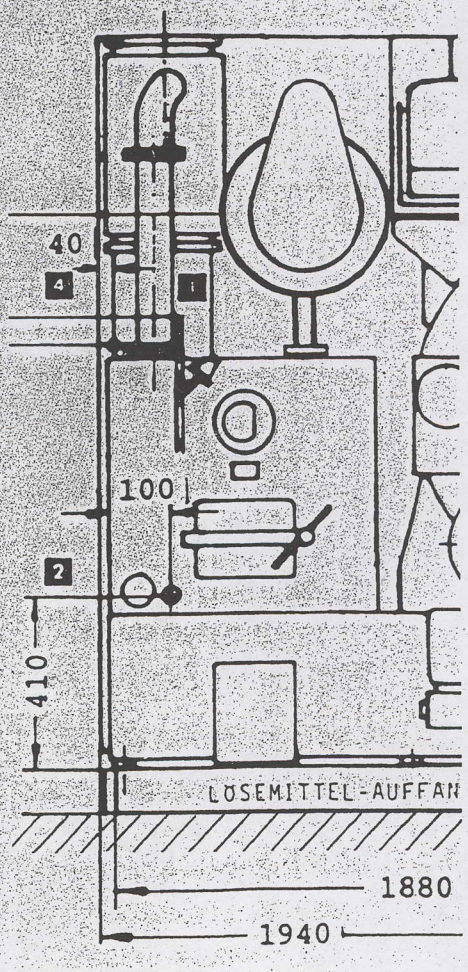
BÖWE
PASSAT

# Installation Instructions




# P 532

THE FIFTH GENERATION

IA. P 532 /12.94 /300 /E IV

Dear Customer,

It gives us great pleasure to supply you with your 5th generation **BÖWE-PASSAT** machine. In designing and building it we have attached great importance to quality. It is up to the latest level of research and technology, particularly concerning environmental protection.

Please do not put this installation instruction aside unread!

This instruction contains important information on operational details of your drycleaning machine.

If specified measurement and installation information are disregarded, we cannot meet the warranty obligations contained in our General Terms of Delivery.

Measurements and other values are as at printing date.

We reserve the right to make technical changes without prior notice in the interest of further development or required constructional modifications.



**BÖWE-PASSAT**
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# ÖWE-PASSAT P 532

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# BÖWE-PASSAT P 532

Contents

# . GENERAL INFORMATION

## Technical literature

We make reference to the publications and leaflets by the trade and professional associations as well as research institutes.

## Laws and regulations

All regulations concerning the industry, particularly with regard to proper handling of halogen hydrocarbons, have to be met absolutely in order to avoid health risks and environmental damage.

In any case please observe applicable laws and regulations in your country.

Applied Standards and Regulations:

- VBG 66 - Safety Regulations for Drycleaning Equipment
- VBG 20 - Safety Regulations for Refrigeration Equipment
  - Heatpumps and Refrigeration Plants
- VDE 0100 - Requirements for High Tension up to 1000 V
- Pressure Vessel Regulations
- CFC - Halon Prohibition Decree

The following applies to the Federal Republic of Germany:

- 2nd Federal Emission Protection Law (2. BImSchV)
- Water conservation Law (WHG § 19)
- Disposal law
- Technical rules for dangerous substances (TRGS 402)
- VDI guide lines
- DIN standards
- VDE regulations

## Repair work

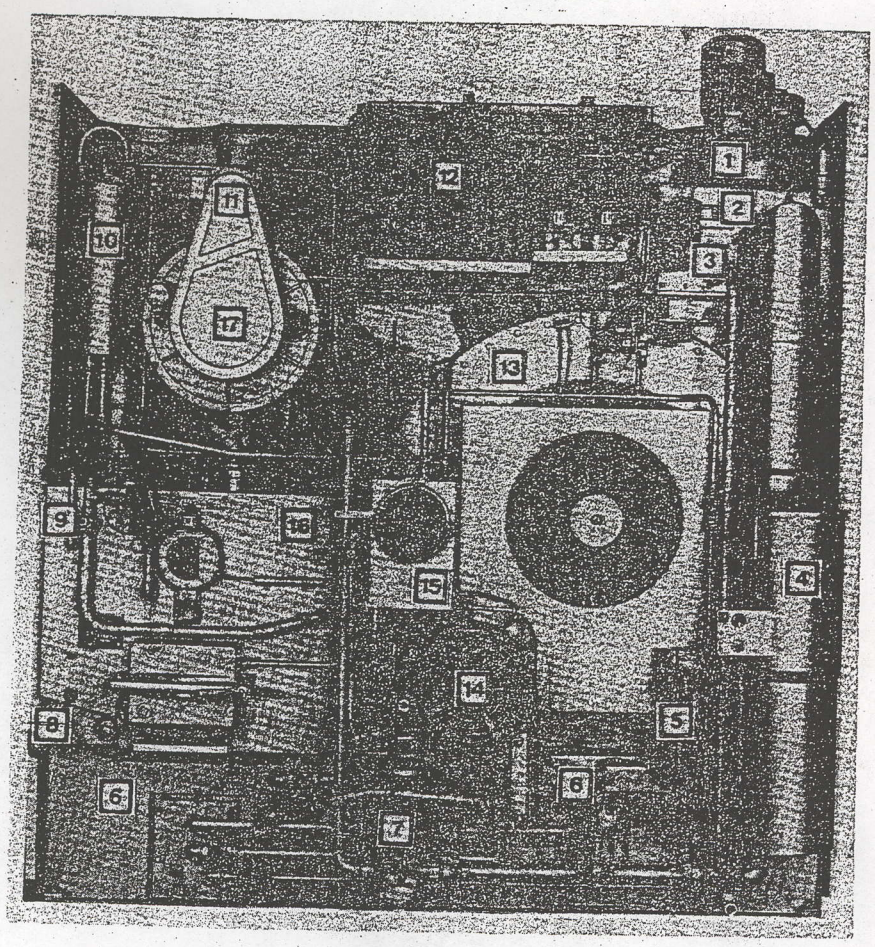
Please consult the BÖWE-PASSAT customer service organization for all maintenance and repair work as well as operating safety aspects of this high-quality drycleaning machine.
If necessary, the BÖWE-PASSAT customer service organization will use original spare parts.

## Safety

Safety devices may not be bypassed, switched off or otherwise be made inoperative. In case of repair work please observe applicable industrial safety rules.

Disposal of still residues, processing water, lint etc. must be carried out properly.

# 2. Machine rear



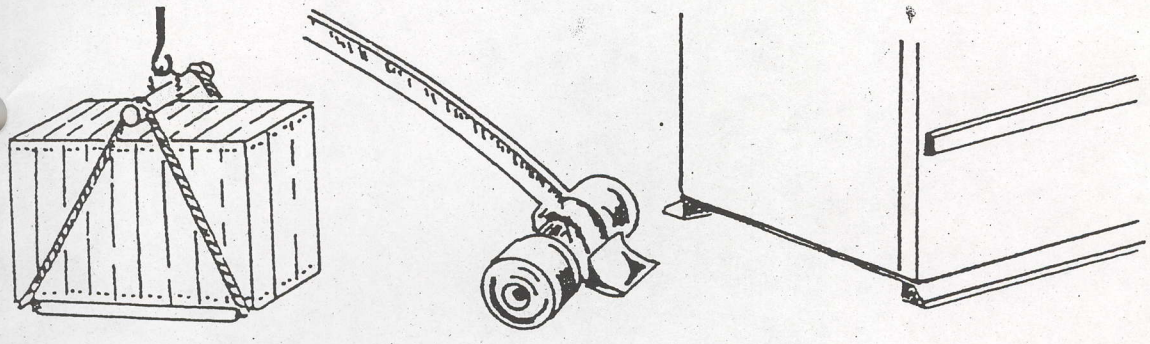

| | | | |
|---|---|---|---|
| 1 | Fan | 9 | Dosing pump anti-foam or neutralizing agent |
| 2 | Recovery section | 10 | Condenser |
| 3 | Air heater | 11 | Filter drive |
| 4 | Lint filter/button trap | 12 | Refrigeration unit |
| 5 | Dosing unit | 13 | Cage housing with cage |
| 6 | Tank (2 x) | 14 | Cage drive |
| 7 | Pump | 15 | Water separator |
| 8 | Still heating | 16 | Still |
| | | 17 | Filter |

# . Transportation

For proper transportation, installation and connection it is recommended to consult the appropriate experts.

For unloading transportation, machine entry and installation it is necessary to use suitable tools and devices such as a crane, forklift, elevating truck, bottle lift, ropes, winch, crowbars, rollers, wooden blocks, wedges.

Transportation equipment for entering the machine can be leased from BÖWE-PASSAT.



## I Entry

Normally the machine is transported and entered in upright position in a wooden crate or box.

| Packing dimensions | | Machine | CONSORBA |
|---|---|---|---|
| Width | mm | 2,300 | 900 |
| Depth | mm | 1,500 | 1,350 |
| Height | mm | 2,390 | 2,330 |

There are alternatives if the entry is too small:

Normal dimensions after unpacking

| | | | |
|---|---|---|---|
| Depth | mm | 1,290 | 1,145 |
| Height | mm | 2,340 | 2,130 |

Disassembly I: Fan

| | | |
|---|---|---|
| Depth | mm | 1,290 |
| Height | mm | 2,165 |

Disassembly II: Loading door /button trap /antifoam dosing pump /main switch / pump and pipes to button trap

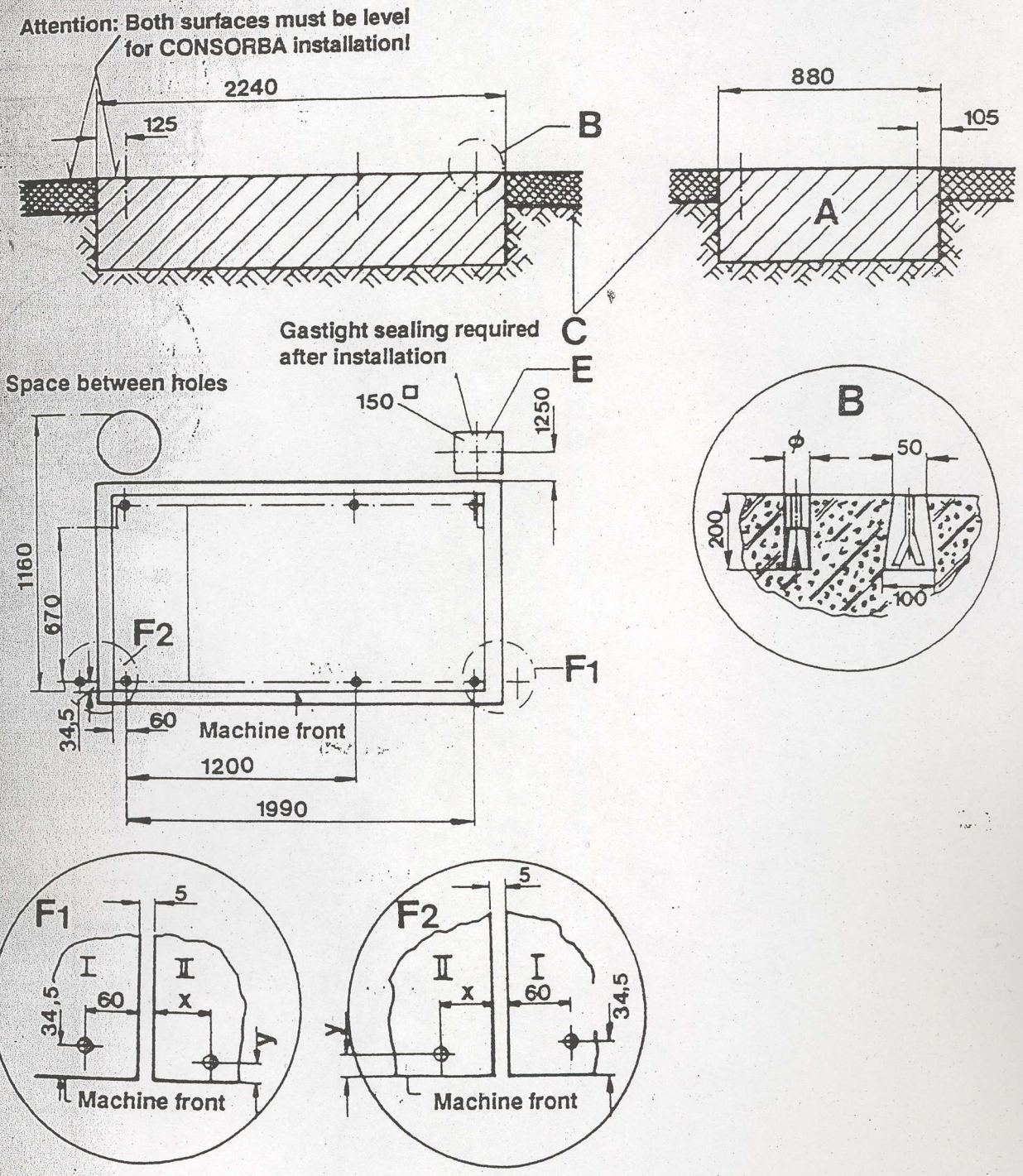
| | | |
|---|---|---|
| Depth | mm | 1,100 |
| Height | mm | 2,165 |

Disassembly III: Disassembly II and control box cover /door locking /frame loading door / tank and front panelling /refrigeration unit /ECO-filter /drive motor /still rake-out door

| | | |
|---|---|---|
| Depth | mm | 970 |
| Height | mm | 2,165 |

# 4. Foundation

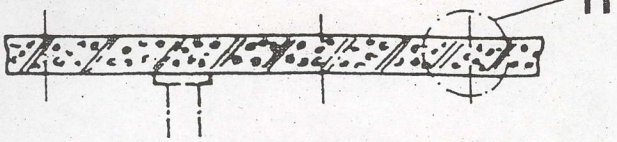
## 4.1 Foundation measurements



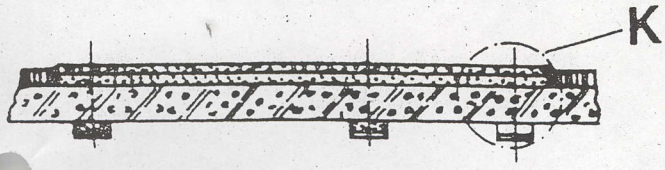

| | |
|---|---|
| Reinforced concrete: for normal floors at least 300 mm deep | A |
| Hole for stone bolt or expanding anchor depending on make | B |
| Room floor - concrete slab | C |
| (If necessary) ceiling breakthrough for supply lines | E |
| Distance from P 532 to nearest machine (outside edge of machine panelling) | F |

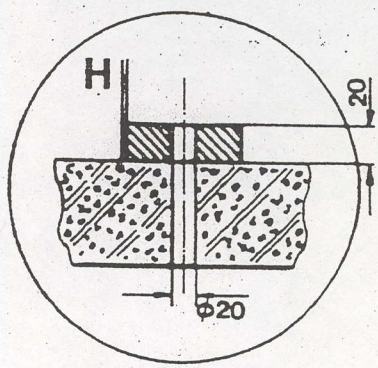
# 4. Foundation

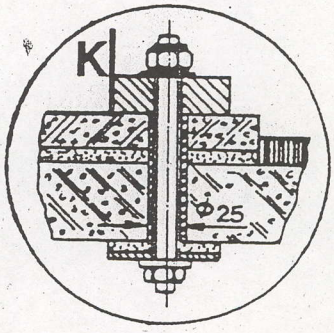
Installation over ceilings




Installation over ceilings with sound insulation




Ceiling borehole (20 mm ø) for through-bolts, length depending on thickness of ceiling.
Support if necessary. **H**

Machine on reinforced concrete slab 100 - 200 mm and pressed foundation cork 12 - 15 mm with 1 - 3 kp/cm$^2$.
Below the ceiling pressed cork and steel plate 10 mm.
Ceiling borehole 25 mm diameter (if necessary PVC hose inset). **K**

## .2 Anchoring

Correct anchoring is very important for low-noise, fault-free operation. For installation on foundation it is preferable to use stone bolts!

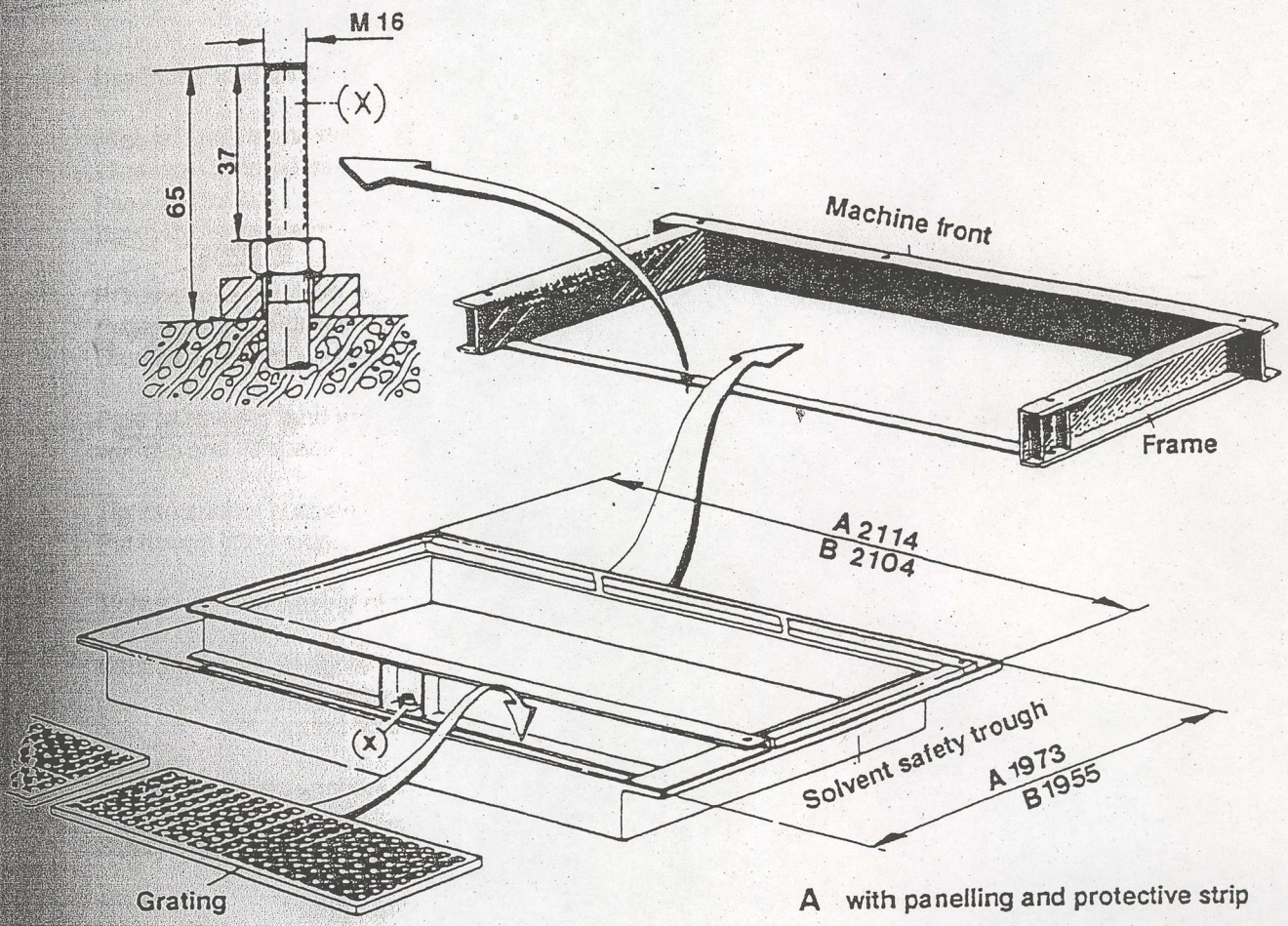
Seating must be horizontal and level. Do not place machine directly on tiles, felt, bituminous coatings, rubber or cork.

With uneven concrete floors it is necessary to level the machine or trough frame with wedges and fill the spaces with cement.

## .3 Noise or vibration insulation

For special vibration insulation special foundations, dampers etc. can be used in collaboration with building and insulation specialists.

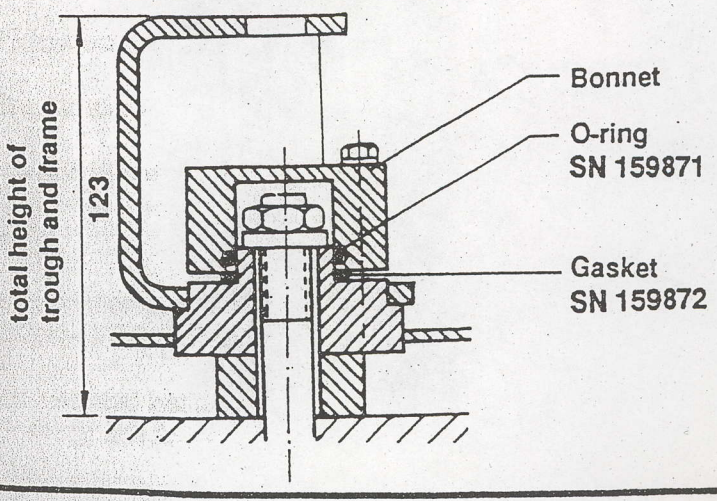
# 5. Solvent safety trough




A with panelling and protective strip

B without panelling and protective strip

(X) Screw with seal bonnet

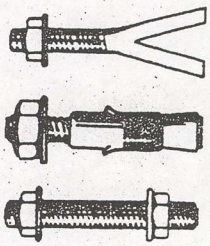


# 5. Solvent safety trough

## 5.1 First installation of trough

Trough anchoring:

There are 3 alternative anchoring methods:



- Stone bolts for cementing in
  (use preferably; length 250 mm)

- Safety expanding anchors
  for inserting in bored holes

- Threaded rods
  for through-holes in case of installation over ceilings

Thread for all anchoring methods: M 16

## 5.2 Cemented-in stone bolts

Work sequences:

Separate trough from frame, insert stone bolts into frame holes with plain washers, spring washers and nuts.

Stone bolt with seal bonnet (X) must project 65 mm over concrete (please see page 9 for details).

Level the frame (watch the front). If floor is uneven, level frame with wedges and fill spaces with cement.

Fill anchoring holes with quick-taking cement.

After cementation tighten nuts evenly. Remove stone bolt nut (X).

Unscrew brass seal bonnet from trough, do not damage the gasket.

Put trough into frame.

Tighten nut and washer of the stone bolt (X).

## 5.3 Safety expanding anchors

Work sequences:

Separate frame from trough.

Install frame at intended location.
Caution: Please watch the front (see drawing on page 9).

# 5. Solvent safety trough

Use frame as drilling template.

Pilot-drill with stone drill 16 mm.
Minimum drilling depth 130 mm.
Remove frame.
Using the template drill 130 mm deep with 25 mm stone drill.

Remove nuts and washers of expanding anchors.
Put anchors into drilled holes.
Caution: Long expanding anchor into bore (X) screw with seal bonnet.

Put the frame on and level. If floor is uneven, level with wedges and fill spaces with cement.

Tighten anchor nuts evenly.
Put trough into frame.

Tighten nut and washer of screw with seal bonnet (X).

Caution: In tightened condition the threaded bolt may not project more than a maximum of 5 mm over the nut (grind off if longer).

Safety expanding anchors can be obtained from BÖWE-PASSAT.

Safety expanding anchor (component) SN 155919, consisting of:

1 long SN 149466
5 short SN 149469

## 5.4 Threaded rods (bored-through ceiling)

Work sequences:

Separate frame from trough.

Install frame in intended location.

Caution: Please watch front side (see drawing on page 9).

Use frame as drilling template.

Pilot-drill with stone drill 16 mm.

Remove frame.

In case of normal installation over a ceiling drill 20 mm deep with stone drill (see foundation drawing).

In case of vibration-insulated installation over a ceiling (see foundation drawing) drill 25 mm deep with stone drill.

# 5. Solvent safety trough

The frame must be completely level on the floor.
If not, level with wedges and fill spaces with cement.

With both floor installations (normal and vibration-insulated), the screw with seal bonnet (X) must freely project 65 mm.

# 6. Installation

## 6.1 Surrounding conditions

### 6.1.1 Regulations

Applicable regulations for room ventilation and size, odour and noise emissions, accident prevention etc. must be met. The control box contains contacts to control the room air (see page 23).

Noise level at a distance 1 m from the machine and 1.60 m above ground:

| | |
|---|---|
| without CONSORBA | 66 dB (A) |
| with CONSORBA | 69 dB (A) |

### 6.1.2 Temperature

Machine should not be exposed to direct sunlight. Adequate air supply is to be ensured due to heat exchange (heat build-up!) Room temperature should not drop below 1 °C owing to the risk of water in the system freezing, and not exceed 40 °C in continuous operation owing to increased solvent consumption.

Heat radiation:

| | |
|---|---|
| without CONSORBA | 12,000 kJ |
| with CONSORBA | 12,500 kJ |

### 6.1.3 Structural surroundings

Partitions, screens, intermediate ceilings and similar near the machine are to be fitted in such a way that they do not hinder operation and are easily and quickly removed for maintenance and repair.

**NOTE!**

Do not operate appliances with open flames, e.g. gas-fired flatwork ironers, tumblers, in the same room, because they can be damaged by noxious, corrosive gases in the event of solvent decomposition.

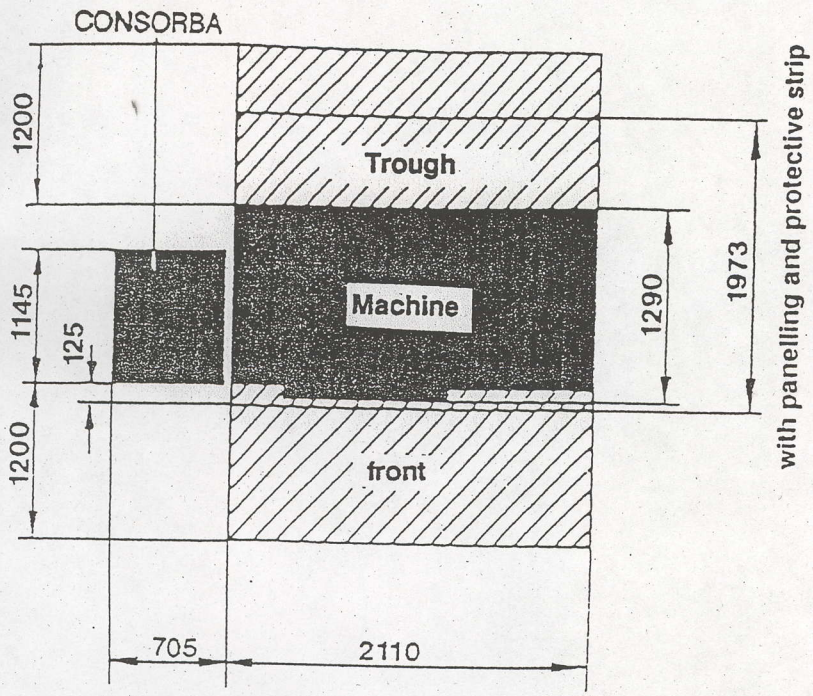
Please ensure that no air from the machine can escape into a possibly existing heating plant room.

# 6. Installation

## 6.2 Place of installation

### 6.2.1 Required space

Front and rear of the machine should be accessible for operation, maintenance and repair.




### 6.2.2 Machine dimensions

| | | without CONSORBA | with CONSORBA |
|---|---|---|---|
| Width | mm | 2,110 | 2,815 |
| Depth | mm | 1,290 | 1,290 |
| Height | mm | 2,340 | 2,340 |

### 6.2.3 Floor load

The place of installation must conform to the floor load which is composed of:

- static load = machine weight + max. solvent filling and
- dynamic load = centrifugal cage force with normally distributed, extraction-damp garments.

The force created during extraction must also be taken into account (floor, supporting walls etc.). Resonances are not permissible.

**Please consult building specialists.**

# 6. Installation

## 6.3 Floor load data

### 6.3.1 Dimensions

| | | without CONSORBA |
|---|---|---|
| Width | mm | 2,050 |
| Depth | mm | 710 |
| Floor surface | $m^2$ | 1.5 |
| Weight without solvent | kg | 1,380 |
| Weight with solvent (stat. load) | kg | 1,850 |
| Centrifugal cage force (dyn. load) | N | 7,000 |
| Floor load (stat. + dyn. load) | | |
| - Standard drive | $N/m^2$ | 17,280 |

Regarding the foundation work please consult building experts. They will take machine-related as well as local particulars into account and find the best solution.

Please use a load dispatcher frame if the permissible floor load is inadequate. We also recommend to install a solvent safety trough (a must in Germany). Please see page 9.

### 6.3.2 Anchoring methods

- For installation over ceilings.
  Through-bolts (threaded rod)
  with washers and nuts M 16
- For installation on foundation.
  Stone bolts for cementing in recessed
  or opened holes.

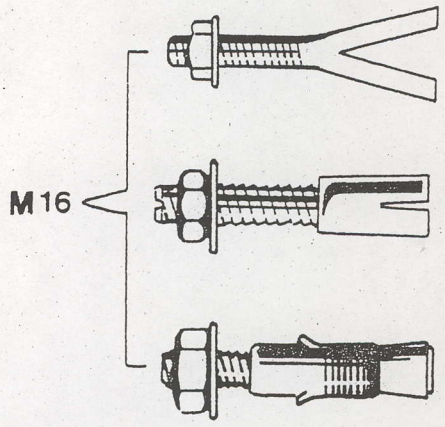
or

Heavy-load plugs with threaded rod

or

Safety expanding anchors for inserting
in bored holes.

We will not be liable for any damage caused by disregard for our recommendations and information.




**NOTE:**

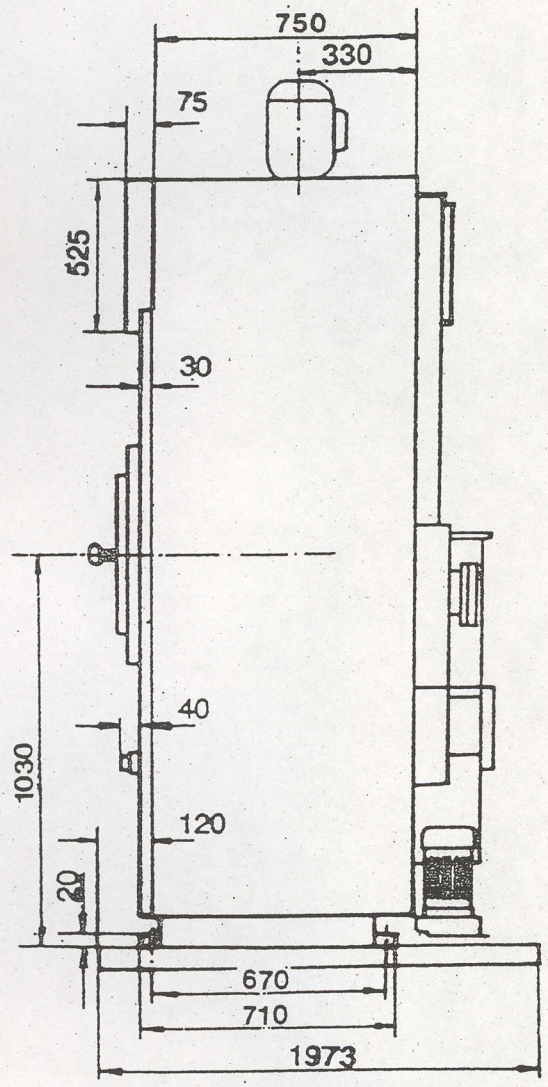
The CONSORBA does not need a foundation and has no influence on the machine foundation.

## 6.4 Machine installation

Work sequences:
Using rollers and other tools bring machine 10 mm over the trough. It is preferable to push the machine on to the trough from the narrow side. If the machine has to be pushed on from the front, BÖWE supports SN 139516 are available. For mounting instructions please see the label on the supports.
Screw machine to frame by means of hexagon screws M 16 (included in delivery).
Retighten foundation screw nut with seal bonnet (X).
Put on copper gasket according to drawing.
Screw on seal bonnet and tighten.
Insert gratings.

# 7. Connection

## 7.1 Machine dimensions specification




Trough with panelling and protective strip

# 7. Connection

## 7.1.1 Machine dimensions specification with "Piggy-back" CONSORBA

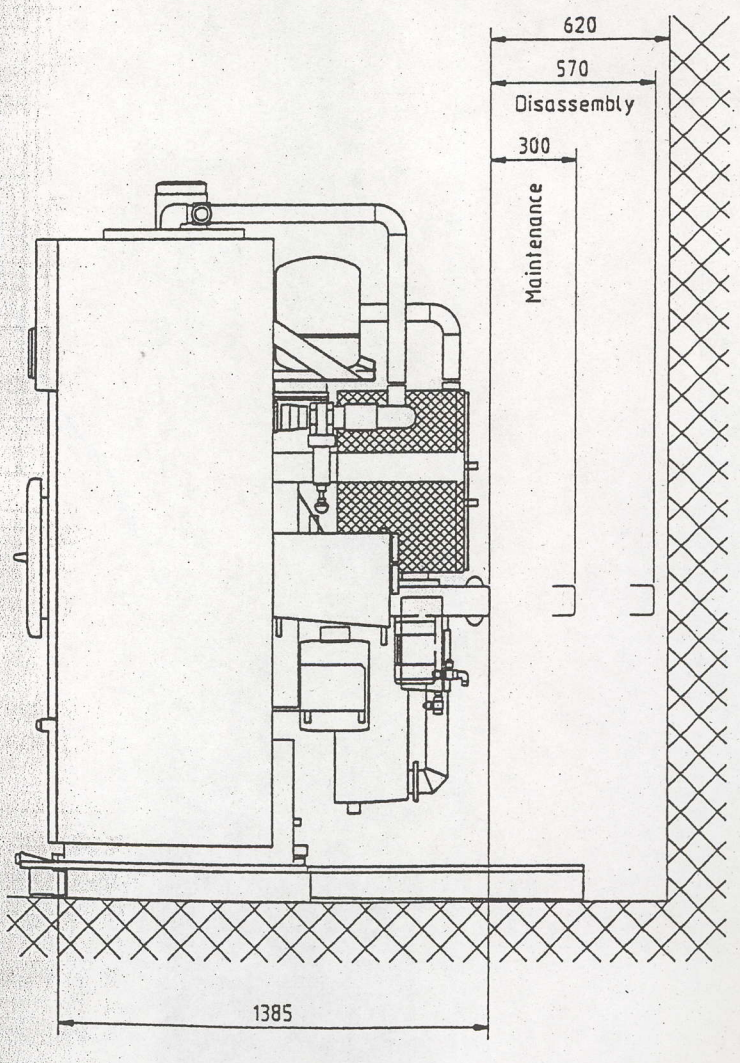
The "Piggy-back" CONSORBA must be rigidly connected to the rear of the machine.

During installation care must be taken that sufficient space for maintenance work is left at the rear of the machine.

With steam heated machines, the connections for steam and condensate must be positioned so that the "Piggy-back" CONSORBA can be drawn out to the rear for maintenance work after disconnection.

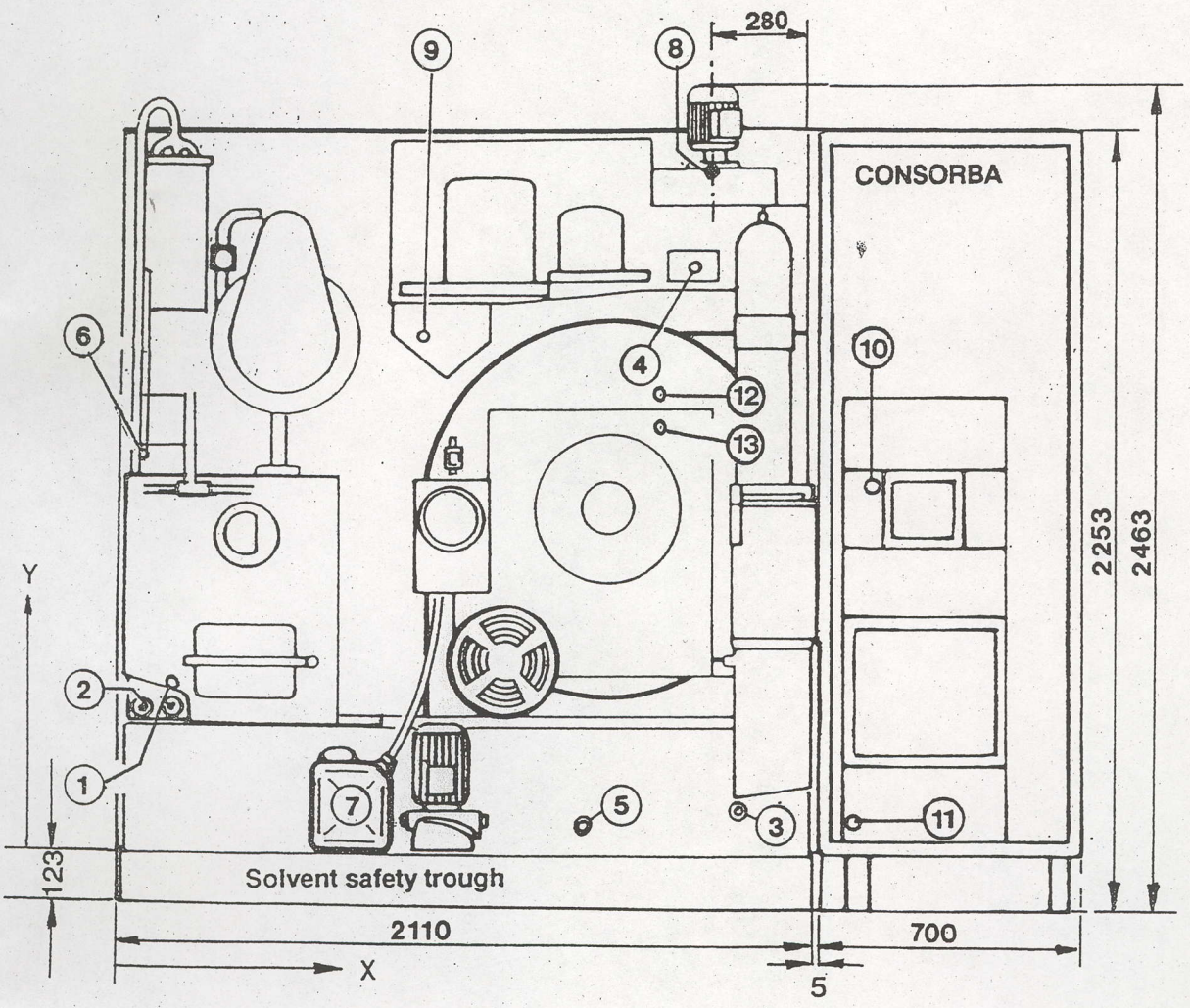
The special carbon is supplied packed in a separate bag along with the machine. The "Piggy-back" CONSORBA is then filled with the special carbon at time of installation. The cover has to be removed to fill it.

Caution: When reassembling, check that the cover is evenly and firmly closed!



# 7. Connection

## 7.2 Machine connections specification




We reserve the right to change measurements!

| Pos. | Medium | NS mm | Zoll inch | - X - mm | - Y - mm |
|---|---|---|---|---|---|
| 1 | Steam/Still | 15 | 1/2 | 130 | 470 |
| 2 | Condensate/still | 15 | 1/2 | 50 | 430 |
| 3 | Condensate/heater | 15 | 1/2 | 1,830 | 90 |
| 4 | Steam/heater | 15 | 1/2 | 1,660 | 1,720 |
| 5 | Cooling water inlet | 15 | 1/2 | 1,390 | 100 |
| 6 | Cooling water drain | 20 | 3/4 | 50 | 1,120 |
| 7 | Processing water collecting container | | | | |
| 8 | Compressed air | 8 | 1/4 | 1,828 | 2,060 |
| 9 | Elec. connection | | | 865 | 1,625 |
| 10 | Steam CONSORBA | 15 | 1/2 | 50 | 1,050 |
| 11 | Condensate CONSORBA | 15 | 1/2 | 20 | 90 |
| 12 | Steam "Piggy-back" CONSORBA | 15 | 1/2 | 1,570 | 1,600 |
| 13 | Condensate "Piggy-back" CONSORBA | 15 | 1/2 | 1,570 | 1,250 |

# 7. Connection

## 7.3 Piping

Connect the supply and drain pipes (supplied by customer) in accordance with the installation details. Steam, compressed air and water must receive stop valves. Water connection must be according to DIN 1988. To avoid sound conduction through walls, an intermediate piece - made of flexible metal hose - can be connected and the pipe supports insulated.

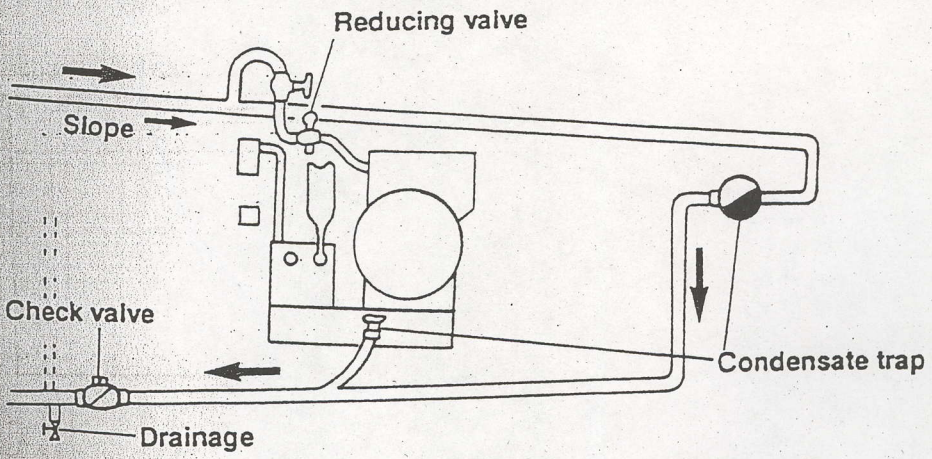
### 7.3.1 Steam

Installation and connection should be insulated.
Avoid the use of asbestos!

Operating pressure 4 - 5 bar saturated steam.
At a pre-pressure of more than 5 bar a reducing valve with pressure gauge must be installed and set so that the admissible max. perc temperature of 150 °C (please measure!) is not exceeded. (Danger of solvent decomposition and machine damage!)

**Steam peak demand** (steam generator size)

| | | |
|---|---|---|
| without CONSORBA | kg/min | 0.8 |
| with CONSORBA | kg/min | 1.05 |




### 7.3.2 Condensate

Install insulated condensation line with a slope, away from machine.
In case of an ascending slope check valve and drainage must be at the lowest point.

Important: Condensate counter pressure must be at least 1.5 bar below the steam inlet pressure.

### 7.3.3 Cooling water supply

Fit the line to the machine without reduction of cross section and if possible without bends. The heat balance of the machine is optimally set to 12 °C cooling water inlet temperature and a uniform pressure of 2 - 4 bar.

**Cooling water peak demand** 4 bar (12 °C)

| | | |
|---|---|---|
| without CONSORBA | l/min | 10.0 |
| with CONSORBA | l/min | 12.0 |

# Connection

For safety reasons a water flowback stop and venting device should be installed.

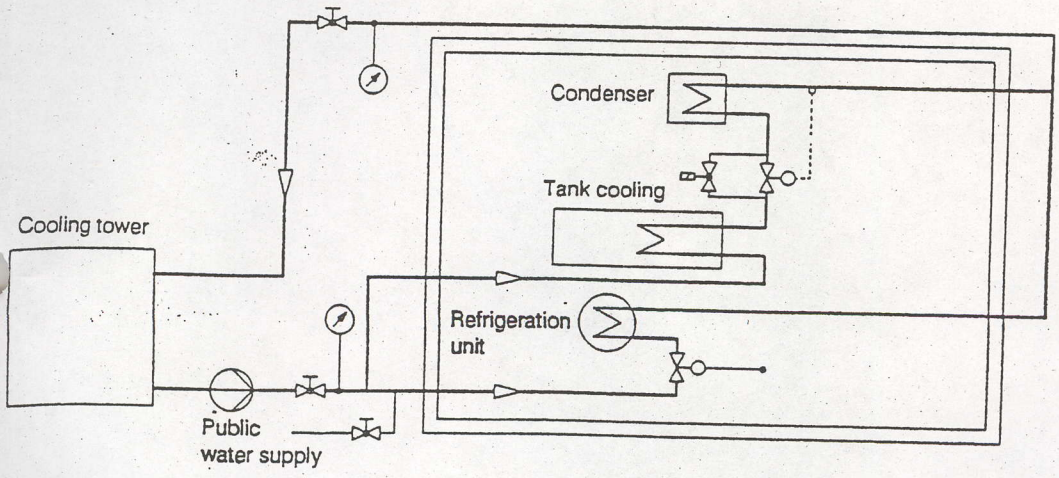
**Cooling tower operation:**

With a pressure drop in the cooling water supply or higher cooling water temperatures (e.g. re-chilling operation), the supply line must be at least one nominal size larger. Inlet temperatures should not exceed 22 °C as otherwise stains would be caused on the garments, solvent consumption would increase and the drying time would be longer.
Water pressure must be adapted to the higher inlet temperature up to double the max. requirement.

With re-chilling the correct installation is especially important. Among other things, the following must be taken into account: cooler performance, switch-over to public city water supply network, low temperature storage, pump size, cooling water valve by-pass.

Cooling water valve for distillation should be removed.

Cooling water valve for refrigeration unit should be exchanged against another with the next larger nominal width. Cooling water should come from the public city water supply network.




Data for temperatures up to 22 °C:

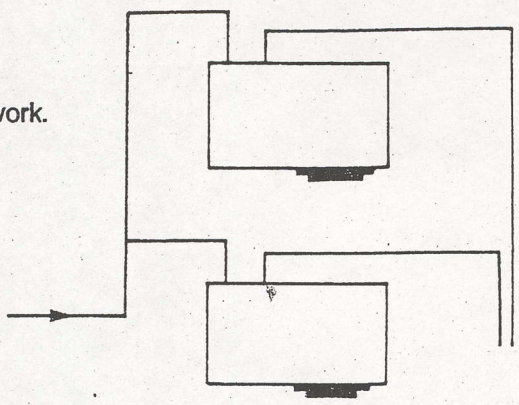
| Min. nominal width | NS | 25 / 1" |
|---|---|---|
| Pump throughput | $m^3/h$ | 1.0 |
| Pump pressure | bar | 4 - 6 |
| Heat to be eliminated: | | |
| without CONSORBA | kJ/h | 35,000 |
| with CONSORBA | kJ/h | 36,000 |

See also the special installation and instruction manual for the re-chiller.

# 7. Connection

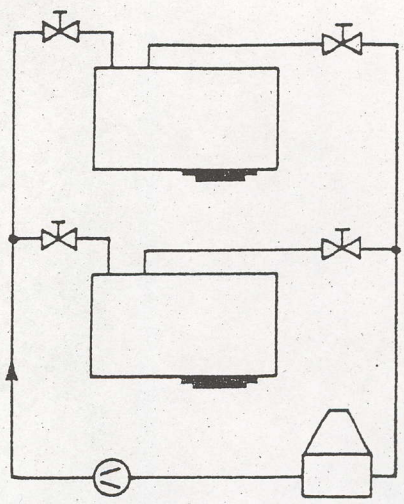
Installation examples for cooling water supply:

Connection for city water supply network.



Cooling water drains must be separate.

Connection with water recirculation (package chiller or cooling tower):



When supply and drain lines are fitted with hand valves, both valves must be opened before starting the machine, so that cooling is ensured and the sensor in the condensate drain line of the still responds in case of cooling water shortage.

### 7.3.4 Cooling water drain

Cooling water leaving the machine can be passed to the drains, re-used or re-chilled as it flows in closed circuit within the machine.

Cooling water re-use is preferable.

# 7. Connection

## 3.5 Processing water

The processing water collecting container must be drained every day. Purify by means of processing water purification system.

## 3.6 Compressed air

Air pressure should be at least 6.0 bar. The machine is equipped with a compressed air reducing valve, pressure gauge and compressed air water separator.

## 3.7 Electric connection

Note mains voltage (data-plate). Make connections L1/L2/L3, establish neutral and protective conductor with corresponding cross-section and fusing. Pass cable through existing PG union into the control box and connect at terminal.

| P 532 without CONSORBA | | P 532 da | P 532 el HR | P 532 el |
|---|---|---|---|---|
| | Operating load kW | 6.6 | 18.6 | 20.6 |
| 230 V | Nominal current A | 41.3 | -- | -- |
| | Fuse A | 50 | -- | -- |
| 400 V | Nominal current A | 25.5 | 42.8 | 45.7 |
| | Fuse A | 35 | 50 | 50 |

| P 532 with CONSORBA | | P 532 da | P 532 el HR | P 532 el |
|---|---|---|---|---|
| | Operating load kW | 7.7 | 24.7 | 26.7 |
| 230 V | Nominal current A | 46.8 | -- | -- |
| | Fuse A | 50 | -- | -- |
| 400 V | Nominal current A | 28.7 | 53.2 | 56.1 |
| | Fuse A | 35 | 63 | 63 |

HR = Heat recycling system

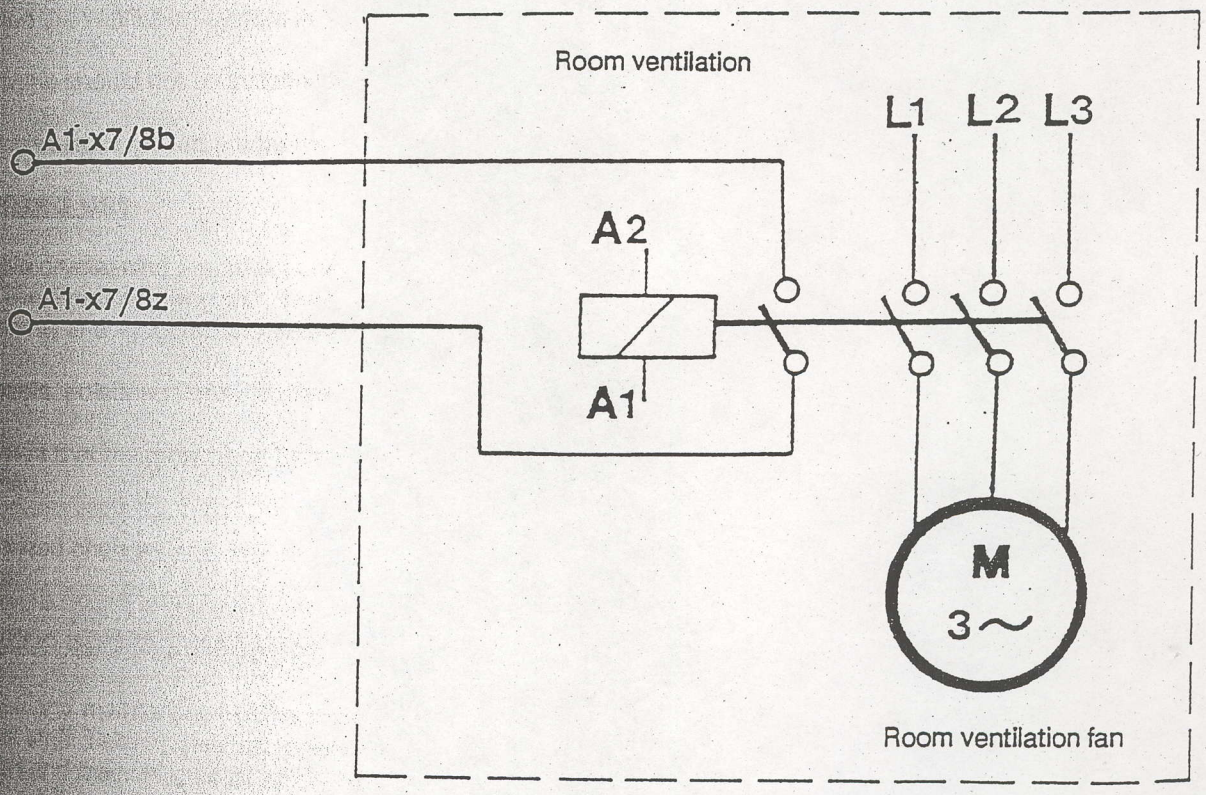
# 7. Connection

## 7.3.8 Actuation of room ventilation

Regulations permit to couple the machine's automatic controls to a room ventilation fan. The machine cannot be started before room ventilation has been switched on.

Room air intake inlet 71 (in 71)
A1-x7/8b
A1-x7/8z

The contacts are connected with the fan controls.



# Safety hints

Each person who is in charge of installing, commissioning, operating, servicing or repairing of the textile drycleaning machine, must have read and understood the operating and installation manual. We explicitly refer to the observance of the respective laws and regulations of the countries in question.

The drycleaning machine was built according to the latest state of engineering and may only be assembled, installed, operated, served and repaired by persons familiar with the machine and informed about possible dangers. The relevant safety regulations as well as other safety and industrial medicine rules are to be strictly obeyed.

## Installation and commissioning

When installing the drycleaning machine the installation instructions should be obeyed. A sufficient room ventilation system must be available. It must be ascertained that the drycleaning machine can be turned on only, when the ventilation system is in operation.

The machine should not be installed in rooms with danger of explosion or in rooms with gas heated machines.

The first start-up is carried out by the service department of the BÖWE-PASSAT Organization.

## Authorized use

This textile drycleaning machine is exclusively designed for operation with Perchloroethylene (Tetrachlorethen $C_2Cl_4$). The direct handling with these solvents should be reduced to absolutely necessary work, whereby safety gloves and -goggles should be worn.

Inflammable, poisonous or radiactive textiles should not be treated.

It is relevant that the prescribed BÖWE-PASSAT operating, service and maintenance regulations are maintained.

Unauthorized changes and alterations of the equipment exclude liability of the manufacturer from resulting damages.

## Operation and Maintenance

Operation and maintenance of the BÖWE-textile drycleaning machine is reserved for qualified and trained specialist staff. Take system into operation only after all safety devices are installed and in function. During operation and maintenance all safety regulations are to be obeyed.

Check machine daily for operational safety before turning on (for leakages) and control feed readings. Dispose of lint and distillation residue according to the operating manual.

Do not carry out any maintenance work while machine is running. Please pay attention to the recommended quality of solvents, lubricants, and additives!

## Repairs

Repairs may only be carried out by skilled workers with tools and protection of labour that is destined for it. Avoid solvent emissions.

When carrying out repairs and cleaning work always turn off main switch and protect equipment from being turned on unauthorized. (Sign: Don't turn on - Repair Work!). When work is being done on the electrical system always remove the master fuse.

Only use original fuses when exchanging defective ones. Work carried out on pneumatic control parts has to be done without pressure, Check compressed air indicator for pressure. Repairs on the refrigerating aggregate may only be done by a refrigeration engineer specially trained for this.

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

## Setting machine out of operation and disassembly

Setting machine out of operation and disassembly is only reserved for qualified and trained specialists, with tools and protection of labour that is destined for it.

Setting machine out of operation and disassembly solvent must be completely drained off from the machine including pipes and armatures. Residues which can produce work shop or environmental handicaps must be removed.

Machine pipes and electric wires for providing and waste disposal must be separated from network and must be guard against incompetent turn on.

Cooling solvent from refrigeration unit must be removed by trained service people.

## Safety symbol 

This safety symbol is used to mark particularly important points which refer to working safety. It points out dangers and serves to protect personnel from physical injures and death.

All the valid legislation and regulations must be observed since the notes concerning working safety only indicate particularly dangerous points.

## Safety instructions

The BÖWE-PASSAT textile cleaning machine uses perchloroethylene. This solvent is harmful to the health and is slightly toxic in the sense of the Hazardous Substances Ordinance.

- No eating, drinking or keeping food in the area where the machine is installed.
- No open flames or fire in the machine room. No smoking.
- The steam generators are to be installed in such a way that no air containing solvents is drawn in by them.
- When the machine is started for the first time the operating personnel is to be trained by BÖWE-PASSAT service personnel in how to operate the machine and are also to be made aware of how to operate the machine safely and the possible dangers.
- The operator is obliged to use trained personnel for loading and unloading the machine, and skilled and trained personnel for maintenance work. Unauthorised personnel must not be allowed to approach the machine.
- The daily checks prescribed in the operating instruction manual are minimum requirements. Any changes which occur on the machine which affect its safety are to be reported immediately by the operating personnel.
- The operator is obliged
  - to draw up clear regulations and responsibilities for operation and maintenance.
  - to ensure that machines are only operated if they are in perfect condition.
  - and to ensure that the area around the machine is tidy, safe and clean by means of inspections and instructions.
- The operator is obliged not to operate the machine in any way which may place the health of the personnel, the environment and the safety of the machine at risk.
- Notice and warning plates are to be affixed on the machine and in the room such that they are clearly visible. Damaged or removed plates are to be replaced immediately. The safety instructions are to be followed at all times.
- In the event of danger of any kind, the machine is to be shut down immediately by turning it off at the main switch.

In the event of a solvent leak:

- Evacuate all the personnel immediately into the open air.
- Remedy the cause of the leak.
- Change any clothing soaked with perchloroethylene.
- Request BÖWE-PASSAT service personnel if necessary.

The proper handling of perchloroethylene is an important prerequisite for safety whilst working with the machine.

The following potential dangers are to be noted:

- Perchloroethylene is a very good grease remover, it removes all the fats from unprotected skin.

  Protection: Wear solvent-resistant gloves, apply fatty cream to the hands.

- Liquid perchloroethylene irritates the eyes very badly.

  Protection: Wear goggles.

- Inhaling perchloroethylene vapours reduces alcohol tolerance.

  Protection: Do not consume alcohol at work or shortly afterwards.

- Perchloroethylene decomposes in open flames or on glowing parts.

  Protection: No smoking.

- Perchloroethylene vapours irritate the mucous membranes in the respiratory passages and eyes.

  Protection: Prevent the escape of vapours, wear breathing apparatus when completing major maintenance work.

  Caution: It is possible to smell perchloroethylene (odour threshold) as from approx. 5 $ml/m^3$ of air. The maximum workplace concentration is 50 $ml/m^3$ - 345 $mg/m^3$.

Perchloroethylene has a similar effect on the central nervous system as an anaesthetic, it may cause unconsciousness and, in very high concentrations, cause death.

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