for drying	kg (lb)	10.0 (22.0)	12.0 (26.5)
Cooling water dr.(12 °C/53.6 °F)	l (US gal)	150 (39.6)	170 (44.9)
<b>Consumption for distillation(1x at low level):</b>			
Elec. energy for distillation	kWh	0.6	0.75
Saturated steam for distillation	kg (lb)	15 (33.1)	18 (39.7)
Cooling water for dist. (12 °C/53.6 °F)	l (US gal)	220 (58.1)	260 (68.6)
<b>Consumption per cycle: *</b>			
Elec. energy, total	kWh	4.7	5.35
Saturated steam, total	kg (lb)	25.0 (55.1)	30.0 (66.2)
Cooling water, total (12 °C/53.6°F)	l (US gal)	370 (97.7)	430 (113.5)
Compressed air (6 bar/87 psi)	l (US gal)	6 (1.6)	6 (1.6)



## 4. Technical Specifications

4.

Machine		M26	M30
Heating		Steam	Steam
Other:			
Dist. throughput (DIN 11916) max.	l/h (US gal/h)	180 (47.5)	180 (47.5)
Filter throughput	l/h (US gal/h)	5000 (1320)	5000 (1320)
Filter surface, economy filter 1	m <sup>2</sup> (ft <sup>2</sup> )	5.0 (53.8)	5.0 (53.8)
Filter surface, economy filter 2	m <sup>2</sup> (ft <sup>2</sup> )	3.5 (37.7)	3.5 (37.7)
Weight without solvent			
(with 2 economy filters, 2 cartridge filters)	kg (lb)	2270 (5005)	2390 (5270)
Weight with solvent			
(with 2 economy filters, 2 cartridge filters)	kg (lb)	2700 (5953)	2850 (6284)
Floor space	m <sup>2</sup> (ft <sup>2</sup> )	3.6 (38.7)	3.8 (40.9)
Floor surface **	m <sup>2</sup> (ft <sup>2</sup> )	2.6 (28.0)	2.8 (30.1)
Cage centrifugal force	N (lb)	22400 (5036)	25900 (5822)
Floor load, stat. and dyn.	N/m <sup>2</sup> (lb/ft <sup>2</sup> )	18800 (393)	19200 (401)
Noise level	dB (A)	62	62
Heat balance: *			
Heat to dissipate via cooling water ***:			
	kJ/cycle	51100	59300
Heat dissipated to the surroundings *:			
	kJ/cycle	14000	18000

\* Values apply to a standard 2-bath cycle, 1<sup>st</sup> bath low level for distillation at cooling water inlet temperature + 12 °C (53.6 °F), steam supply 4 - 5 bar (58.0 - 72.1 psi) overpressure saturated steam, ambient temperature 5 to + 40 °C (41 to +104 °F)

\*\* For portion of the floor surface for force transmission, see Installation Instructions, Point 5.3.1

\*\*\* Refers to water without additives

**Subject to change!**

## 5. Settings and Optimum Operating Values

## 5.

Machine		M21	M26	M30
<b>Basic values:</b>				
Steam pressure (saturated steam)	bar (psi)	4 - 5 (58 - 72)	4 - 5 (58 - 72)	4 - 5 (58 - 72)
Steam temperature (max. permitted)	°C (°F)	150 (302)	150 (302)	150 (302)
Cooling water pressure	bar (psi)	2 - 4 (29 - 58)	2 - 4 (29 - 58)	2 - 4 (29 - 58)
Low cooling water level switch	bar (psi)	2 (29)	2 (29)	2 (29)
Cooling water temperature, max.	°C (°F)	25 (77)	25 (77)	25 (77)
Compressed air	bar (psi)	6 (87)	6 (87)	6 (87)
Low air pressure switch (if present)	bar (psi)	4 (58)	4 (58)	4 (58)
<b>Cage speeds:</b>				
Cleaning /drying	RPM	35	35	35
Spinning	RPM	400 /600	400 /600	400 /600
Reversing cycle (cleaning)	sec.	10 /5 /10	10 /5 /10	10 /5 /10
Low level	l (US gal)	52.5 (13.9)	65 (17.2)	75 (19.8)
High level	l (US gal)	105 (27.7)	130 (34.3)	150 (39.6)
Pump pressure (max.)	bar (psi)	1.5 (22)	1.5 (22)	1.5 (22)
Filter surface, economy filter	m <sup>2</sup> (ft <sup>2</sup> )	5.0 (53.8)	5.0 (53.8)	5.0 (53.8)
Tank I: Optimum filling volume (high level)	l (US gal)	110 (29.0)	135 (35.6)	155 (40.9)
<b>Detergent solution cooler:</b>				
Detergent solution thermal sensor:	°C	40	40	40
Detergent solution cooler ON	(°F)	(104)	(104)	(104)
	°C	45	45	45
Alarm value	(°F)	(113)	(113)	(113)
<b>Refrigeration technology:</b>				
Filling capacity, cooling agent R 404A	kg (lb)	4,6 (10.14)	4,6 (10.14)	4,6 (10.14)
<b>Expansion valve:</b>				
Nozzle size: solvent cooling	No.	03	03	03
Drying /reduction	No.	01	01	01
High pressure control ON	bar (psi)	21 (305)	21 (305)	21 (305)
High pressure control OFF	bar (psi)	25 (363)	25 (363)	25 (363)
Low pressure control	bar (psi)	2 (29)	2 (29)	2 (29)

## 5. Settings and Optimum Operating Values

## 5.

Machine		M21	M26	M30
<b>Drying:</b>				
Cooling water regulator setting:				
Adjust 4 – 6 min. after start of drying	bar (psi)	18 (261)	18 (261)	18 (261)
Thermal sensor cage entry *	°C (°F)	75 (167)	75 (167)	75 (167)
Temp. sensor after cooler:				
Alarm value 1	°C (°F)	30 (86)	30 (86)	30 (86)
Alarm value 2	°C (°F)	35 (95)	35 (95)	35 (95)
Safety temperature limiter after cooler *	°C (°F)	45 (113)	45 (113)	45 (113)
Safety temperature limiter, cage inlet *	°C (°F)	100 (212)	100 (212)	100 (212)
<b>Distillation</b>				
Cooling water regulator condenser	°C (°F)	45 (113)	45 (113)	45 (113)
Thermal sensor:				
Cycle distillation OFF	°C (°F)	133 (271)	133 (271)	131 (271)
Still stripping OFF	°C (°F)	138 (280)	138 (280)	138 (280)
Residue draining	°C (°F)	55 (131)	55 (131)	55 (131)
Thermal sensor, distilled solvent	°C (°F)	45 (113)	45 (113)	45 (113)
Restrictor in steam feeder	mm (in)	6 (.24)	6 (.24)	6 (.24)
Vacuum pressure control	kPa	minus 75	minus 75	minus 75
* at flash point >55°C (131 °F)				

## 6. Operation

## 6.

### 6.1 First Startup

### 6.1

The BÖWE Customer Service department is responsible for carrying out the first startup.



**Attention:** Before opening the switch panel or removing paneling, set the main switch to "0".

#### 6.1.1 Preparatory Work

Set up the supply systems (electrical current, cooling water, compressed air, steam and condensate line).

#### 6.1.2 Filling Machine With Solvent



You must use solvents that have a flash point that is higher than the temperature stated on the machine nameplate.

The amount of solvent needed is:

Machine M21 tank I: approximately 110 l (29 US gal)

Machine M26 tank I: approximately 135 l (36 US gal)

Machine M30 tank I: approximately 155 l (41 US gal)

Total filling amount M21: approximately 445 l (118 US gal)\*

Total filling amount M26: approximately 510 l (135 US gal)\*

Total filling amount M30: approximately 565 l (150 US gal)\*

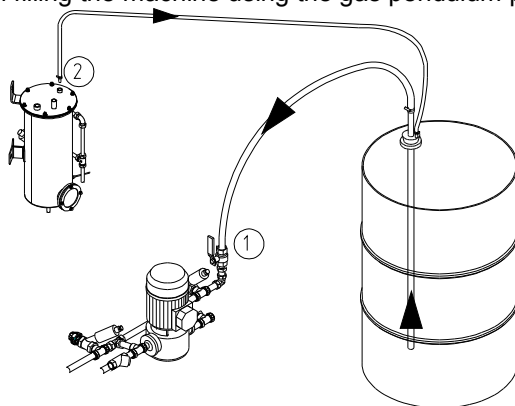
\*Machine with 1 economy filter.

For machines with 2 economy filters: + 50 l (13 US gal)

For machines with 2 economy filters and 1 cartridge filter: + 75 l (20 US gal)

For machines with 2 economy filters and 2 cartridge filter: + 90 l (24 US gal)

(When filling the machine using the gas pendulum process, refer to diagram)



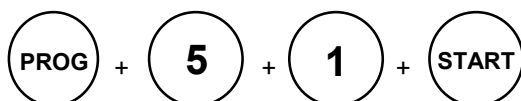
If the pump does not suction, pour about 5 liters (1.3 US gal) of solvent into the button trap. Check that the direction of rotation is correct.

## 6. Operation

6.

### Execution:

- Connect a hose between the barrel and ball valve (1).
- Connect gas displacement line between the barrel and water separator (2).
- Open the ball valve (1).
- Start program P51:



The tanks fill up, with one overflowing into the other.

- Watch the level of the liquid in the tank at the sight-glass until the tanks are full enough.
- Lift the suction line out of the barrel.
- Close the ball valve (1).
- Stop program P51 and leave:



- Remove the hose connections to the barrel.
- Put the screw cap on to the ball valve (1).
- Close the barrel and store in accordance with regulations.

Depending on the filter you have, you may have to refill with solvent after you fill the filter.

### If the barrel becomes empty during the filling, do the following:

- Close the ball valve (1).
- Stop program P51:



- Change the barrel.
- Open the ball valve (1).
- Continue program P51:



### 6.1.3 Refilling Solvent

Follow the procedure given in Point 6.1.2 for routine refilling of solvent.



**Attention:** Even empty containers can still hold solvent residues. Therefore, tightly seal the container (barrel) again and store or dispose of in accordance with regulations!

## 6. Operation

6.

### 6.1.4 Filling Extraction Tank with solvent

Use programme P60 to pump the solvent into the distillation  
By doing so the extraction tank fills of itself.

### 6.1.5 Manually Filling the Vacuum Pump Operating Material Tank

- Open the screw cap.
- Fill container with approximately 10 liters (2.6 US gal) of solvent. (Use funnel)
- Close the screw cap.

The vacuum pump is now ready for operation.

### 6.1.6 Vacuum Pump



The yellow ball valve between the operating material tank and the cooling coil must be open during operation.

The black needle valve in the venting line (ø 6mm or approx. 1/4 in) between the operating material cooler and the vacuum pump must be open.



Never allow the vacuum pumps to run when dry; never allow them to run in the wrong direction of rotation.

## 6. Operation

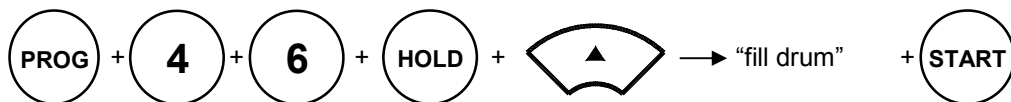
6.

### 6.1.7 Filling the Water Separator

The distillation heating starts automatically. The distillation fills the water separator.

### 6.1.8 Filling the Economy Filter

- Start filter maintenance program P46 (filter 1) or P47 (filter 2), starting with step “fill drum”:




You do not have to use filter powder!

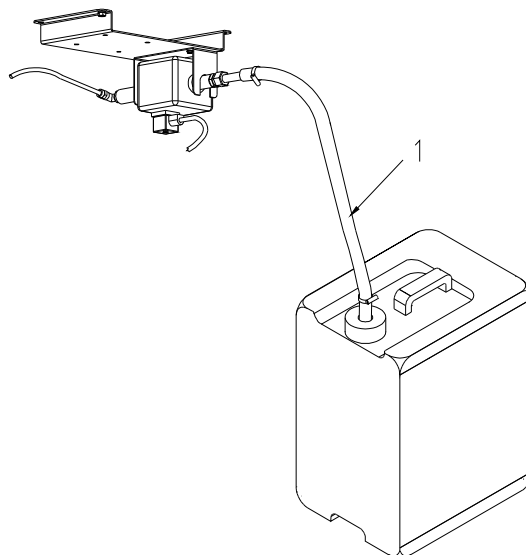
## 6. Operation

6.

### 6.1.9 Dosing Unit

- Insert suction hose (1) into cleaning agent container.
- Use function 60E + 26E,  
or 60E + 27E  
or 60E + 28E and an entry of time to start the pump suction, until the pump runs quietly.

	<b>Attention:</b> Watch the liquid level in the product container. The pump should not run when it is dry! Please put out of operation when the pump is not used! Addition of cleaner intensifier in the correct quantity (no overdosing) improves product run-off, minimises the risk of smell and prevents static charging.
---	--




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### 6.1.10 Sprayer (optional equipment)

The sprayer draws the product out of a tank and sprays it onto the garments in the cage.

- Insert suction hose into cleaning agent container.
- Use function 60E + 29E  
or 60E + 30E and an entry of time to start the pump suction, until the pump runs quietly.

The monthly multi-maintenance program P50 also has an integrated section to rinse the lines and nozzle.

	<b>Attention:</b> Watch the liquid level in the product container. The pump should not run when it is dry! Please put out of operation when the pump is not used!
---	---

### 6.1.11 Electrical Steam Generator (optional equipment, only for M21)

Look at the manual of the steam generator as well as information in the machine documents.



## 6. Operation

6.

### 6.1.12 Opening the Loading Door


#### Never leave the loading door standing open!

Before each start, make sure that the loading door is closed.  
During longer standstills, concentrations of the solvent gas can form.

You can unlock the loading door with the  button for up to 10 minutes.

Starting with the 11<sup>th</sup> minute, you cannot open the loading door until after you have started the "DEODORIZING" program (P43) and the horn has stopped sounding.

Once the machine has been turned on, it is not possible to open the loading door until the "DEODORIZING" program (P43) starts and the horn sounds to signal the end of the program.

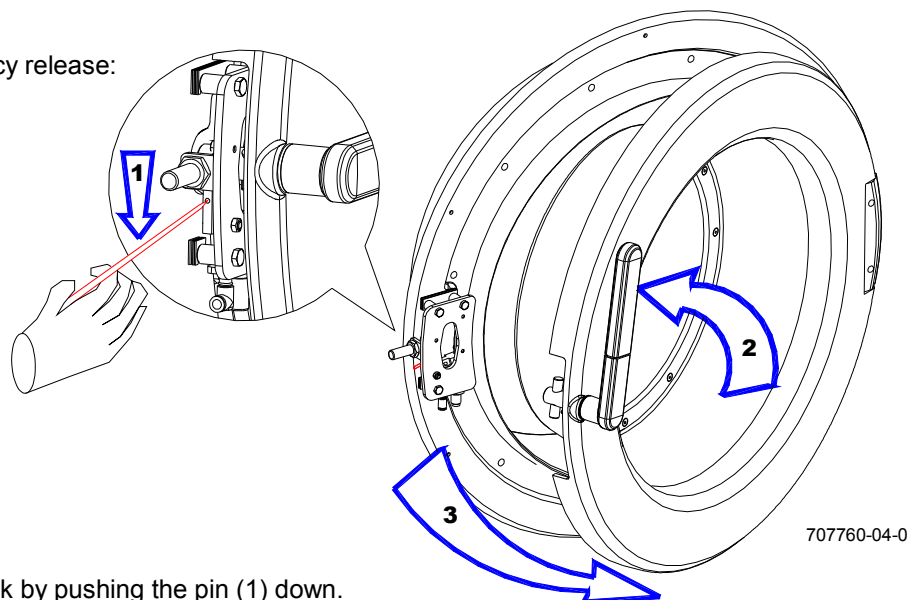
 <p><b>Caution</b></p>	<p><b>Attention:</b> When neither current nor compressed air is present or when the program has been interrupted, a mechanical <b>EMERGENCY</b> opening is possible with the help of a tool.</p>
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The trained user is permitted to carry out an EMERGENCY opening only when the program has stopped and the cage is not turning. Before the emergency opening, carefully open the button trap cover in order to release any overpressure.

After removing garments that have not finished drying, place them in a solvent-tight transport container. Obey the safety regulations.

Emergency release:



- Unlock by pushing the pin (1) down.
- Open the loading door at the same time (2+3).

After correcting the error, close the loading door and cover and continue the program by pressing the "Start" button.


## 6. Operation

6.

### 6.1.13 Performing a Test Run

Load the machine with test garments (note the filling capacity!).  
Start program P2 (see 6.2 Automatic Operation - Brief Instructions) and check the settings and operating values listed under Point 5 during the cycle; correct if necessary.

### 6.1.14 Refrigeration Unit

	<p><b><u>Attention:</u></b></p> <p>No cooling agent is allowed to escape into the atmosphere during operation, servicing work and decommissioning of refrigeration units.</p> <p>You must keep a record of the quantities of cooling agent used and present this record to the authorities upon demand.</p> <p>Only people who have the necessary special knowledge and technical equipment are authorized to service and decommission refrigeration units.</p>
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## 6. Operation

## 6.

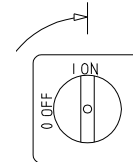
### 6.2 Automatic Operation - Brief Instructions

### 6.2

Open valves for water, steam, condensate, compressed air.  
Set up the power supply  
Before starting, make sure that all doors and covers are closed.

Turn main switch "ON"

Display: The display shows which software relating to the solvent has been installed. Delete with "C"  
"BOEWE"  
"Textile Cleaning"



Machine type, for example: "M21"

Then the deodorizing program "P43" is displayed.

Press the "Start" button.

After the signal sounds, press the "Stop" button.

Loading:

Open the loading door, load the cage according to the filling capacity, close the loading door.

Erase the displayed, previous program

P43 by pressing "C".

Select a program according to the overview.

Input the required program

(program and number)



Start:

Press "Start". The pointer E114 might appear. Delete with "C".

The program executes automatically.

During automatic and manual operation, the loading door is locked from the start of the cycle until the end (signal).

If there is a failure or if the door limit switch is not adjusted correctly, there will be an alarm indication.

A signal that sounds in intervals announces that the program has ended.

Stop: Press the "Stop" button\*.

Open the loading door and unload the garments.

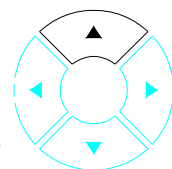
Close the loading door.

If you repeat the same program, you only need to load the garments, close the loading door and press the "Start" button.

If you do not restart the machine, the

loading door locks. You can unlock the door with the

"↑" button for up to 10 minutes. Starting with the 11<sup>th</sup> minute, start "P43" deodorizing.



Caution

**Turn off the main switch if there is a risk of any kind.**

**If the machine is severely out of balance during spinning, stop it by pressing the "STOP" button, or by pressing pushbutton**



**reduce the number of revolutions.**

\* When pressure in the machine has built up (visible as a block diagram in the display) the signal E106 appears. When the pressure has dissipated, the loading door unlocks and can be opened.

## 7. Functional Units

## 7.

### 7.1 Tanks (Work Tank /Clean Tank /Extra Tank)

### 7.1

The **work tank** contains solvent, which is used over and over.

The solvent is pumped from the work tank to the cage. If there is not enough solvent in the work tank, fresh solvent is taken from the clean tank. After the garments have been cleaned, the solvent is pumped back to the work tank or to the distillation.

**Tank 3** is an extra tank for special applications. If an optional second centrifuge filter is used, this is allocated to the third tank. This permits separate cleaning of light and dark products.

Clean solvent that is recovered from the 2<sup>nd</sup> fraction of the distillation is in the **clean tank**.

When the clean tank overflows, it fills up the work tank again.

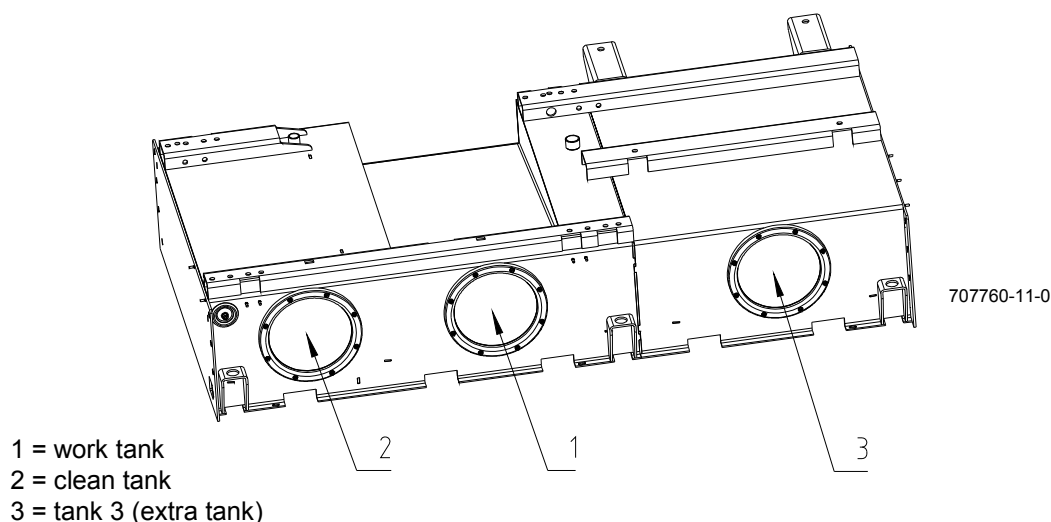
Sacrificial anodes in the tanks protect against corrosion.

M21	Filling volumes	Recommended filling quantity
Work tank	200 l (52.8 US gal)	105 l (27.7 US gal) (high level)
Tank 3	200 l (52.8 US gal)	105 l (27.7 US gal) (high level)
Clean tank	125 l (33.0 US gal)	125 l (33.0 US gal)

M26	Filling volumes	Recommended filling quantity
Work tank	225 l (59.4 US gal)	130 l (34.3 US gal) (high level)
Tank 3	225 l (59.4 US gal)	130 l (34.3 US gal) (high level)
Clean tank	140 l (37.0 US gal)	140 l (37.0 US gal)

M30	Filling volumes	Recommended filling quantity
Work tank	250 l (66.0 US gal)	150 l (39.6 US gal) (high level)
Tank 3	250 l (66.0 US gal)	150 l (39.6 US gal) (high level)
Clean tank	155 l (40.9 US gal)	155 l (40.9 US gal)

All three tanks are self-cleaning, which means that the sloping bottoms remain nearly free of dirt.



### 7.2 Solvent Pump

### 7.2

The solvent pump is a self-priming vertical pump.

Delivery rate up to 175 l/min (46.2 US gal/min)

## 7. Functional Units

## 7.

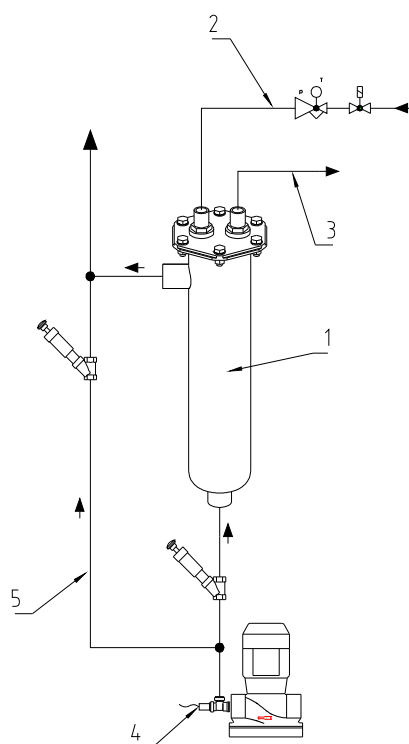
### 7.3 Solvent Cooling System

### 7.3

The detergent solution cooler works over a heat exchanger that is cooled with a cooling agent. The cooling of the solvent is set to 40 °C (104 °F).

The cooling is controlled over a thermal sensor at the input to the heat exchanger.

During each bath, the program remains stopped before pumping up (the cage does not move) until the selected detergent solution temperature has been reached. Then the detergent solution temperature is monitored while the program runs.



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- 1 Solvent cooling system
- 2 Cooling agent inlet
- 3 Cooling agent outlet
- 4 Thermal sensor
- 5 Bypass without cooling

## 7. Functional Units

## 7.

### 7.4 Economy Solvent Filter

### 7.4

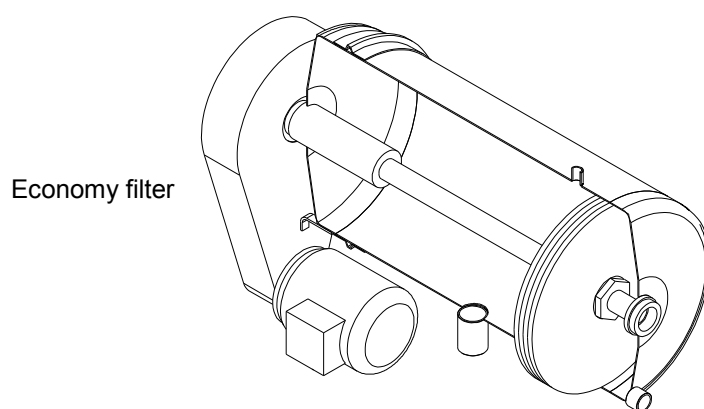
The economy filter is a filter without a precoating (without filter powder).  
You must perform filter maintenance after a selectable number of cycles or at least once a week.

After filter maintenance program P46 or P49 starts, all necessary processes run fully automatically (draining, spinning, rinsing, precoating, cage drying with reduction).  
A signal sounds after the reduction.  
The machine is ready for use again.

#### Second economy filter (optional equipment):

Use a second filter when you want to filter the solvent separately for white and dark garments.  
It is allocated to the third tank.

Separate standard cleaning programs are available for the second filter. Select filter maintenance program P47 for fully-automatic maintenance of the second filter.



707760-06-0

#### Note:

With the filter maintenance programmes automatically the distillation maintenance programme starts( smbol 15).

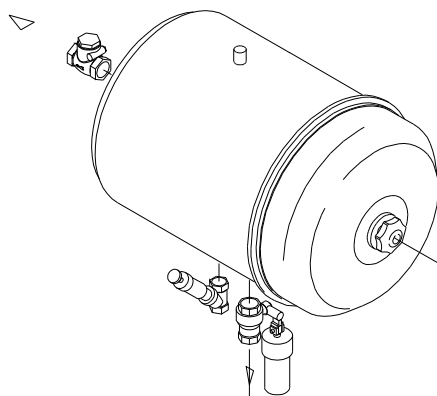
## 7. Functional Units

**7.**

### 7.5 Solvent Filter, Jumbo Cartridge (Optional equipment)

**7.5**

**This model is only available without distillation!**



The special cartridges handle filtration of both pigment dirt and soluble constituent parts by combining different adsorbents, such as carbon and so-called bentonite, with paper filters.

## 7. Functional Units

## 7.

### 7.6 Adsorption Cartridge Filter

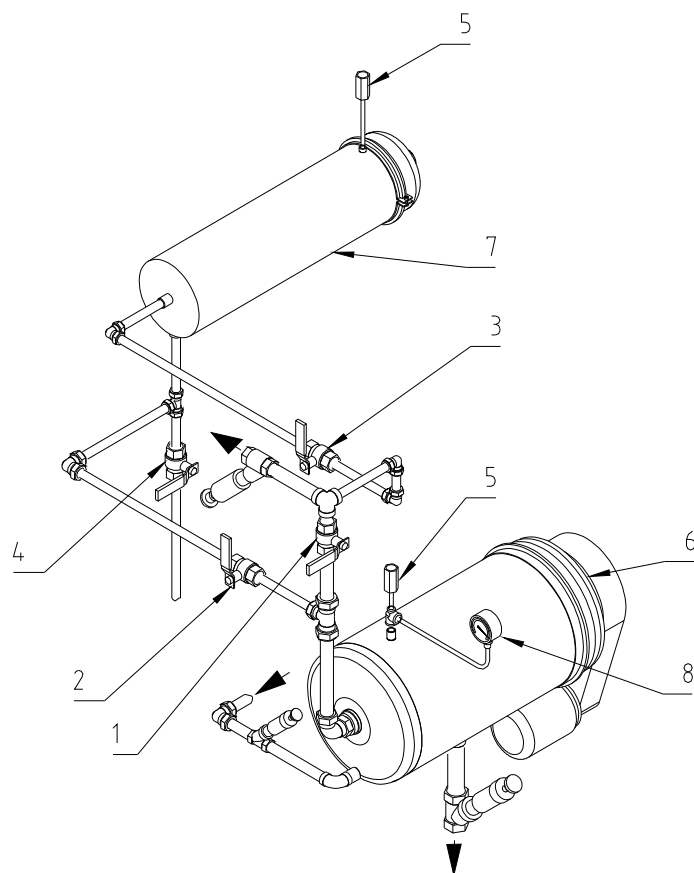
### 7.6

#### (Optional equipment /USA standard)

The reason that the economy filter and the cartridge adsorption filter are both used on one machine is that this provides separate filtration of pigment dirt and soluble dirt (fatty acids, dyes).

The insoluble pigment dirt is separated with the help of the extraction filter and the soluble dirt (especially dyes) is adsorbed on the cartridge.

In case there is discoloration of the solvent during the cycle, it is possible to manually activate the cartridge filter (7) in the filter circuit after the economy filter (6).



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Steps for activating the cartridge filter:

- Open ball valves (2) and (3)
- Close ball valve (1)

If you want to remove the filter from the solvent circuit again and use only the economy filter, make the following setting by hand:

- Open ball valve (1)
- Close ball valves (2) and (3)



## 7. Functional Units

7.

### 7.7 Cage

7.7

The cage has a dynamic channeling of holes for optimum air flow during drying.

### 7.8 Cage Drive

7.8

The cage drive is an adjustable V-belt drive with 3 V-belts.

### 7.9 Button Trap

7.9

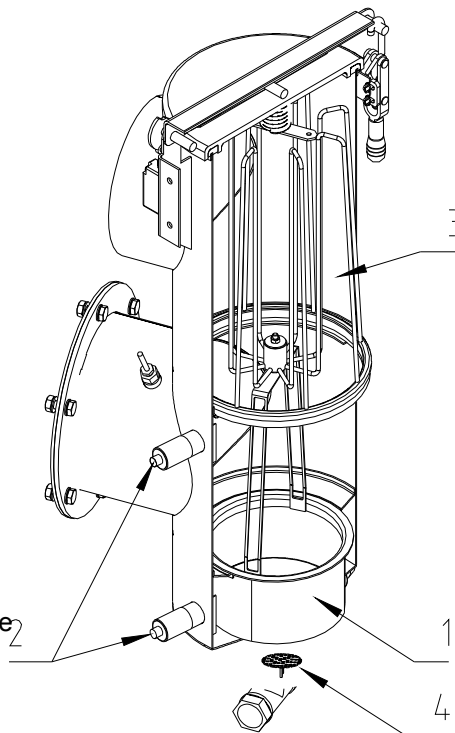
The button trap strainer (1) catches large impurities (such as buttons, etc.) and lint that are in the detergent solution. Never operate the system without the button trap strainer! (Risk of damaging the solvent pump). Additionally there is a perforated disk below at the outlet tube (4). During the drying, a flow of air dries the dirty lint in the button trap strainer.

### 7.10 Level Controller

You can adjust the low and high levels with a capacitive sensor. (2)

### 7.11 Lint Filter

The lint filter (3) catches the lint that is carried along in the air flow. The lint filter is in the button trap housing. Never operate the system without the lint filter! Never use a damaged lint filter! Make sure that the lint filter sits firmly in place. (Risk of lint on the cooling register)



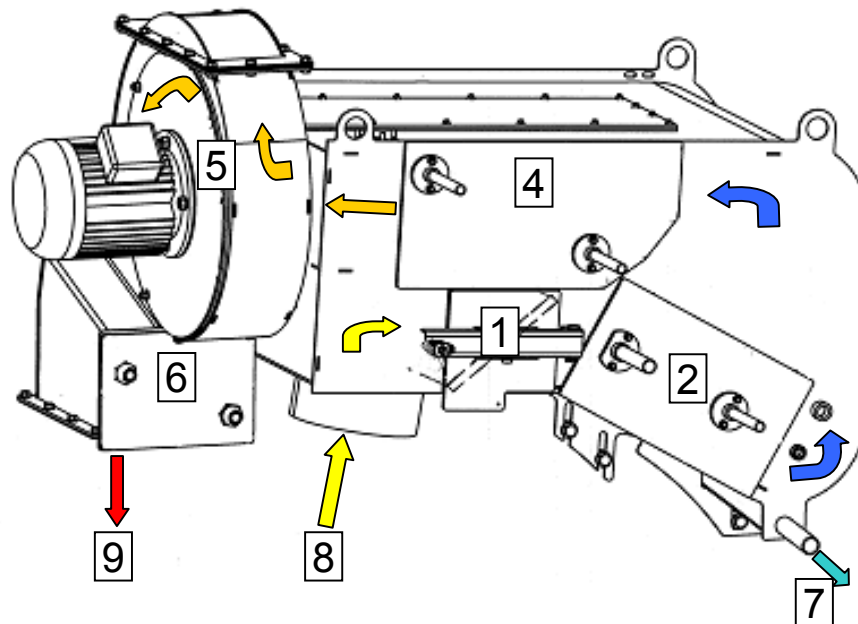
## 7. Functional Units

## 7.

### 7.12 Airshaft

### 7.12

An additional lint filter, refrigeration unit and fan, with housing, are integrated in the airshaft.



Airshaft Rück.jpg

- 1 Additional lint filter
- 2 Intense cooling unit
- 4 Pre-heater
- 5 Fan with housing
- 6 Heater battery
- 7 Solvent drain
- 8 Air inlet
- 9 Air outlet

#### 7.12.1 Additional Lint Filter:

For safety reasons, the additional lint filter protects the cooling register from linting up in case the lint basket has been left in the button trap.

## 7. Functional Units

## 7.

---

### 7.12.2 Refrigeration Unit:

Refrigeration technology is used to cool the air cooler in the airshaft and to cool the solvent. The low aftercooler temperature of the air cooler reduces the solvent residue concentration in the cage and the solvent emissions.

The heated gas that arises in the cooling compressor (heat pump principle) is fed through the pre-heater. The energy consumed for drying is considerably reduced because the thermal energy is fed back.

The air cooler is specially coated as protection against corrosion.

### 7.12.3 Heater Battery:

The drying air is heated up in the heater battery. The heater battery is fed either by external steam or by the small electric steam generator (only at M21) that is integrated in the machine.

### 7.12.4 Thermal Sensor After Cooler:

A thermal sensor regulates the aftercooler temperature.

### 7.12.5 Safety Temperature Limiter:

In addition, an independent safety temperature limiter is built in after the cooler, in order to monitor the function of the cooler. It is set to a maximum temperature. When the temperature reaches this level, the machine switches off.

## 7. Functional Units

## 7.

### 7.13 Drying Controller (Volume Drystat)

### 7.13

The drying controller is in the solvent drain line from the air duct to the extraction tank. It consists of a valve and a sight-glass with built-in level sensor, positioned above the valve.

The drying controller determines the amount of recovery to be expected in a predefined period of time. If this particular level of recovery is no longer attained during the predefined time period, the garments are dry.

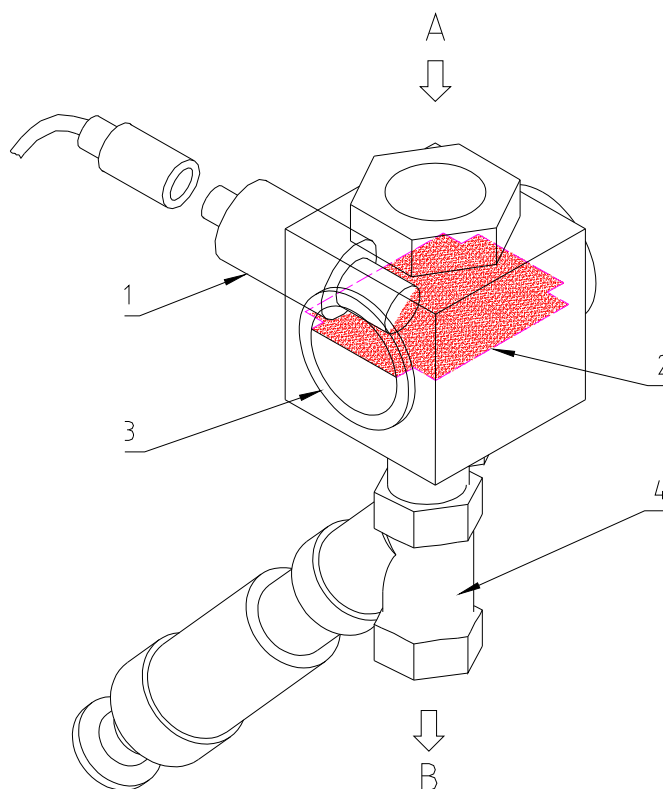
The valve closes after the end of the specified drying time. The recovery causes the volume (measurement chamber) between the valve and sensor to fill.

When the filling level has been reached, the sensor opens the valve and the solvent drains into the extraction tank. This process repeats until the filling time (adjustable in the specification code) is exceeded.

The programme enters the post-drying phase, when additionally a certain temperature is reached.

The measurement chamber must empty within a specific time. If this time is exceeded, an error message is displayed and the machine switches to the malfunction state.

Note the diagnostic message!



707760-03-0

A = solvent feed from air duct

B = solvent drain to extraction tank

1 = level sensor

2 = solvent level

3 = measurement chamber (sight-glass)

4 = valve

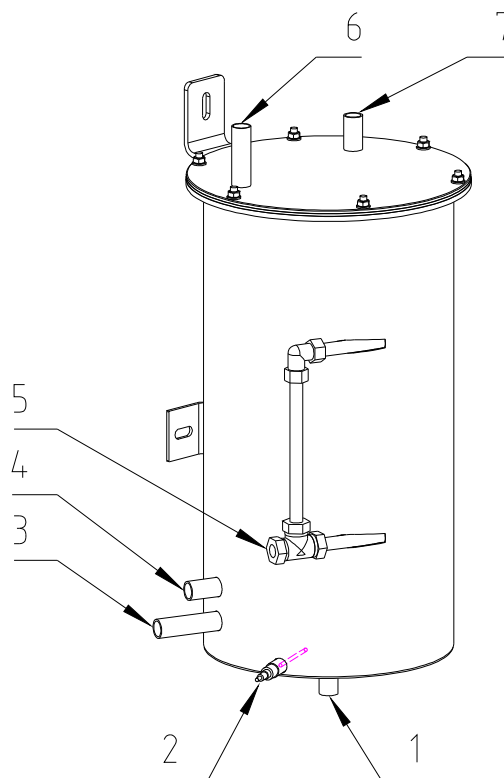
## 7. Functional Units

## 7.

### 7.14 Extraction Tank

### 7.14

The condensate recovered from the drying is fed to the extraction tank. In the same way, the condensate runs from the 1<sup>st</sup> fraction of the distillation into the extraction tank. The condensate from the 1<sup>st</sup> fraction distillation mainly contains water and low-boiling solvent. In the extraction tank, the water and other low-boiling solvents are separated from the cleaning solvent. The heavy water collects at the bottom. In the lower area, there is a water-sensitive level sensor, which controls the draining of the process water. Higher up, the solvent is routinely suctioned off and then used for the precleaning bath or suctioned off to the distillation. There is always a residual amount of solvent and water that remains in the extraction tank. This is why you must carry out maintenance on the tank routinely. There is a fixed program available for this.



707763-01-0

- 1 For draining water/emptying tank
- 2 Water sensitive level sensor
- 3 Drying inlet, distillation inlet
- 4 Solvent suctioning

- 5 Connection, rinsing with pump
- 6 Overflow from operating material tank
- 7 Ventilation and aeration atmospheres

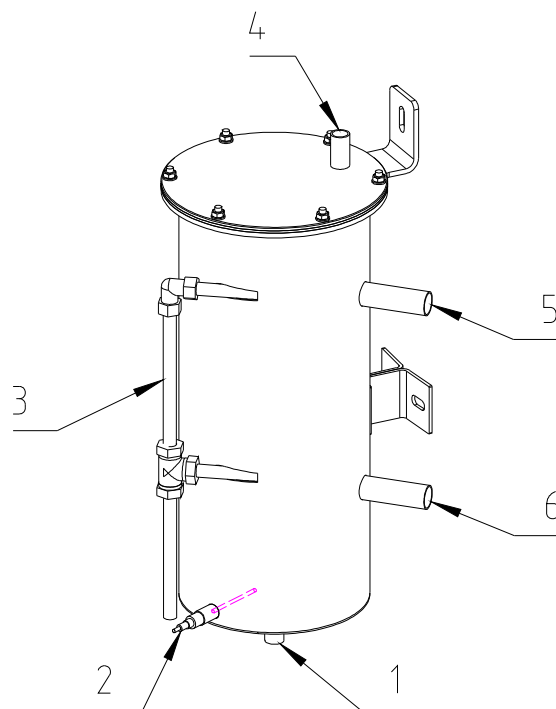
## 7. Functional Units

## 7.

### 7.15 Water Separator

### 7.15

The condensate recovered from the 2<sup>nd</sup> fraction of the distillation runs to the water separator. In the water separator, water that may still be left and other low-boiling solvents are separated from the cleaning solvent. The heavy water collects at the bottom, where there is a water-sensitive sensor, which controls the draining of the process water. The solvent runs to the clean tank.



707763-02-0

- 1 For draining water/emptying tank
- 2 Water-sensitive level sensor
- 3 Connection, rinsing with pump

- 4 Ventilation and aeration atmospheres
- 5 Solvent overflow to clean tank
- 6 Distillation inlet

## 7. Functional Units

## 7.

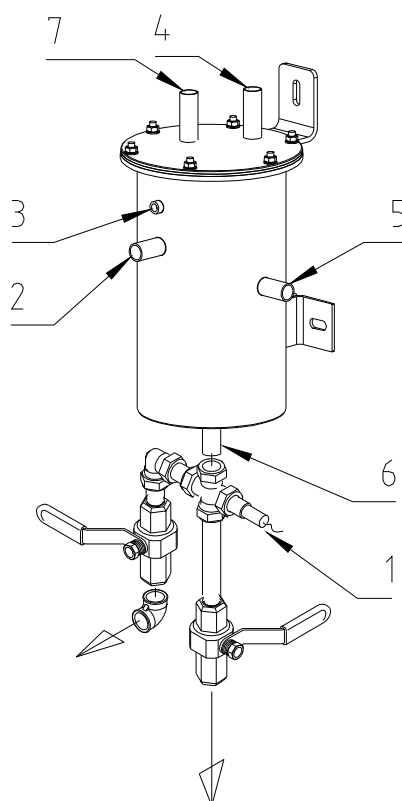
### 7.16 Vacuum Pump

### 7.16

The vacuum pump is a liquid ring pump that needs a certain amount of liquid to operate. The vacuum pump evacuates the distillation system. The vacuum pump on-times are regulated over the vacuum pressure controls and over the machine control system.

#### 7.16.1 Operating Material Tank:

The operating material tank supplies the vacuum pump with the liquid it needs for operating.



707763-03-0

- 1 Thermal sensor for operating material
- 2 Vacuum pump inlet
- 3 Aeration for vacuum pump

- 4 Ventilation and aeration atmospheres
- 5 Overflow to extraction tank
- 6 Discharge to operating material cooler/for emptying
- 7 Filler stubs

## 7. Functional Units

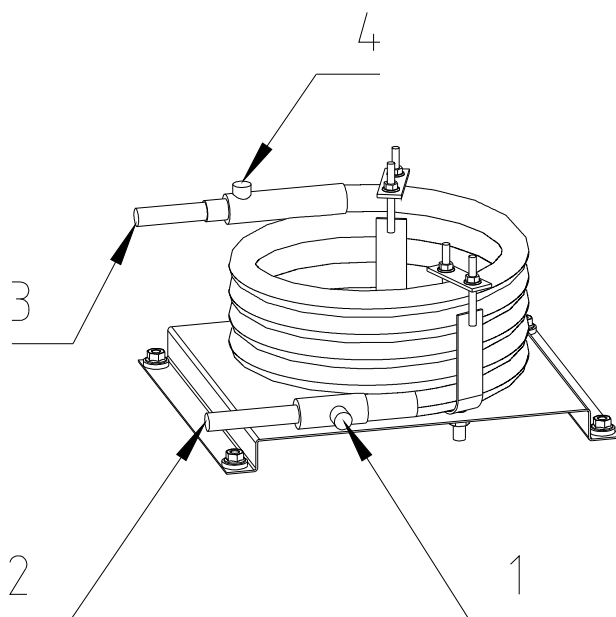
## 7.

### 7.17 Operating Material Cooler

### 7.17

The solvent needed for operating the vacuum pump is cooled in the operating material cooler. If the solvent is too warm, there may be noises in the pump.

The operating material cooler always operates when the vacuum pump is running. A sensor monitors the temperature. When a selectable temperature is exceeded, the vacuum pump switches off.



707763-05-0

- 1 Operating material outlet to vacuum pump
- 2 Cooling water inlet
- 3 Cooling water outlet to condenser
- 4 Operating material inlet

### 7.18 Steam Generator

### 7.18

Optional equipment, for the M21 only

On electric machines, the saturated steam needed for distillation and drying is generated in the small electric steam generator. The system is automatically vented and filled with fresh water.



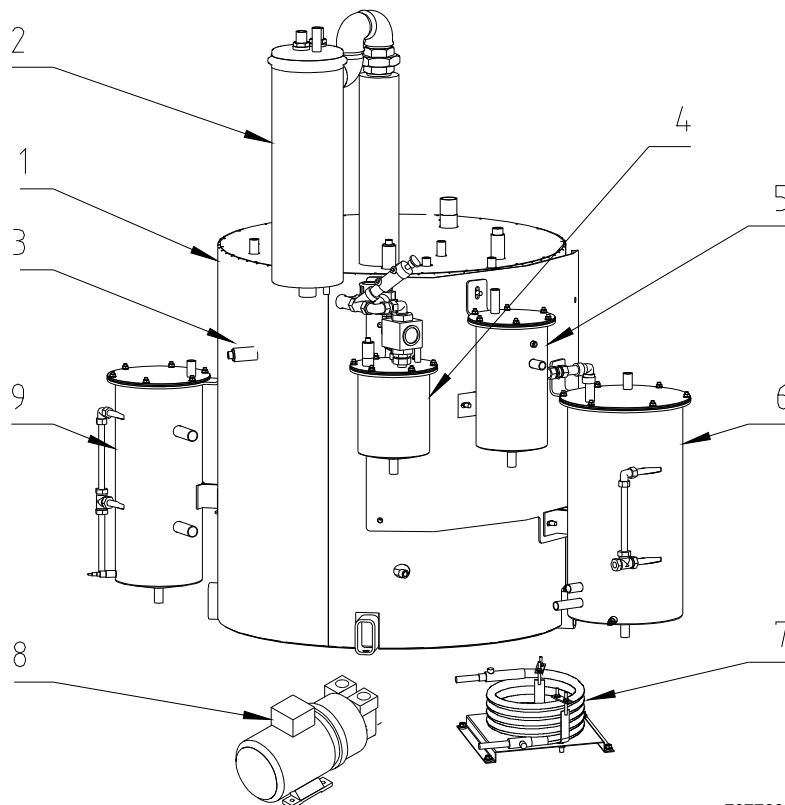
## 7. Functional Units

## 7.

### 7.19 Distillation

### 7.19

The distillation systems consists of the still with ascending pipe, condenser, water separator, flash tank, extraction tank, operating material tank, operating material cooler and vacuum pump. The still is equipped with an overfill preventer. The still and the sight-glass are rinsed each time the still is filled. You can turn the distillation heater on and off with 13E. A thermal sensor at the bottom turns off the heating when a selected value has been exceeded. Distillation takes place at an underpressure of approximately 900 mbar (13 psi). Besides you can stop the destillation by pressing the button „0“ (about 2 sec.)



707763-06-0

- 1 Still with ascending pipe
- 2 Condenser (stainless steel)
- 3 Overfill sensor
- 4 Flash tank
- 5 Operating material tank

- 6 Extraction tank
- 7 Operating material cooler
- 8 Vacuum pump
- 9 Water separator

## 7. Functional Units

## 7.

The distillation process runs according to the following description:

### **Start**

The distillation system starts automatically when the vacuum is built up, even before solvent is pumped to the distillation system.

### **Filling**

When the pre-selected vacuum is reached, the vacuum causes solvent to be suctioned to the distillation system (the solvent pump assists).

The filling process ends when either:

- a) The filling time has expired
- b) Air is suctioned in or
- c) The level probe in the still cuts off.

### **Pre-distillation**

Pre-distillation begins automatically when a), b) or c) occurs.

The still heats up to the preliminary temperature for the 1<sup>st</sup> fraction. The low-boiling solvents evaporate and flow to the condenser. This distillate is extracted over the flash tank by the condenser and drained to the extraction tank.

The main distillation process takes place after this preliminary phase.

### **Main distillation**

The still heats up to the solvent's boiling point (2<sup>nd</sup> fraction).

This distillate is extracted over the flash tank and drained to the water separator.

The distillation process ends when a pre-selected bottom temperature has been reached in the still.

The vacuum pump switches off. The red reference lamp on the distillation system lights.

The vacuum stays at its level at the time.

Measures to guarantee safety during distillation:

- The vacuum is continuously checked
- Overfill preventer
- Monitoring of the temperature of the condensate, the vacuum pump's operating material and the distillation process at the bottom of the still.
- You can only open the distillation system door when it has cooled off and maintenance has been run. This is the only time when the system is vented. Green reference lamp lights.

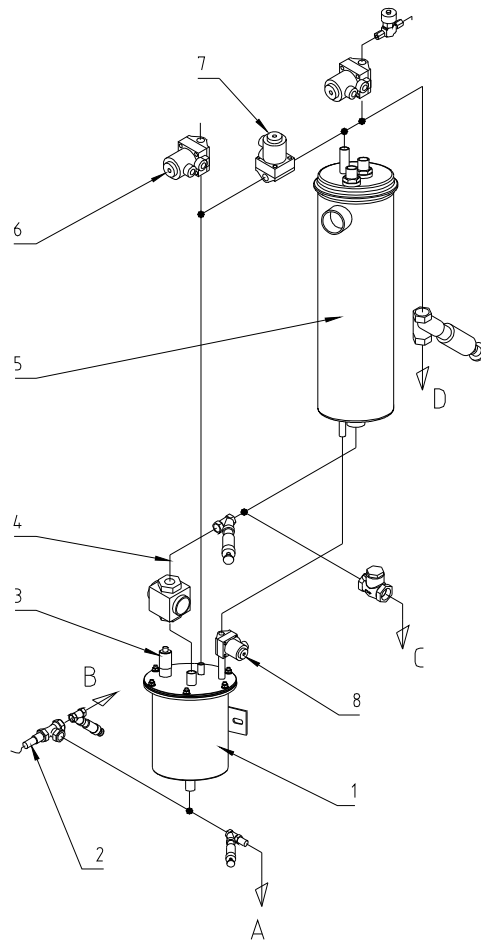
## 7. Functional Units

## 7.

### 7.19.1 Flash Tank

The condensate from the first fraction and then from the second fraction are recovered from the distillation over the flash tank. During the distillation process, the flash tank is under the same vacuum as the distillation system. The condensate from the first fraction (low-boiling solvents) runs from the condenser to the flash tank. To drain the distillation system, the flash tank is disconnected and vented. Draining is done to the extraction tank.

The condensate of the second fraction (cleaning solvent) is extracted in just the same way, but is drained into the water separator. The level probe in the flash tank controls the draining.



707763-04-0

- |                                 |   |
|---------------------------------|---|
| 1 Flash tank                    | 7 Evacuation of flash tank                          |
| 2 Thermal sensor                | 8 Steam trap, first fraction (low-boiling solvents) |
| 3 Level sensor, overflow sensor | A – Discharge, first fraction to extraction tank    |
| 4 Steam trap, second fraction   | B – Discharge, second fraction to water separator   |
|                                 | C – Overflow to distillation                        |
| 5 Condenser                     | D – Suction line to vacuum pump                     |
| 6 Venting, flash tank           |   |

## 7. Functional Units

## 7.

### 7.20 Dosing Unit


### 7.20

The device, a vibrating reciprocating pump (1), automatically doses chemical additives from the supply pack:

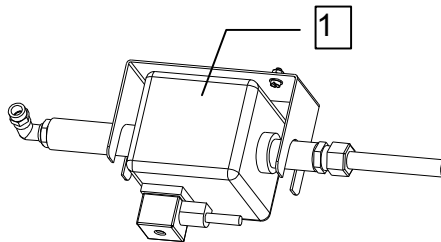
- In each cycle
- At the right time
- In the right amount.

The dosing amount depends on the information provided by the manufacturer of the product.

Use only products that remain liquid at room temperature.

	<b>Attention:</b> <b>Watch the liquid level in the product container.</b> <b>The pump should not run when it is dry!</b> <b>Use only suitable chemical additives.</b>
---	---

Before longer standstills and when changing products, rinse out the unit with solvent.



707760-13-0

### 7.21 Sprayer

### 7.21

(optional equipment)

#### General Information

The sprayer is a device for finishing and waterproofing the garments in the drycleaning machine. The sprayer draws the product or product mixture out of a tank and sprays it onto the garments in the cage.

The drycleaning machine computer control system controls the sprayer. Stored fixed programs or individually created customer programs handle the fully automatic sequence of the rinsing process.

With absorbent ski clothing, quilted jackets, down, Goretex, microfiber textiles, etc. we recommend that you spray on to dry garments.

Rinsing the garments with solvent from the machine's clean tank before spraying usually results in better waterproofing results.

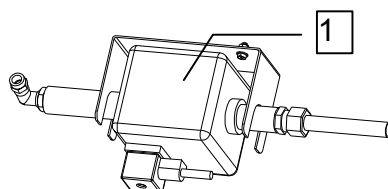
It is possible to build the sprayer on to the cleaning machine at a later time; everything has been prepared.

## 7. Functional Units

7.

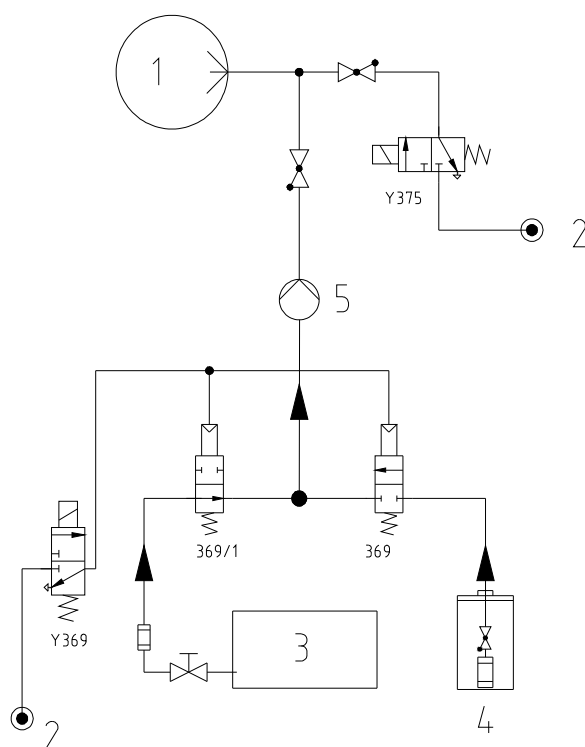
### Construction

The main component is a vibrating reciprocating pump (1) with connections for the product suction lines, suction lines for rinsing with solvent from the clean tank, spray line, connection for compressed air for blowing the spray nozzles clean and electrical connection for the pump.



707760-13-0

Sprayer functional diagram:



707760-15-0

- 1 Cage
- 2 Compressed air 6 bar (87 psi)
- 3 Clean tank
- 4 Product
- 5 Spray pump

## 7. Functional Units

## 7.

### Sprayer operation

The computer controls the sprayer.

Use only products that remain liquid at room temperature.



**Attention:** **Watch the liquid level in the product container.**  
**The pump should not run when it is dry!**  
**Use only suitable chemical additives.**

Then enter the number of the waterproofing program, press the "START" button; the spraying time, which you can change, if necessary, appears in the display field. Press "E" to start the program.

The system suctions the product from the product container and passes it through the open stop valve (369); the system feeds the product through the spray pump to the spray nozzles in the cage via the non-return valve and then sprays the garments.

The flexible suction hose is shaped into a tube at one end so that the suction line always reaches vertically down to the bottom of the product container. A fine sieve with suction valve is located at the suction opening.

The total spraying time determines how much of the product is sprayed, according to the throughput capability of the spray nozzles and the pump pressure.

A step that uses compressed air to "blow free" the spraying line and spray nozzles is automatically performed in the program sequence. Also valve Y375 for the compressed air line is then opened for 30 seconds. When the "blow free" step has completed, the spray pump turns off and valve Y375 closes.

Before longer standstill times or before you change the product, we recommend that you rinse with solvent. This should prevent the sprayer from becoming gummed up with product residues.

Do this by starting program P50. For the duration of the spraying, the stop valve (369/1) is open, so that solvent from the clean tank is suctioned in for rinsing instead of the product.



In order to achieve a good waterproofing effect, make sure not to overload the cleaning machine with garments.

It is useful to apply the amount of product to the number of garments instead of to the weight.

The recommended value is 40 ml of product for waterproofing each garment piece. Please refer to the datasheets from the appropriate manufacturer for the exact amount.

The machine uses a 1.5 nozzle; an additional 2.5 nozzle is included in the delivery. Your chemical additives supplier can help you to make the exact adjustment.

### Note:

On request the probes for the containers with auxiliary agents can be supplied at the same time. These will give information in good time, when the containers are to be replaced.

## **7. Functional Units**

## **7.**

---

### **7.22 Solvent Safety Trough**

### **7.22**

The drycleaning machine and distillation unit are equipped with an integrated solvent safety trough.

The safety trough prevents any liquid solvent that may possibly escape from getting into the ground.

### **7.23 Cooling Water Shortage Fuse**

### **7.23**

A shortage of cooling water is registered in two ways:

1. By monitoring the cooling water pressure before the cooling water regulator. The shortage fuse operates when the water pressure falls.
2. The temperature is monitored by sensor in the solvent drain line after the condenser.

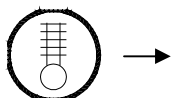
## 8. Data Displays

8.

### 8.1 Temperature Display

8.1

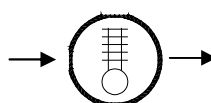
- Press function key:



Temperatures 1 - 8 are displayed.

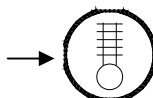
Machine	P21	User Guide
Time	10:45	
--	Temperature Display	
air outlet	:020°C	Condenser :020°C
air inlet	:020°C	Solvent :020°C
Bottom Still	:022°C	above carbon :020°C
After cooler	:011°C	under carbon :020°C
Temperatures →		

- Display additional temperatures:



Machine	P21	User Guide
Time	10:45	
--	Temperature Display	
free	:---°C	
free	:---°C	
free	:---°C	
free	:---°C	
back		

- Leave the temperature display:

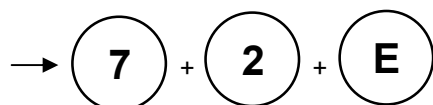
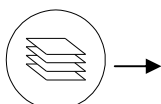


707734-03-C4

### 8.2 Operating Data

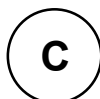
8.2

- Press function key:



A summary of all programmes run to date appears

- End the data display:





## **8. Data Display**

**8.**

---

### **8.3 What to Do When the Machine Malfunctions**

**8.3**

1. If there is an error, the machine stops and displays the error.
2. You can identify the error with the diagnosis list (or on the display).
3. After you have corrected the error, delete the error message with C and press the START button to restart the machine.

There is a difference between error messages (the machine stops) and error notices (the machine continues running and you can delete the notice with "C").

## 9. Control System and Programs

## 9.

### 9.1 Summary of Cleaning Programs

### 9.1

P18 to P20	Reserved
P21 to P42	Free programming locations
P43	Deodorizing: <b>Attention: Always select this if the loading door cannot be opened.</b>

Prog. no.	Program name	Application
P1	1-bath/filtration	For lightly soiled garments
P2	2-bath/preclean/filtration	For normally soiled garments.
P3	3-bath /preclean /filtration /rinsing	For special quality
P4	1-bath gentle program	For wool and mohair
P5	2-bath gentle program	For delicate garments, silk
P6	2-bath/pump circuit	For heavily soiled garments
P7	1-bath /rinsing/waterproofing	Waterproofing moist garments
P8	Waterproofing	Waterproofing dry garments
P9	2-bath with interval spinning	For hard-to-dry garments/micro
P10	2-bath with interval spinning/waterproofing	Microfibers und special sportswear
P11	1-bath/pump circuit	For heavily soiled or bleeding garments
P12	1-bath filtration with filter 2	For lightly soiled light-colored garments
P13	2-bath filtration with filter 2	For normally soiled light-colored garments
P14	3-bath filtration with filter 2	For special light quality
P15	1-bath gentle program with filter 2	For wool and mohair, light
P16	2-bath gentle program with filter 2	For delicate white garments, silk
P17	1-bath filtration/without distillation	For barely soiled garments

Program overview sign

Cleaning programs			801727
P1 1-bath / filtration	P15 1-bath / gentle prog. filter 2	P29	
P2 2-bath / preclean / filtration	P16 2-bath / gentle progr. filter 2	P30	
P3 3-bath / preclean / filtration	P17 1-bath / filtr. / without distill.	P31	
P4 1-bath / gentle program	P18	P32	
P5 2-bath / gentle program	P19	P33	
P6 2-bath / pump circuit	P20	P34	
P7 1-bath / rinsing/waterproofing	P21	P35	
P8 waterproofing	P22	P36	
P9 2-bath with interv. extraction	P23	P37	
P10 2-bath / interv. extr. / waterpr.	P24	P38	
P11 1-bath / pump circuit	P25	P39	
P12 1-bath / filtration filter 2	P26	P40	
P13 2-bath / filtration filter 2	P27	P41	
P14 3-bath / filtration filter 2	P28	P42	

## 9. Control System and Programs

9.

### 9.2 Program Sequences (Extract)

9.2

Machine M21/M26 /M30	P 01	P 02	P 03	P 04	P 05	P 06	P 07	P 08
Pump tank to tank	00:30	00:30	00:30	00:40	00:40	00:30	00:40	
Pump up from tank 1	01:30	01:00	01:00	01:00	01:00	01:00		
Pump out extraction tank	00:30	00:30	00:30	00:30	00:30	00:30	00:30	
Pump up from tank 2	01:00			00:30			01:15	
Pump circuit		02:00	02:00		02:00	03:00	02:00	
Spin to distillation		01:45	01:45		01:45	01:45	05:15	
Pump to distillation		00:30	00:30		00:30	00:30		
Pump up from tank 1		01:30	01:30					
Pump up from tank 2		01:00	01:00		02:30	01:10*		
Filtration	05:00	05:00	05:00	05:00	05:00			
Pump circuit	03:00*	03:00*	03:00*	03:00*	03:00*	04:00		
Pump to tank 1	01:30	01:30	01:30	01:30	01:30			
Pump to tank 2								
Pump to distillation							00:30	
Spin to tank 1		05:15			05:15			
Spin to tank 2								
Spin to distillation	05:15		02:45	05:15		05:15		
Pump to tank 1		00:30			00:30			
Pump to tank 2								
Pump to distillation	00:30		00:30	00:30		00:30		
Pump up from tank 2			01:10					
Pump circuit			02:00					
Pump to tank 1								
Pump to distillation								
Spin to tank 1			05:15					
Spin to distillation								
Pump to tank 1			00:30					
Tumble	00:30	00:30	00:30	00:30	00:30	00:30	00:30	00:30
Spray							XX	XX
Tumble							04:00	04:00
Predrying without heat:							03:00	03:00
Dry, cage outlet 50°C/122°F								
Dry, cage inlet: 75°C /167°F ***	12:00	12:00	12:00	12:00	12:00	12:00	14:00	14:00
Drying time controller	X	X	X	X	X	X	X	X
Reduction** from	02:00	02:00	02:00	02:00	02:00	02:00	02:00	02:00
until	06:00	06:00	06:00	06:00	06:00	06:00	06:00	06:00

See next page for key to table

## 9. Control System and Programs

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**9.**

- \* Dosing
- \*\* Temperature controlled
- \*\*\* Depends on used solvent; at P04 /P05: 70 °C /161°F
- X Plus standstill times because of the drying controller
- xx Depends on the spraying time specified

The times given above correspond to the program sequences at the time of printing.

We reserve the right to make any procedural changes to times and program sequences in the interest of technical progress.

## 9. Control System and Programs

## 9.

### Program Sequences (Extract)

Machine M21/M26 /M30	P 09	P 10	P 11	P 12	P 13	P 14	P 15	P 16	P 17
Pump tank to tank	00:30	00:30	00:40	00:30	00:30	00:30	00:40	00:40	00:30
Pump up from tank 1 /3	01:00	01:00		01:30	01:00	01:00	01:30	01:30	01:30
Pump out extraction tank	00:30	00:30	00:30	00:30	00:30	00:30	00:30	00:30	00:30
Pump up from tank 2			01:00	01:00			00:30		01:00
Pump circuit	02:00	02:00	03:00		02:00	02:00		02:00	
Spin to distillation	01:45	01:45	05:15		01:45	01:45		01:45	
Pump to distillation	00:30	00:30			00:30	00:30		00:30	
Pump up from tank 1 /3	01:30	01:30			01:30	01:30			
Pump up from tank 2	01:00	01:00			01:00	01:00		02:30	
Filtration	05:00	05:00		05:00	05:00	05:00	05:00	05:00	05:00
Pump circuit	03:00*	03:00*		03:00*	03:00*	03:00*	03:00*	03:00*	03:00*
Pump to tank 1 /3	01:30	01:30		01:30	01:30	01:30	01:30	01:30	01:30
Pump to tank 2									
Pump to distillation			00:30						
Spin to tank 1 /3	01:45	01:45			05:15			05:15	05:15
Spin to tank 2									
Spin to distillation				05:15		02:45	05:15		
Pump to tank 1 /3	00:30	00:30			00:30			00:30	00:30
Pump to tank 2									
Pump to distillation				00:30		00:30	00:30		
Pump up from tank 2						01:00			
Pump circuit						02:00			
Pump to tank 1 /3									
Pump to distillation									
Spin to tank 1 /3	02:45	02:45				05:15			
Spin to distillation									
Pump to tank 1	00:30	00:30							
Spin to tank 1	05:15	05:15							
Pump to tank 1 /3	00:30	00:30				00:30			
Tumble		00:30					00:30	00:30	
Spray		XX							
Tumble	00:30	04:00	00:30	00:30	00:30	00:30			00:30
Pump tank 2 to tank 3				00:25	00:25		00:25	00:25	
Predrying without heat:		03:00							
Dry, cage outlet 50°C/122°F									
Dry, cage inlet: 75°C /167°F ***	12:00	14:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00
Drying time controller	X	X	X	X	X	X	X	X	X
Reduction** from until	02:00 06:00	02:00 06:00	02:00 06:00	02:00 06:00	02:00 06:00	02:00 06:00	02:00 06:00	02:00 06:00	02:00 06:00

See next page for key to table

## 9. Control System and Programs

---

**9.**

- \* Dosing
- \*\* Temperature controlled
- \*\*\* Depends on used solvent; at P15 /P16: 70 °C /161°F
- X Plus standstill times because of the drying controller
- xx Depends on the spraying time specified

The times given above correspond to the program sequences at the time of printing.

We reserve the right to make any procedural changes to times and program sequences in the interest of technical progress.

P12/P13/P14/P15/P16: via tank 3 and filter 2 (when exist)

## 9. Control System and Programs

9.

### Program sequence (example):

#### **P09            2-bath for hard-to-dry garments/microfiber with interval spinning**

1<sup>st</sup> bath:        Pre-cleaning in pump circuit,  
30 seconds pumping from tank 1 to tank 1, solvent cooling,  
45 seconds pumping up from tank I, pump circuit low level,  
30 seconds draining of extraction tank,  
2 minutes pump circuit,  
1 minute 30 seconds pumping out and spinning to distillation.

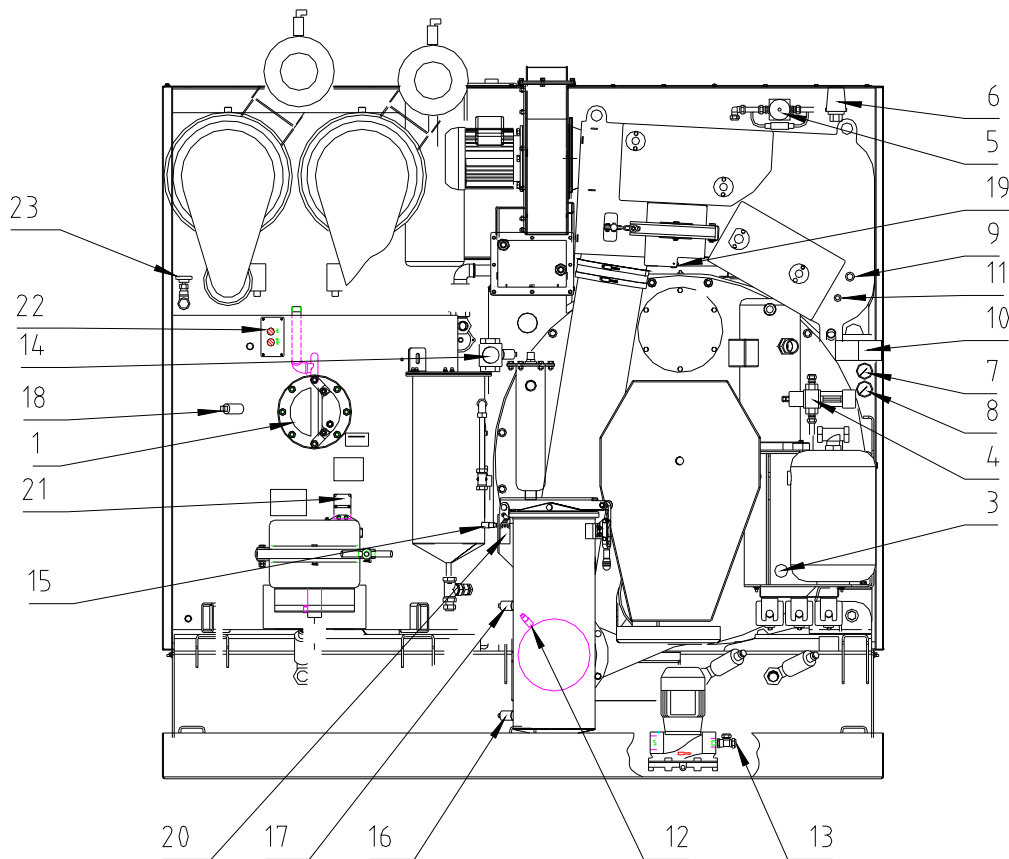
2<sup>nd</sup> bath:        Filtration  
90 seconds pumping up from tank I in pump circuit, high level,  
1 minute pumping from tank II, filter circuit high level,  
7 minutes filtration,  
3 minutes pump circulation with addition,  
30 seconds pumping to tank I,  
1 minute spinning to tank I.  
30 seconds spinning run down,  
2 minutes spinning to tank I,  
30 seconds spinning run down,  
4 minutes spinning to tank I,  
45 seconds spinning run down/tumbling.  
Drying  
12 minutes drying, high air flow, thermostat II 75 ° C (167 °F) \*,  
x minutes delay time, drying time controller,  
2 - 6 minutes reduction (temperature-controlled)

\* Depends on solvent

**Wrinkle protection:** If you do not press the STOP button at the cycle end, wrinkle protection/deodorizing with gentle reversing continues to run. The machine automatically stops and locks after a maximum of 10 minutes. You cannot open it until program P43 has run.

## 10. Operating and Monitoring Systems

## 10.



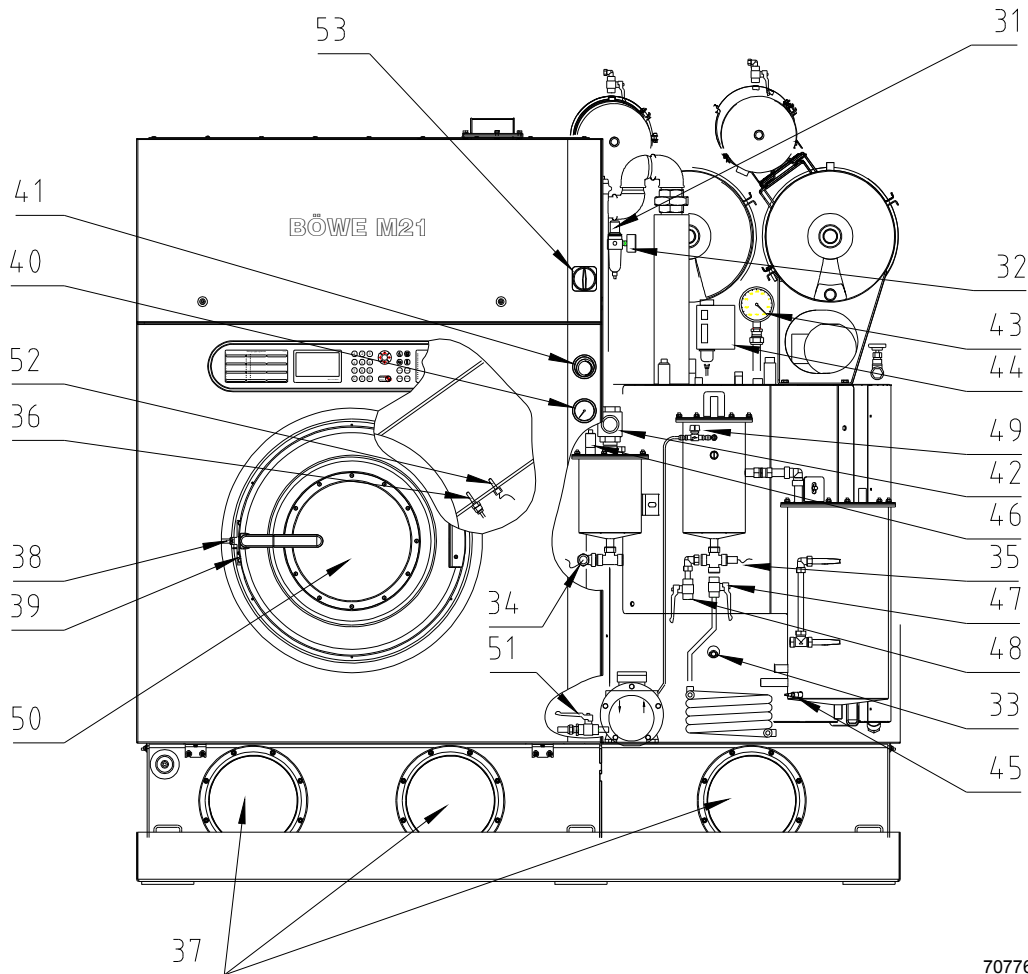
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- |    |  |    |                                      |
|----|--|----|--------------------------------------|
| 1  | Sight-glass, still                                 | 19 | Limit switch, additional lint filter |
| 3  | Sight-glass, refrigeration unit                    | 20 | Limit switch, button trap            |
| 4  | Cooling water regulator, refrigeration unit        | 21 | Limit switch, still                  |
| 5  | Cooling water regulator, distillation              | 22 | Lamps green - red                    |
| 6  | Low cooling water level switch                     | 23 | Manual valve, distillation steam     |
| 7  | Low pressure gauge (refrigerating)                 |    |                                      |
| 8  | High pressure gauge (refrigerating)                |    |                                      |
| 9  | Safety temperature limiter after cooler            |    |                                      |
| 10 | High and low pressure controls, refrigeration unit |    |                                      |
| 11 | Thermal sensor, aftercooler                        |    |                                      |
| 12 | Thermal sensor, cage housing outlet                |    |                                      |
| 13 | Thermal sensor, solvent                            |    |                                      |
| 14 | Drying time controller                             |    |                                      |
| 15 | Sensor, water-sensitive                            |    |                                      |
| 16 | Sensor, low level                                  |    |                                      |
| 17 | Sensor, high level                                 |    |                                      |
| 18 | Overfill sensor, distillation                      |    |                                      |



## 10. Operating and Monitoring Systems

## 10.



707763-08-0

- |    |  |    |  |
|----|--|----|--|
| 31 | Low air pressure switch                        | 42 | Sight-glass, distillation                  |
| 32 | Pressure gauge, compressed air                 | 43 | Vacuum pressure gauge                      |
| 33 | Thermal sensor, distillation                   | 44 | Vacuum control switch, distillation        |
| 34 | Thermal sensor, distillation condenser         | 45 | Water-sensitive level sensor               |
| 35 | Operating material thermal sensor, vacuum pump | 46 | Overfill sensor, level sensor, flash tank  |
| 36 | Thermal sensor, cage housing inlet             | 47 | Stopcock, operating material               |
| 37 | Sight-glasses, tanks 1 + 2 + 3                 | 48 | For emptying operating material tank       |
| 38 | Limit switch, loading door                     | 49 | Aeration for vacuum pump                   |
| 39 | Limit switch, loading door locking             | 50 | Loading door window                        |
| 40 | Filter pressure gauge, Economy filter 1        | 51 | Outflow, vacuum pump                       |
| 41 | Sight-glass, filter circuit                    | 52 | Safety temperature limiter, cage air inlet |
|    |  | 53 | Main switch                                |

## 10. Operating and Monitoring Systems

## 10.

1	Sight-glass, still: For observing the distillation process.	18	Overfill sensor, distillation: Stops the pumping process when the filling amount has been reached.
2	Sight-glass, inlet to water separator: For observing the condensate feed from distillation.	19, 20, 21	Limit switches: All maintenance openings are protected with limit switches.
3	Sight-glass, refrigeration unit: For checking whether the cooling agent is free of bubbles <u>during the reduction phase</u>	22	Green and red lamps: Shows whether the distillation residues can be drained.
4	Cooling water regulator, refrigeration unit: You can set the condensation pressure in the refrigeration unit here.	23	Manual valve, distillation steam: For steam reduction
5	Cooling water regulator, distillation: Regulates the cooling water flow (setting of the cooling water temperature at drain approximately +45 °C/113 °F)		
6	Low cooling water level switch: Monitors the cooling water supply. Set to 1 bar (14.5 psi.)		
7	Low pressure gauge (refrigerating): For checking the evaporation pressure.		
8	High pressure gauge (refrigerating): For checking the condensation pressure.		
9	Safety temperature limiter after cooler: Cuts off all machine functions. Call service technician.		
10	High pressure control (refrigerating): Switches the system to the malfunction state if there is overpressure Low pressure control (refrigerating): Switches the system to the malfunction state if there is not enough cooling agent		
11	Thermal sensor, aftercooler: Monitors the aftercooler temperature and switches the machine off when the temperature exceeds 30° C/86° F?		
12	Thermal sensor, cage housing outlet: Monitors the temperature at the air outlet		
13	Thermal sensor, solvent: Monitors the solvent temperature.	31	Low air pressure switch: Monitors the compressed air supply. Set to 4 bar (58 psi)
14	Drying time controller: Extends the drying time, depending on the type and amount of garments	32	Pressure gauge, compressed air: You can read off the required operating pressure (6 bar/87 psi) on the pressure gauge
15	Sensor, water-sensitive: Controls the draining of the process water	33	Thermal sensor, distillation: Cuts off the distillation heater.
16	Sensor, low level: Regulates the detergent solution level.	34	Thermal sensor, distillation condenser: Monitors the solvent temperature.
17	Sensor, high level: Regulates the detergent solution level.	35	Operating material thermal sensor, vacuum pump: Monitors the operating material temperature

## 10. Operating and Monitoring Systems

## 10.

36	Thermal sensor, cage housing inlet: Monitors the air inlet temperature		
37	Sight-glasses, tanks 1+2+3: You can read off the liquid level on the scale.		
38, 39	Limit switch on the loading door: Monitors the closing and locking of the loading door.		
40	Filter pressure gauge, Economy filter 1: Visual inspection of the selected filter pressure.		
41	Sight-glass, filter circuit: For observing the flow and clearing of the detergent solution.		
42	Sight-glass, distillation: Visual inspection of the condensate process		
43	Vacuum pressure gauge: For vacuum control during the distillation cycle.		
44	Vacuum control switch, distillation: Controls the vacuum to be reached. If it is not reached, the display shows a diagnostic message, the distillation cycle stops and the cleaning machine continues running.		
45	Water-sensitive level sensor: Controls the draining of the process water		
46	Level sensor, overfill sensor: Controls the draining of the condensate.		
47	Stopcock, operating material: To block the operating material tank during any maintenance work.		
48	Ball valve for emptying operating material tank		
49	Aeration for vacuum pump: needle valve must be opened.		
50	Loading door window: Note the filling quantity given on the sign. Visual inspection of cage movement		
51	Outflow, vacuum pump: Ball valve for emptying the vacuum pump.		
52	Safety temperature limiter, cage air inlet: Cuts off all machine functions. Call service technician.		
53	Main switch: Rotary switch for separating the machine from the electrical power system		

to points 4 and 5

The cooling water controllers should be subjected to a regular function test.

When the machine is not in operation cooling water feed must be cut off by means of a stop valve to be fitted on site.

## 11. Maintenance

## 11.



**Attention:** Warranty claims will only be accepted if maintenance has been performed properly! Follow safety regulations! All recommendations concerning maintenance are minimum requirements and refer to a one-shift operation!

### 11.1 Operation and Maintenance Summary

### 11.1

#### When starting operation:

- Turn on steam supply
- Turn on room ventilation system
- Turn on cooling water supply
- Turn on compressed air supply
- Open condensate valve
- Turn on machine main switch
- Start deodorizing program P43, press "STOP" button when program ends and signal sounds.

#### When stopping operation:

- Turn off machine main switch
- Turn off steam supply
- Close condensate valve
- Turn off cooling water supply
- Turn off compressed air supply to compressor
- Turn off room ventilation system or switch to night operation

#### Inspection and maintenance work:

##### Daily: (before starting the first cycle)

- Check machine for leaks
- Check solvent safety trough for solvent
- Clean button trap strainer and lint filter (see 11.5.1)
- Dispose of process water in accordance with the regulations that apply in your country!
- Check the liquid level of the cleaning agent container
- Machine is ready for operation

##### Daily: (after the last cycle)

- Execute distillation maintenance program P45
- (Alternatively start with 15 E during the last charge)

##### Weekly:

- Run multi-maintenance program P49
- Drain water from compressed air armature
- Clean the sprayer dirt strainers and spray nozzles
- Check limit switch function

##### Monthly:

- Execute multi-maintenance program P50
- Check solvent levels in the tanks
- Clean strainers in water and steam feeders
- Lubricate cage bearing
- Check post-filter, clean
- Vacuum pump's operating material tank empty, clean and refill

##### Semi-annually:

- Have the flash point of the solvent checked
- Check air cooler, clean
- Clean tanks
- Retighten screwed unions
- Check V-belt tension, re-tension

##### Annually:

- Machine inspection (according to BGR 500 chapter 2.14)
- Remove filter discs and clean in the machine (program P6)
- Check back wall of cage, clean

##### Attention:

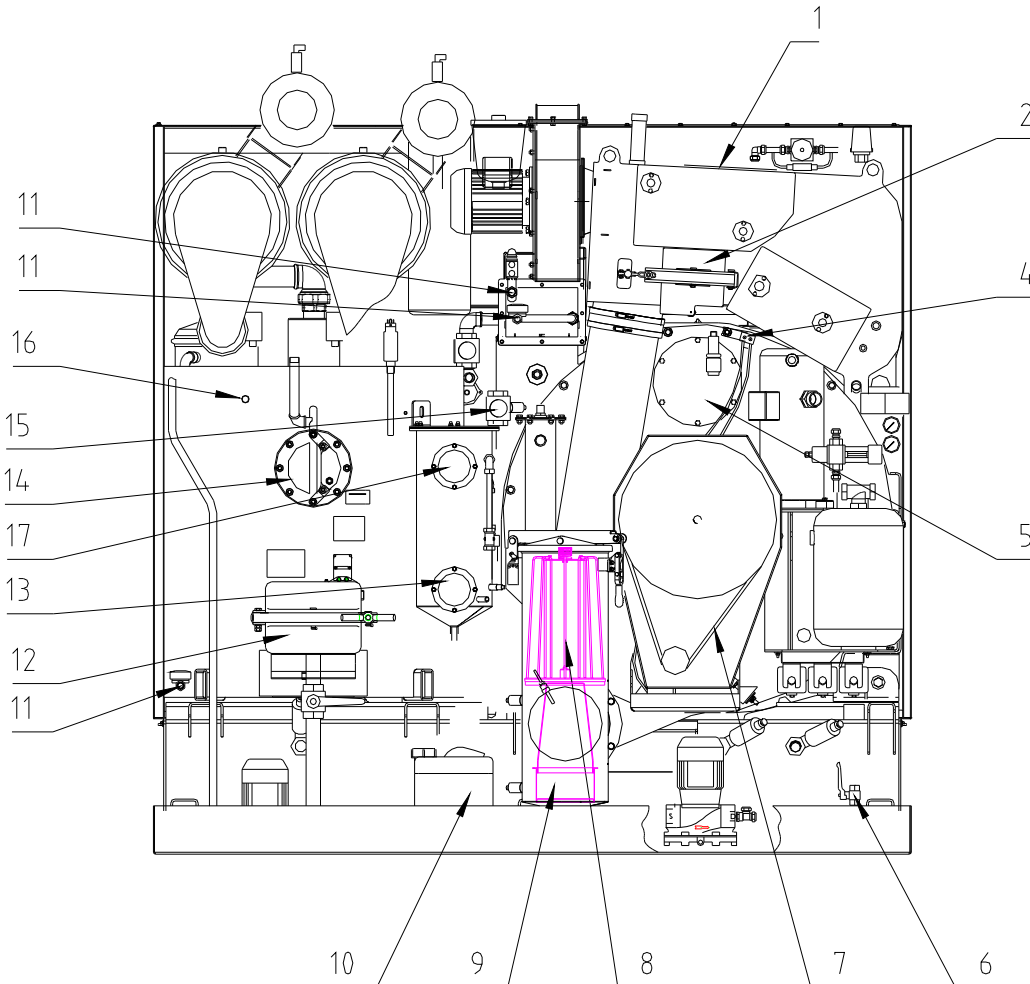
- **Immediately close the loading door and maintenance openings again.**
- **Use only lithium-based lubricating greases, such as.**
  - ALVANIA 3 (SHELL)      - MARSON L2 (FINA)
  - BEACON 2 (ESSO)      - LGMT 3 (SKF)

## 11. Maintenance

## 11.

### 11.2 Maintenance Points

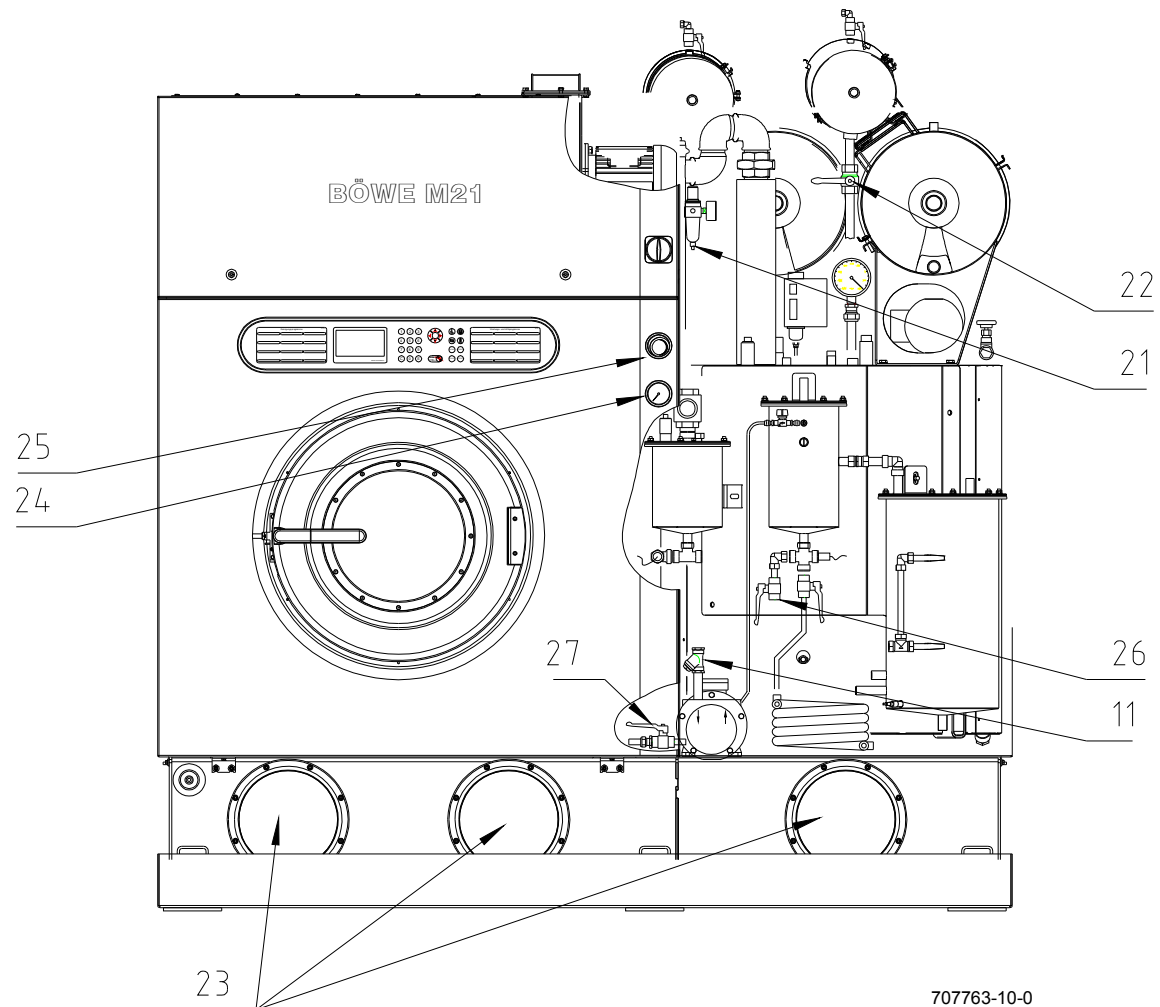
### 11.2



707763-09-0

- |    |                               |    |                        |
|----|-------------------------------|----|------------------------|
| 1  | Inspection cover, airshaft    | 13 | Sight-glass, still     |
| 2  | Additional lint filter        | 14 | Drying time controller |
| 4  | Grease nipple, cage           |    |                        |
| 5  | Inspection cover, cage flange |    |                        |
| 6  | Solvent filling valve         |    |                        |
| 7  | V belt                        |    |                        |
| 8  | Lint filter                   |    |                        |
| 9  | Button trap strainer          |    |                        |
| 10 | Process water collecting tank |    |                        |
| 11 | Strainer                      |    |                        |
| 12 | Still rake-out door           |    |                        |

**Additional maintenance points:**  
- Limit switch



707763-10-0

## 11 Strainer

- 21 Compressed air drain
- 22 Manual valve, adsorption filter outflow
- 23 Tank sight-glasses
- 24 Filter pressure gauge
- 25 Sight-glass, filter circuit
- 26 Manual valve, operating material tank outflow
- 27 Manual valve, vacuum pump outflow

## 11. Maintenance

## 11.

Short description of the maintenance points.

Refer to [11.5](#) "Maintenance Work Instructions" for exact maintenance sequences.

### Machine:

1	Inspection cover, airshaft: Open semiannually, check airshaft for dirt.	10	Process water collecting tank: Dispose of process water in accordance with regulations. Do not allow to overflow!
2	Additional lint filter: Check it daily. Open once a month (more frequently if required), replace lint filter mat (wash used mat).	11	Strainer: Clean monthly (possibly more often after first startup). Found in the steam and water supply lines and in front of the vacuum pump.
		12	Still rake-out door: For cleaning out the distillation residues (See point 11.5.8)
4	Grease nipple, cage: For monthly lubrication of the cage bearing.	13	Sight-glass, still: Clean sight-glass when it is dirty.
5	Inspection cover, cage flange: Open when needed, remove lint on the back wall of the cage.	14	Drying controller: Check for dirt
6	Solvent filling valve: Open in connection with program P51, see Point 6.1.2 for further instructions		
7	V belt: Check semi-annually and re-tension if necessary.		<b><u>Additional maintenance points:</u></b>
8	Lint filter: Clean daily or more often when there is a lot of lint.	-	Limit switches: Check limit switch function
9	Button trap: Clean the button trap strainer daily or whenever it is dirty.		

## 11. Maintenance

## 11.

-		24	Filter: Perform filter maintenance weekly (program P46 or P47).
21	Compressed air drain: Drain water weekly at the valve of the glass tank.	25	Sight-glass, filter circuit: If there is insufficient clearing of the solvent, check the filter disc for damage.
22	Manual valve, adsorption filter: If adsorption is insufficient, drain and replace cartridge.	26	Manual valve, operating material: For emptying.
23	Tank sight-glass (front side): Semi-annual tank cleaning through the sight-glass opening. Rinse with program P50	27	Manual valve, vacuum pump outflow: For emptying during repair work.



## 11. Maintenance

## 11.

### 11.3 Maintenance Program Summary

### 11.3

P71 to P84	Free programming locations
P43	Deodorizing: <b>Attention: Always select this if the loading door cannot be opened.</b>

The following maintenance programs are installed in the M21/M26/M30:

P44	Short drying	For afterdrying
P45	Distillation maintenance	Still stripping or program sequence "emission-free still rake out (see Point 11.5.7)
P46	Filter 1 filter maintenance	Extraction of the filter disc, followed by still stripping.
P47	Filter 2 filter maintenance	Extraction of the filter disc, followed by still stripping.
P48	Adsorber maintenance (only on PERC machines with Slimsorba)	For desorption of the Slimsorba at times other than during the cleaning cycles. The program has two phases: desorption and carbon cool-down.
P49	Multi-maintenance 1	Combination of filter maintenance for filter 1, Slimsorba maintenance, water separator maintenance and distillation maintenance.
P50	Multi-maintenance 2	Combination of tank maintenance for tanks 1 + 2 + 3, spray nozzle rinsing and flushing of the drum back plate
P51	Fill tanks	Fill the clean tank and then overflow into the work tank and further into tank 3
P52	Prepare stock solution	Addition of drycleaning detergent into the solvent from the work tank and tank 3 through a recipient tank in the button trap.
P53	Drain extraction tank	Pump the extraction tank out to distillation
P54	Rinse the water separator	Automatic cleaning of the water separator
P55	Pumping out the distillation residue	(only with emission-free still rake out system)
P56	From tank 1 to cage	For cleaning the work tank
P57	From tank 2 to cage	For cleaning the clean tank
P58	From tank 3 to cage	For cleaning the extra tank

## 11. Maintenance

## 11.

P59	From tank 1 to distillation	Strip tank 1
P60	From tank 2 to distillation	Strip tank 2
P61	From tank 3 to distillation	Strip tank 3
P62	From cage to distillation	Pump to distillation
P63	From cage to tank 1	Pumping to tank 1
P64	From cage to tank 2	Pumping to tank 2
P65	From cage to tank 3	Pumping to tank 3
P66	From tank 2 to tank 1	Refill clean tank
P67	From tank 2 to tank 3	Refill clean tank
P68	Empty tank 1	For pumping out the work tank. Empty the machine
P69	Empty tank 2	For pumping out the clean tank. Empty the machine
P70	Empty tank 3	For pumping out tank 3. Empty the machine

Program overview sign

maintenance and utility programs			801727
P43 deodorizing	P57 from tank 2 to cage	P71	
P44 short drying	P58 from tank 3 to cage	P72	
P45 still maintenance	P59 from tank 1 to still	P73	
P46 maintenance filter 1	P60 from tank 2 to still	P74	
P47 maintenance filter 2	P61 from tank 3 to still	P75	
P48 maintenance adsorption unit	P62 from cage to still	P76	
P49 Multi-maintenance 1	P63 from cage to tank 1	P77	
P50 Multi-maintenance 2	P64 from cage to tank 2	P78	
P51 filling tanks	P65 from cage to tank 3	P79	
P52 preparation / stock solution	P66 from tank 2 to tank 1	P80	
P53 draining sluice-tank	P67 from tank 2 to tank 3	P81	
P54 rinsing water separator	P68 empty tank 1	P82	
P55 pumping out still residues	P69 empty tank 2	P83	
P56 from tank 1 to cage	P70 empty tank 3	P84	

## 11. Maintenance

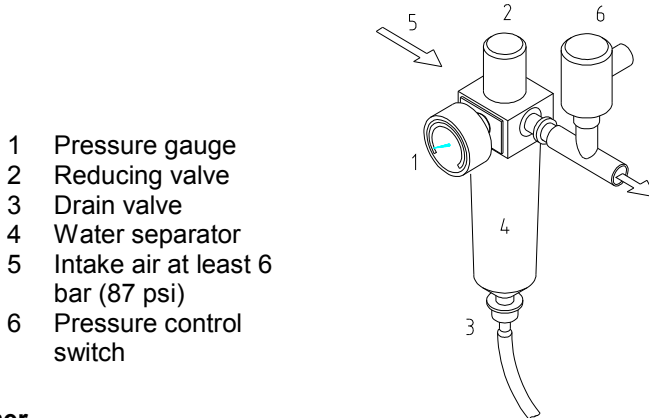
## 11.

### 11.4 Special Maintenance Features

### 11.4

#### Compressed air armature

When needed, drain the water separator at the drain valve and aerate the pneumatic control system over this valve during maintenance work. Check the water separator filter insert for dirt. Clean or replace as needed. Never work without an original filter insert!



707760-14-0

#### Strainer

Open the strainers in the water and steam system and before the vacuum pump and clean the strainer inserts (monthly).

#### Lubricating points

Use a grease gun to lubricate the cage bearing and sealing rings at the appropriate grease nipples (monthly).  
Use only lithium-based lubricating greases, such as.

- ALVANIA 3 (SHELL)
- MARSON L2 (FINA)
- BEACON 2 (ESSO)
- LGMT 3 (SKF)

#### Limit switches at maintenance openings

The safety limit switches prevent the machine from starting operation as long as a lockable machine opening is open.

This means: Cage loading door, still door, button trap cover  
insertion filter (post-filter)

## 11. Maintenance

11.

### Disposing of the machine



- Drain cartridge filter.
- Allow cartridge to drip dry and dispose of it.
  
- Drain Economy filter
- Remove, clean and dry filter discs
  
- Empty water separator, operating material tank, extraction tank and operating material cooler (dispose of process water, decant solvent).
  
- Empty out process water tank, dispose of process water.
  
- Empty tanks. You can draw off the solvent residue by tilting the machine and attaching one end of a flexible suction tube to an external pump and inserting the other end through the sight-glass opening.
  
- Empty condenser.
  
- Empty out solvent pump and vacuum pump, do not leave any solvent residue in the base of the pump
  
- Empty and clean the still when it is cold, dispose of residues.
  
- Pump cooling agent out of the refrigeration unit (done by authorized customer service technician).
  
- Close open solvent lines tightly when disassembling the machine.
  
- You must completely remove all residues that could present a hazard to people and the environment,

**Observe safety regulations concerning the handling of solvent (see Point 2).**

## 11. Maintenance

## 11.

### Pump solvent out of the machine



Pressure side of the pump:      Remove cap  
    Connect hose to barrel

Start program P68 (empty tank I)  
 Start program P69 (empty tank II)  
 Start program P70 (empty tank III)

If the tank does not empty out, you must start the required program again

### 11.5 Maintenance Work Instructions

### 11.5



**Note that after cleaning the solvent tanks:**  
 you must check covers, sight-glasses or doors that you opened for  
 leaks when you fill the tanks again.

**Make sure that the machine is turned off and secured before performing any maintenance work.**  
**Observe safety regulations concerning the handling of solvent (see Point 2).**  
**Only trained service personnel who are familiar with the machine are authorized to perform maintenance work.**

#### 11.5.1 Lint Filter/Button Trap



The button trap and lint filter are combined in a common maintenance unit with a single maintenance opening.

Maintenance of the lint filter and the needle seat should be carried out daily prior to the first and after the last cleaning charges (but only after P34 has been run!)

#### Sequence of the maintenance work on the lint filter:

- Loosen the cover fastener and open the cover.
- Remove the lint filter basket.
- Remove and clean the lint filter mat from the filter basket (wash if necessary).
- Check the lint filter mat for any damage.
- Place cleaned lint filter mat on to the filter basket and secure properly.



**Attention: Never work without the lint filter insert and never use damaged lint filter mats.**

- Then perform the button trap maintenance.

## 11. Maintenance

## 11.

Sequence of the maintenance work on the button trap:

- Remove strainer insert
- Clean strainer insert
- Clean additional round sieve
- Reinsert sieve cartridge



**Attention: Never work without a strainer insert - the pump could be damaged by foreign bodies!**



**Attention: Perform maintenance only when the machine has been turned off and after the drying has finished.**

- Then insert the lint filter basket and make sure that it seats firmly in place
- Clean the cover seal
- Firmly close the cover of the common maintenance opening

### 11.5.2 Additional Lint Filter



Check the additional filter daily:

- Open the cover on the airshaft
- Remove the filter, suction it off, or, alternatively, clean it with a brush (wash if needed).
- Replace the additional filter.
- Close the cover

## 11. Maintenance

## 11.

### 11.5.3 Water Separator/Extraction Tank

**Dispose of the process water according to the regulations in your country.**

You must clean the water separator and extraction tank routinely (and always after the distillation system has boiled over). The unit does this automatically with a fixed maintenance program P54 or as an integrated part of the so-called multi-maintenance program P49.

Start one of the maintenance programs listed above weekly.

You can run another program at the same time as the maintenance program.

Sequence of the maintenance program:

- Step 1: Draining the water phase from the water separator into the tank (7).
- Step 2: Emptying the water separator into the distillation system (6) with the solvent pump.
- Step 3: Rinsing the water separator with solvent from the clean tank (5).
- Step 4: Emptying the water separator into the distillation system (6) with the solvent pump.
- Step 5: Draining the water phase from the extraction tank into the tank (7).
- Step 6: Emptying the extraction tank into the distillation system (13) with the solvent pump.
- Step 7: Rinsing the extraction tank with solvent from the clean tank (11).
- Step 8: See step 6
- Step 9: Produce the recipient tank in the extraction tank.
- Step 10: Bring recipient tank to defined level.

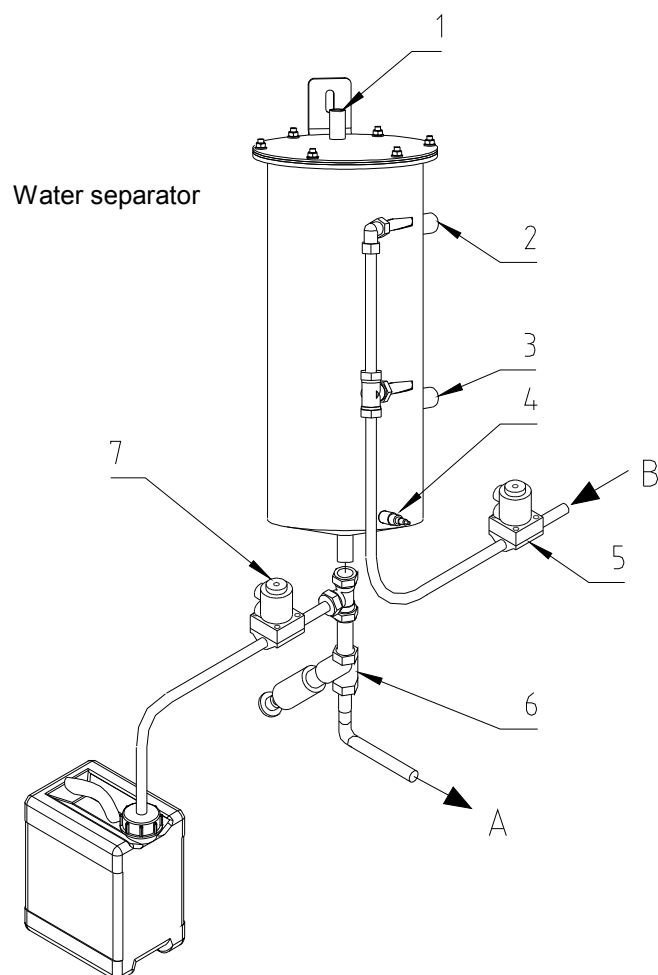
After the maintenance has completed, the horn sounds and the program ends. The cycle counter is reset to 0.

General function at the end of a cleaning cycle:

The water phases from the safety separator and extraction tank are drained into the process water tank when the loading door is opened.

## 11. Maintenance

## 11.



707763-11-0

- 1 Ventilation and aeration atmospheres
- 2 Solvent discharge to clean tank
- 3 Distillation inlet
- 4 Sensor for process water
- 5 Rinsing, water separator
- 6 Drain, water separator
- 7 Draining, water phase

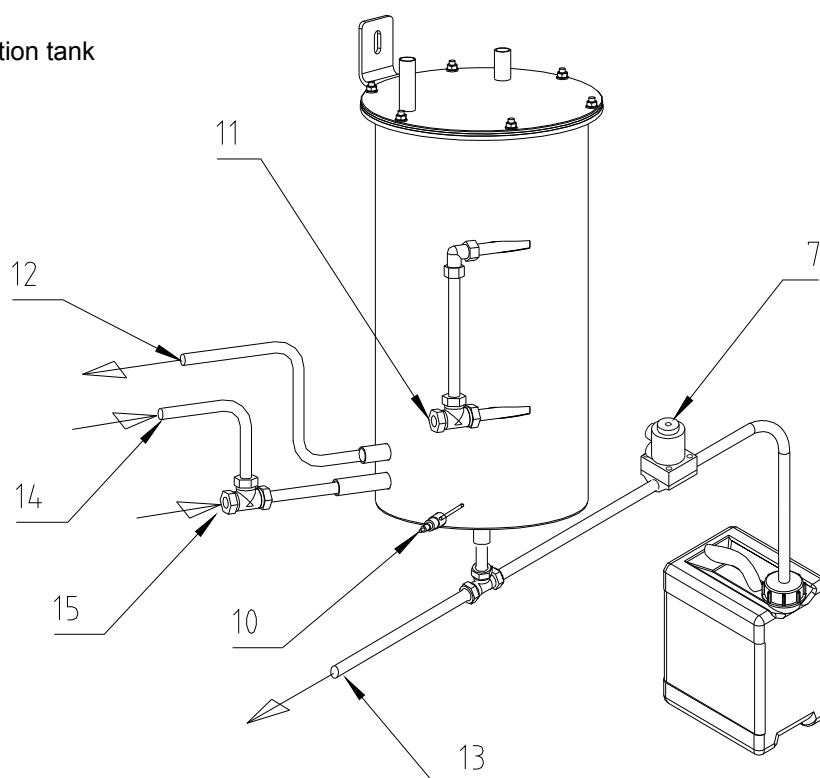
A – Pumping to distillation  
 B – Pump line from clean tank



## 11. Maintenance

11.

Extraction tank



707763-12-0

- 7 Draining, water phase
- 10 Water-sensitive sensor for process water
- 11 Connection, extraction tank rinsing with pump
- 12 Suctioning off solvent with pump
- 13 Emptying with pump
- 14 Distillation inlet
- 15 Drying inlet

### 11.5.4 Flash Tank

The flash tank cleans itself during each distillation cycle, and does not require any separate maintenance.

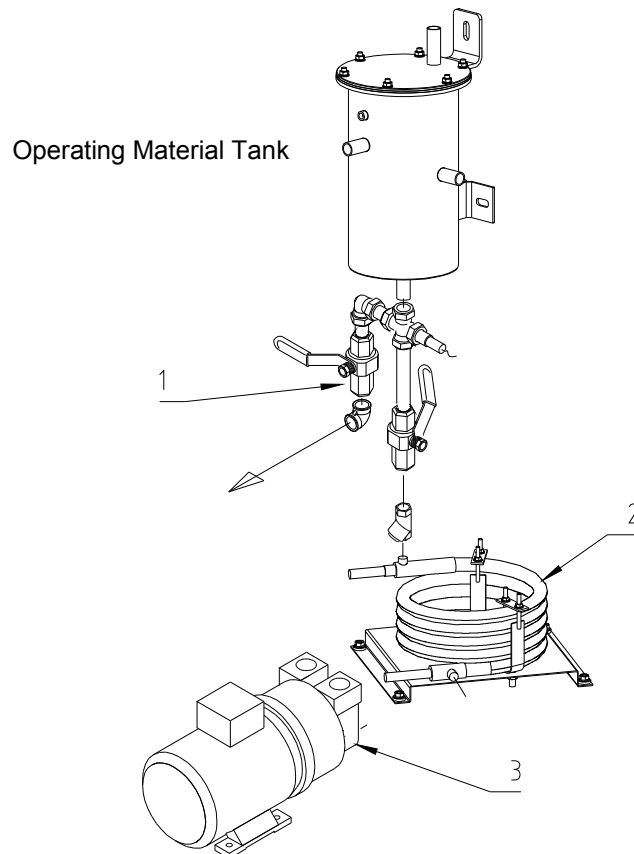
## 11. Maintenance

**11.**

### 11.5.5 Operating Material Tank



Observe safety regulations concerning the handling of solvent (see Point 2).



707763-13-0

- 1 Drain Operating Material Tank
- 2 Operating material cooler
- 3 Vacuum pump

- open the valve 1
- empty the container into a suitable receptacle
- Clean the container
- Close valve 1
- fill with 10 l solvent

## 11. Maintenance

11.

### 11.5.6 Economy Filter Maintenance



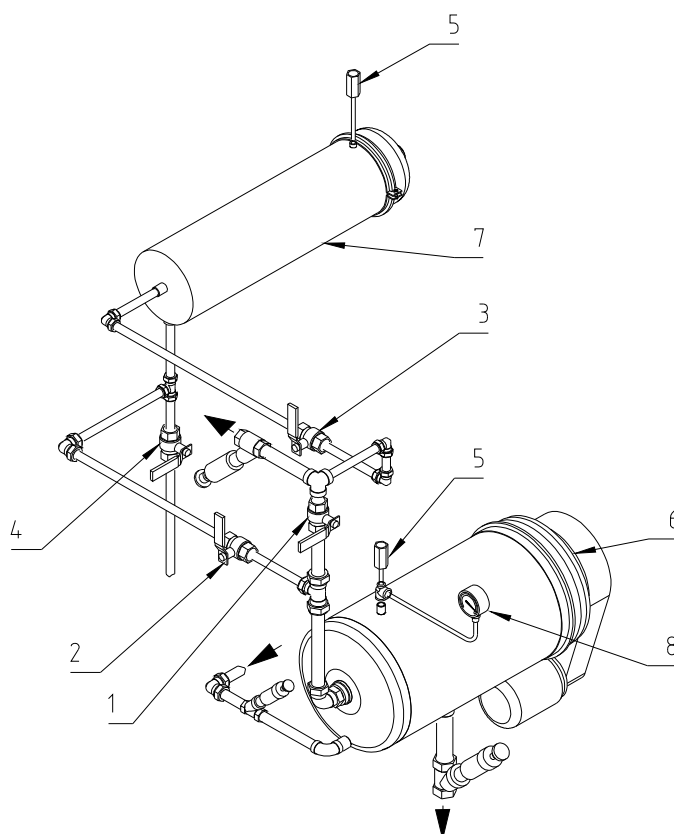
**Observe safety regulations concerning the handling of solvent (see Point 2).**

You must perform the maintenance on the economy filter when an adjustable number of cycles has run or at least once a week.

The filter pressure is displayed on the filter pressure gauge (8)\*. When the machine has run through the specified number of cycles, a diagnostic message (see diagnosis list) indicates that it is time for filter maintenance.

On machines with an additional cartridge filter (7), you must separate it from the economy filter (6) when you perform maintenance on the economy filter. Do this by opening the ball valve (1) and closing ball valves (2) and (3).

Start filter maintenance program P46 (filter 1) or P47 (filter 2):



707760-05-0

\* For filter 1, the pressure gauge is on the front of the machine.

## 11. Maintenance

## 11.

### 11.5.7 Adsorption Filter Cartridge Maintenance



**Observe safety regulations concerning the handling of solvent (see Point 2).**

When changing the cartridge, separate the cartridge filter (7) from the economy filter (6) by setting:

Ball valve (1) open

Ball valves (2), (3), (4) closed

Sequence for the rest of the work:

- Open ball valve (4), drain filter and let it sit and drain sufficiently (over night or weekend)  
The filter venting takes place automatically over ball valve (5).
- (The next day) Loosen the tension clip on the filter housing and open the housing housing (7)
- Unscrew the thumb screw, replace the cartridge (if necessary, replace the sealing disc) and tighten the thumb screw again
- Check that the housing gasket sits correctly (replace gasket if necessary).
- Close the housing, mount the tension clip and then close ball valve (4) on the filter drain.

Fill the cartridge filter with solvent during the next cycle. Do this by closing ball valve (1) and opening ball valves (2) and (3).

Then either run the filtration over the cartridge filter to the end or separate the cartridge filter from the economy filter again.

Dispose of used filter cartridges as special waste in a way that avoids emissions!

## 11. Maintenance

## 11.

### 11.5.8 Filter Maintenance for Jumbo Cartridge Filter (Optional Equipment)



**Observe safety regulations concerning the handling of solvent (see Point 2).**

When the filter capacity has been reached (no longer sufficient clearing of the solvent), you must replace the cartridges.

Work sequence:

- Open filter drain valve Y130 (filter 1) and/or Y177 (filter 2) by hand (in the evening or on the weekend)
- The next day: loosen the tension clip on the filter housing and open the housing.
- Unscrew the thumb screw, replace the cartridge (if necessary, replace the sealing disc) and tighten the thumb screw again.
- Check that the housing gasket sits correctly (replace gasket if necessary)
- Close the housing, mount the tension clip.
- Use program P46 or P47 to refill the filter(s) (valves Y130 and Y177 close automatically).
- Dispose of used filter cartridges as special waste in a way that avoids emissions!

## 11. Maintenance

11.

### 11.5.9 Distillation Maintenance



You must strip the still at the end of each work day.



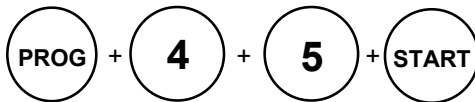
Caution




**The condenser and still (sight-glass, distillation opening) present a burn hazard**

Sequence of the maintenance work:

- When the last cleaning cycle has ended, start distillation maintenance P45:



The horn sounds at the end of the program and symbol 15 disappears.

Alternatively, you can start the distillation maintenance by entering 15E (before press ) while the last cycle is still running (but the last pumping out to distillation step must have completed).



**Attention:** Perform maintenance work only when the machine has been turned off and when the distillation blow-out is cold. The green lamp must light up and the display on the vacuum meter must have sunk to 0 bar (0 psi). Check the liquid level before opening the still door. Open the door carefully.

Additional sequence of the maintenance work:

- Let the still cool off (preferably over night)
- The next morning, hang the clean-out trough on to the still
- Open the door of the still and rake out the distillation residues
- Clean the overfill preventer probe
- Close the door of the still tightly



**Attention:** Do not drain distillation residues into the sewer system or place with the normal garbage. You must dispose of the residues as special waste.

## 11. Maintenance

## 11.

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### 11.5.9.1. Emission-free Distillation System Maintenance (Optional Equipment)

Distillation residues can be pumped off into a disposal vessel using an additional sludge pump. When the still maintenance is finished, ventilate the still after the distillation system has cooled off (green lamp). Now you can pump off the residue with program P55.

#### Remarks on distillation:

Fill the still only up to the lower edge of the sight-glass.

When solvent containing water is distilled, the distillate becomes slightly cloudy as a result of the water traces.

The distillation performance is reduced if you do not remove distillation residues from the still daily. This also increases the risk of boiling over and increases the solvent consumption.

When operating with Economy filters without filter powder, the distillation residue is liquid.

This means that there will not be an increase in the consumption of solvent involved if the distillation equipment is used correctly.

If the distillation unit boils over, empty and clean the water separator and the extraction tank with program P54 (if necessary, distill the contents of the clean tank). The distillation cleans the condenser and the flash tank automatically.

## 11. Maintenance

**11.**

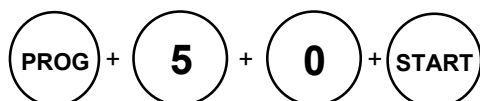
### 11.5.10 Maintenance of the Solvent Tank

In order to prevent a build-up of water in the tanks and, simultaneously, to rinse them, you must perform the tank maintenance once a month.

Before starting maintenance program P50, you must clean the button trap strainer.

The cage and the distillation system must be empty.

Start multi-maintenance program P50:





## 12. Safety Remarks Located on the Machine

## 12.

Gemäß EN ISO 8230 befinden sich an der Maschine nachfolgende Sicherheitshinweise:

*In accordance with EN ISO 8230 the machine is fitted with safety hints as below:*

Conforme à EN ISO 8230 les indications de sécurité suivantes se trouvent à la machine:

Kontaktwasser kann geringe Spuren von Lösemittel enthalten.  
Vorschriftsmäßig entsorgen!

*Contact water may contain small quantities of solvent.  
Please dispose of according to the regulations in your country!*

L'eau de contact peut contenir une petite quantité de solvant.  
Evacuer l'eau de contact conformément à la réglementation.

SN 708073

Nadelfänger täglich bzw. bei Bedarf öfter reinigen  
(Nur bei ausgeschalteter Maschine und nach beendeter Trocknungsphase).

*Clean button trap if necessary but at least once a day  
(only if machine is switched off and the drying phase has been finished).*

Nettoyer le filtre à épingle tous les jours et si nécessaire plus souvent  
(seulement hors fonctionnement de la machine et après une opération de séchage).

SN 708074

Reinigen der Destillation nur bei  
- ausgeschalteter Maschine und  
- kalter Destillierblase durchführen

*Clean still only if  
- machine is switched off and  
- distillation is cold*

Nettoyer l'alambic seulement si:  
- La machine est hors de fonctionnement  
- Le distillateur est revenu à température ambiante

SN 708075

## 12. Safety Remarks Located on the Machine

## 12.

<p><b>Vorsicht!</b> <b>Heiße Oberflächen</b></p> <p><b>Attention!</b> <b>Hot surfaces</b></p> <p><b>Attention!</b> <b>Surface chaude</b></p>	SN 708076
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<p><b>Zulässige Füllmenge</b></p> <p><b>Max. filling capacity</b></p> <p><b>Capacité admissible</b></p>	SN 708086
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<p><b>Filter täglich bzw. bei Bedarf öfter reinigen</b> <b>(nur bei ausgeschalteter Maschine und nach beendeter Trocknungsphase)</b></p> <p><b><i>Clean lint filter if necessary but at least once a day</i></b> <b><i>(only if machine is switched off and the drying phase has been finished.)</i></b></p> <p><b>Nettoyer le filtre tous les jours et si nécessaire plus souvent</b> <b>(seulement hors fonctionnement de la machine et après une opération de séchage).</b></p>	SN 708087
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<p><b>Filter und Wasserabscheider dürfen manuell</b> <b>nur bei leerer Destillation abgelassen werden.</b></p> <p><b><i>Filter and water separator must only be drained manually</i></b> <b><i>if the distillation is empty.</i></b></p> <p><b>La vidange manuelle du filtre à solvant et du séparateur d'eau</b> <b>est seulement permise quand le distillateur est vide.</b></p>	SN 708077
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<p><b>21 kg /46 lbs</b> <b>Zulässige Füllmenge</b></p> <p><b>Max. filling capacity</b></p> <p><b>Capacité admissible</b></p> <p>SN 800195</p>	<p><b>26 kg /57 lbs</b> <b>Zulässige Füllmenge</b></p> <p><b>Max. filling capacity</b></p> <p><b>Capacité admissible</b></p> <p>SN 800196</p>
<p><b>30 kg /66 lbs</b> <b>Zulässige Füllmenge</b></p> <p><b>Max. filling capacity</b></p> <p><b>Capacité admissible</b></p> <p>SN 800197</p>	

### For cleaning machines that operate with combustible solvent

#### Hazardous to humans and the environment:

- Risk of fire or explosion if any contact with open flames, embers or sparks
- Damages the skin, risk of eczema formation
- Serious damage to the lungs is likely if vapor is inhaled

#### Safety precautions:



- No source of fire near the solvent, absolutely no smoking
- Avoid skin contact, use protective gloves if possible
- No direct contact with the solvent



- Use protective skin cream regularly
- **Do not eat or drink in the work area**

#### What to do in case of fire:

- In case of fire, extinguish with a carbon dioxide or foam fire extinguisher
- If you spill solvent, use a suitable bonding agent

#### First aid:

- Immediately remove clothing that is wet with solvent
- If you have inhaled concentrated vapor, go out into the fresh air immediately
- If you get solvent in your eyes, rinse them with water and contact a physician immediately

#### Disposal:

When stored, the solvent must be kept in closed containers and must be disposed of by experts only.



**BÖWE Textile Cleaning GmbH**  
**Dr.-Georg-Schaeffler-Strasse 22, D-77815 Bühl**  
**Telefon (07223) 80103-0, Telefax (07223) 80103-29**  
**Phone: ++49-7223-80103-0, Fax: ++49-7223-80103-29**  
**email: [service@boewe-tc.de](mailto:service@boewe-tc.de)**